**African Surgical Outcomes Study in Paediatrics (ASOS-Paeds) definitions**

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# **Definitions for preoperative and surgical data**

## **Date of first presentation**

This is the date the patient first presented to a healthcare facility for the condition or problem which the surgery is for.

## **Healthcare facility of first presentation**

This is the hospital or clinic where the patient first presented for the condition or problem which has resulted in them having surgery.

## **Home town**

The village, city, or town nearest to where the patient lives.

## **American Society of Anesthesiologists (ASA) physical status score**

|  |  |  |
| --- | --- | --- |
|  |  | Paediatric examples including but not limited to: |
| ASA I | A normal healthy patient | Healthy (no acute or chronic disease), normal BMI percentile for age |
| ASA II | A patient with mild systemic disease which does not limit physical activity | Asymptomatic congenital cardiac disease, well controlled dysrhythmias, asthma without exacerbation, well controlled epilepsy, non-insulin dependent diabetes mellitus, abnormal BMI percentile for age, mild/moderate OSA, oncologic state in remission, autism with mild limitations |
| ASA III | A patient with severe systemic disease which limits physical activity | Uncorrected stable congenital cardiac abnormality, asthma with exacerbation, poorly controlled epilepsy, insulin dependent diabetes mellitus, morbid obesity, malnutrition, severe OSA, oncologic state, renal failure, muscular dystrophy, cystic fibrosis, history of organ transplantation, brain/spinal cord malformation, symptomatic hydrocephalus, premature infant PCA <60 weeks, autism with severe limitations, metabolic disease, difficult airway, long term parenteral nutrition. Full term infants <6 weeks of age. |
| ASA IV | A patient with severe systemic disease that is a constant threat to life | Symptomatic congenital cardiac abnormality, congestive heart failure, active sequelae of prematurity, acute hypoxic-ischemic encephalopathy, shock, sepsis, disseminated intravascular coagulation, automatic implantable cardioverter-defibrillator, ventilator dependence, endocrinopathy, severe trauma, severe respiratory distress, advanced oncologic state.  |
| ASA V | A patient who is not expected to survive for 24 hours without the operation | Massive trauma, intracranial hemorrhage with mass effect, patient requiring ECMO, respiratory failure or arrest, malignant hypertension, decompensated congestive heart failure, hepatic encephalopathy, ischemic bowel or multiple organ/system dysfunction. |

**What should I do if some important medical co-morbidities are not included on the case record form (CRF)?**We realise that some patients may have important data which we have not asked for. The CRF has been designed to request only the most important patient data.

## **Co-morbid disease**

We have not made definitions for all these diseases. We simply want doctors to give what they believe are the most appropriate answers. If the patient probably has the disease, then tick the box. If they probably do not have the disease, then leave it blank.

We have defined the following:

Cardiac disease: any cardiac disease including pulmonary hypertension

Chronic respiratory disease: any chronic disease of the lungs/airways

Current respiratory tract infection: currently on treatment for or has active signs of an upper or lower respiratory tract infection e.g. tonsillitis, sinusitis, common cold, pneumonia, bronchitis, bronchopneumonia

## **Duration of surgery**

Duration of surgery is calculated from ‘anaesthetic induction time’ until ‘the end of surgery’. We realise that some patients will have regional techniques prior to general anaesthesia, and possibly in a ‘block room’ prior to transfer to the operating room. The ‘anaesthetic induction start time’ should be taken from the time of the first anaesthetic intervention i.e. if it is in a remote ‘block room’ then this is the anaesthetic start time. The ‘end of surgery’ is defined as the time at which the patient leaves the operating room.

## **Urgency of surgery**

* Elective: Intervention planned or booked in advance of routine admission to hospital. Timing to suit patient, hospital and staff.
* Expedited: Patient requiring early treatment where the condition is not an immediate threat to life, limb or organ survival. Normally within days of decision to operate.
* Urgent: Intervention for acute onset or clinical deterioration of potentially life-threatening conditions, for those conditions that may threaten the survival of limb or organ, for fixation of many fractures and for relief of pain or other distressing symptoms. Normally within hours of decision to operate.
* Immediate: Immediate life, limb or organ-saving intervention – resuscitation simultaneous with intervention. Normally within minutes of decision to operate.
	+ Life-saving
	+ Other e.g. limb or organ saving

## **Severity of the surgery**

This is the category of surgery which indicates a combination of complexity and amount of tissue injury.

* Minor surgery would include procedures lasting less than 30 minutes performed in a dedicated operating room which would often involve extremities or body surface or brief diagnostic and therapeutic procedures . Examples include examination under anaesthesia, cystoscopy without intervention, removal of small cutaneous tumour, biopsy of small lesions, tenotomies, interventional radiology etc.
* Intermediate procedures are more prolonged or complex that may pose the risk of significant complications or tissue injury. Examples include insertion of k-wires, tonsillectomy, inguinal hernia repair, appendicectomy, tendon repair of hand, cleft lip and palate repair, ventriculoperitoneal shunts, strabismus surgery etc.
* Major surgical procedures are expected to last more than 90 minutes and include major abdominal surgery, cardiac surgery, thoracotomy, procedures involving free flap to repair tissue defect, amputation, craniofacial surgery, craniotomy, cystectomy, resection of liver lesions, nephrectomy, transplant surgery, spinal surgery, osteotomy etc.

## **Primary indication for surgery**

This is the underlying initiating disease/ event which ultimately resulted in the need for surgery. For example, should a patient present with a fractured humerus after a minor fall, but is found to have a malignant tumour at the fracture site, then the primary indication for surgery is ‘non-communicable disease’ i.e. cancer, and not ‘traumatic injury’ i.e. trauma, as the tumour preceded the fall. Another example is a patient presenting with an abscess for incision and drainage who is a diabetic. The underlying disease is diabetes and therefore the primary indication is “non-communicable”. An inguinal hernia requiring inguinal herniorrhaphy in a neonate is a congenital condition.

## **Traumatic injury as the primary indication for surgery**

Injury is defined as damage or harm to the body resulting in impairment of health whether unintentional or intentional. It can result from exposure to thermal, mechanical, electrical, or chemical energies. The World Health Organization defines ‘Violence’ as the intentional use of physical force or power, threatened or actual, against oneself, another person, or against a group or community, which either results in or has a high likelihood of resulting in injury, death, psychological harm, maldevelopment, or deprivation (World Health Organization, 2002). Unintentional injuries may include near drowning, falls, burns, motor vehicle accidents, poisonings, sports injuries and traumatic brain injury amongst others. Intentional injuries (or violence) may include assault, parasuicide, etc. Therefore ‘traumatic injury’ would include all intentional and unintentional injuries which were primarily responsible for surgery.

## **Neurosurgery**

Neurosurgical procedures are defined as involving the brain and cervical spine. Surgery on the thoracic and lumbar spine is defined as orthopaedic surgery.

## **Anaesthesia and Surgical providers**

We have decided to ask about the most senior staff member who is involved in the case and are present in the operating room. The most senior surgeon may not perform the operation themselves but watch a junior colleague do this. However, they are still the most senior surgeon in the operating room and could, for example, assist if something went wrong. The most senior surgeon may not be present in the operating room throughout the entire procedure. The same principles apply to anaesthetists.

**Physician (specialist) anaesthesiologist/surgeon:** A graduate of medical school who has completed a *nationally recognized* specialist anaesthesia/surgery training program/residency

**Non-specialist physician anaesthetist/surgeon**: A graduate of medical school who has not completed a specialist training program/residency in anaesthesia/surgery but has undergone some formal anaesthesia/surgery training

**Nurse anaesthetist/surgeon:** A graduate of a nursing school who has also completed a *nationally recognized* nurse anaesthetist/ nurse surgeon training program

**Non-physician, non-nurse anaesthetist:** An anaesthesia/surgery provider with no nursing degree, but who has completed a *nationally recognized* anaesthetist/surgery training program

# **Definitions of intra-operative severe anaesthesia-related critical events**

The following definitions are provided for guidance where the nature of a possible complication during anaesthesia is uncertain. These include any events which take place from the start of anaesthesia until discharge from PACU.

## **Anaphylaxis**

|  |
| --- |
| The occurrence of any suspected IgE or non-IgE mediated severe allergic reaction leading to cardiovascular instability and/or severe bronchospasm and requiring immediate resuscitation (fluid resuscitation and adrenaline). |

## **Aspiration**

Regurgitation or vomiting of gastric contents which has passed through the larynx into the trachea or tracheobronchial tree.

## **Bradycardia**

Defined as heart rate below lowest normal value for age

|  |  |
| --- | --- |
| AGE | Normal HR bpm |
| Newborn – 3 months | 80 - 205 |
| 3 months – 2 years | 75-190 |
| 2 - 10 years | 60-140 |
| >10 years | 50-100 |

## **Bronchospasm**

Bronchospasm is defined as an increased respiratory effort, especially during expiration, and wheeze on auscultation. If the patient is ventilated, bronchospasm may also be considered if a significant increase in peak inspiratory pressure (under volume controlled ventilation) or significant decrease in tidal volume (under pressure controlled ventilation) are observed. In all cases, any episode of airway constriction requiring the administration of a bronchodilator will be included. (ref)

## **Cardiac arrest**

Cardiac arrest associated with the induction or maintenance of general anaesthesia, regional anaesthesia or airway manipulation.

Cardiac arrest is defined as the cessation of cardiac mechanical activity, as confirmed by the absence of signs of circulation. ECG changes may corroborate the incidence of cardiac arrest.

## **Cardiovascular instability**

The occurrence of any of the following:

1. **Arrhythmia**

Electrocardiograph (ECG) evidence of cardiac rhythm disturbance severe enough to require treatment (e.g. anti-arrhythmic agents, vasoactive agents, intravenous fluid, etc.). This includes arrhythmias occurring following regional analgesia and requiring

intervention. For example: bradycardia requiring atropine, supraventricular tachycardia, atrial or ventricular tachyarrhythmia, torsade de Pointe, etc.

1. **Severe hypotension**

A reduction in blood pressure more than 30% below normal baseline for age

|  |  |  |
| --- | --- | --- |
| AGE | NORMAL SYSTOLIC PRESSURE | NORMAL DIASTOLIC PRESSURE |
| Neonate | 67 - 84 | 35 - 53 |
| 1. - 12 months
 | 72 - 104 | 37 - 56 |
| 1 – 2 years | 86 - 106 | 42 - 63 |
| 3 - 5 years | 89 - 112 | 46 - 72 |
| 6 - 9years | 97 - 115 | 57 - 76 |
| 10 – 11 years | 102 - 120 | 61 - 80 |
| 12 – 16 years | 110 - 131 | 64 - 83 |

1. **Bleeding**

Bleeding resulting in hypotension and necessitating unanticipated and unpredicted blood transfusion.

1. **Cardiovascular instability despite anticipated bleeding and transfusion** (e.g.: liver transplant, scoliosis surgery…)

## **Difficult BMV (Bag mask ventilation)**

When it is not possible for the anaesthesiologist to provide adequate ventilation because of one or more of the following problems: inadequate mask seal, excessive gas leak, or excessive resistance to the ingress or egress of gas. (ASA)

## **Difficult intubation**

Tracheal intubation that requires multiple attempts

## **Drug Error**

|  |
| --- |
| Drug error is defined as the administration of a wrong drug, or a wrong dose given by any route, or a wrong site of administration, that has led to either respiratory/cardiac/neurological consequence or to an unplanned admission to the ICU. |

## **Failed intubation**

Failure to place the endotracheal tube after multiple intubation attempts.

## **Laryngospasm**

Laryngospasm is defined either as complete airway obstruction associated with rigidity of the abdominal and chest walls and leading to unsuccessful ventilation of the patient, or glottic closure associated with chest movement but silent unsuccessful respiratory efforts and unsuccessful assisted ventilation of the patient, unrelieved in both situations with simple jaw thrust and CPAP manoeuvres and requiring the administration of medication (propofol, suxamethonium, lignocaine spray on vocal cords etc.) and/or tracheal intubation.

## **Low Glucose**

Levels below the following blood glucose levels;

First 24 hours of life <1.65 mmol/l

Neonates (>24hours old) <2.5mmol/l

Infants and children <3.6mmol/l

## **Severe hypoxia**

Hypoxia with a peripheral saturation of <80% on pulse oximetry, or clinical impression of hypoxia in the absence of a pulse oximeter.

# **Definitions and grading of surgical complications**

The following definitions and grading are provided for guidance where the nature and severity of a possible complication following surgery is uncertain. Specific definitions are also provided below.

**Select the complication and indicate if it is severe.**

The degrees of severity describe the degree of impact on the patient.

* The definition of severe is taken from the more complicated Clavien-Dindo (CD) classification and is a composite of grades III to V, unless otherwise specified. (See table below)

|  |  |  |
| --- | --- | --- |
| **GRADE** | Equivalent to Clavien-Dindo Grade | Definition |
| **ASOS-Paeds mild grade** | I | **Any deviation from normal postoperative course** without the need for pharmacological treatment or surgical, endoscopic and radiological interventions.**Allowed therapeutic regimens are:** drugs as anti-emetics, antipyretics, analgesics, diuretics and electrolytes and physiotherapy. This grade also includes wound infections opened at the bedside. |
| **ASOS-Paeds moderate grade** | II | **Requiring pharmacological treatment** with drugs other than such allowed for grade I complications.Blood transfusions and total parenteral nutrition are also included. |
| **ASOS-Paeds severe****grade** | III | **Requiring surgical, endoscopic or radiological intervention**IIIa) intervention not under general anesthesiaIIIb) intervention under general anesthesia |
| IV | **Life-threatening complication** (including CNS complications) requiring IC/ICU-managementIVa) **single organ** dysfunction (including dialysis)IVb) **multi organ** dysfunction |
| V | **Death** of a patient |

##

## **Acute Kidney Injury (AKI)**

|  |  |  |
| --- | --- | --- |
| **Acute Kidney Injury** **(AKI) Stage**   | **AKIN**   | **KDIGO** |
| **Mild**  | Stage 1Increase in creatinine of ≥50%orabsolute increase in creatinine of 0.3mg/dl | Stage 1Increase in creatinine of ≥50%orabsolute increase in creatinine of 0.3mg/dl |
| **Moderate** | Stage 2Increase in creatinine of ≥100% | Stage 2Increase in creatinine of ≥100% |
| **Severe**  | Stage 3Increase in creatinine of ≥200% |  Stage 3Increase in creatinine of ≥200%oreGFR ≤35ml/min per 1.73m2 (if age < 18 yr)or Renal Replacement Therapy |

**Guidance:**

Estimate eGFR (estimated glomerular filtration rate) using the Schwartz method. (eGFR = 0.413 x (height/serum creatinine) if height is in cm)

Baseline serum creatinine should have been measured before surgery but an estimated value can be used if the patient does not have chronic kidney disease.

**Severity grading**

As per the table above.

## **Arrhythmia**

Electrocardiograph (ECG) evidence of cardiac rhythm disturbance.

**ASOS- Paeds Severity grading**

See categories and definitions on page 10

## **Cardiac arrest**

The cessation of cardiac mechanical activity, as confirmed by the absence of signs of circulation. ECG changes may corroborate the incidence of cardiac arrest.

Tick on CRF if Yes

## **Bloodstream infection**

An infection in the blood stream which may or may not be related to infection at another site and which meets at least one of the following criteria:

1. Patient has a recognised pathogen cultured from blood cultures which may or may not related to an infection at another site.
2. Patient has at least one of the following signs or symptoms: fever (>38°C), chills, or hypotension and at least one of the following:
	1. common skin contaminant cultured from two or more blood cultures drawn on separate occasions
	2. common skin contaminant cultured from at least one blood culture from a patient with an intravascular line, and a physician starts antimicrobial therapy
	3. positive blood antigen test

**ASOS-Paeds Severity grading**

See categories and definitions on page 10

## **Other infection**

Any other type of infection

**ASOS-Paeds Severity grading**

See categories and definitions on page 10

## **Pneumonia**

Child with a cough or difficulty breathing, coarse crackles, reduced breath sounds or bronchial breathing on auscultation, fever, lower chest wall indrawing, nasal flaring, grunting or head nodding.

Chest radiographs with new or progressive and persistent infiltrates, or consolidation, or cavitation, or clinical diagnosis with severity below:

**Pneumonia Severity grading:**

|  |  |  |
| --- | --- | --- |
| **Pneumonia**  | **Equivalent to earlier WHO staging**  | **Definition** |
| **Mild**  | Fast breathing pneumonia | * Fast breathing with a respiratory rate of ≥ 60 breaths/minute in children < 2months old; ≥ 50 breaths/minute in children 2- 11 months old; ≥40 breaths/minute in children 1- 5 years old; ≥35 breaths/minute in children 5-15 years old
* Crackles, reduced breath sounds or bronchial breathing on auscultation.
 |
| **Moderate**  | Chest indrawing pneumonia | * Cough or difficulty breathing plus any one of the following:
* Chest indrawing
* Nasal flaring
* Grunting (in young infants)
 |
| **Severe**  | General danger signs pneumonia | * Cough or difficulty breathing plus any one of the following:
* Central cyanosis
* Severe respiratory distress (head nodding)
* Not being able to drink
* Convulsions lethargy or unconsciousness
 |

## **Postoperative bleed**

Blood loss occurring within 72 hours after the end of surgery which would normally result in transfusion of blood according to your unit protocol.

**ASOS-Paeds Severity grading**

See categories and definitions on page 10

## **Surgical site infection (superficial)**

Infection involving only superficial surgical incision which meets the following criteria:

1. Infection occurs within 30 days after surgery and
2. Involves only skin and subcutaneous tissues of the incision and
3. The patient has at least one of the following:
	1. purulent drainage from the superficial incision
	2. organisms isolated from an aseptically obtained culture of fluid or tissue from the superficial incision and at least one of the following signs or symptoms of infection: pain or tenderness, localized swelling, redness, or heat, or superficial incision is deliberately opened by surgeon and is culture positive or not cultured. A culture-negative finding does not meet this criterion.
	3. diagnosis of an incisional surgical site infection by a surgeon or attending physician

**ASOS-Paeds Severity grading**

See categories and definitions on page 10

## **Surgical site infection (deep)**

An infection which involves both superficial and deep parts of surgical incision and meets the following criteria:

1. Infection occurs within 30 days after surgery if no surgical implant is left in place or one year if an implant is in place and
2. The infection appears to be related to the surgical procedure and involves deep soft tissues of the incision (e.g. fascial and muscle layers) and
3. The patient has at least one of the following:
	1. purulent drainage from the deep incision but not from the organ/space component of the surgical site
	2. a deep incision spontaneously dehisces or is deliberately opened by a surgeon and is culture-positive or no cultures were taken whilst the patient has at least one of the following signs or symptoms of infection: fever (>38°C) or localized pain or tenderness. A culture-negative finding does not meet this criterion.
	3. an abscess or other evidence of infection involving the deep incision is found on direct examination, during surgery, or by histopathologic or radiologic examination
	4. diagnosis of a deep incisional surgical site infection by a surgeon or attending physician

**ASOS-Paeds Severity grading**

See categories and definitions on page 10

## **Surgical site infection (body cavity/organ/space)**

An infection which involves any part of the body excluding the fascia or muscle layers and meets the following criteria:

1. Infection occurs within 30 days after surgery and
2. The infection appears to be related to the surgical procedure and involves any part of the body, excluding the skin incision, fascia, or muscle layers, that is opened or manipulated during the operative procedure and
3. The patient has at least one of the following:
	1. purulent drainage from a drain that is placed through a stab wound into the organ/space
	2. organisms isolated from an aseptically obtained culture of fluid or tissue in the organ/ space
	3. an abscess or other evidence of infection involving the organ/space that is found on direct examination, during reoperation, or by histopathologic or radiologic examination
	4. diagnosis of an organ/space surgical site infection by a surgeon or attending physician

**ASOS-Paeds Severity grading**

See categories and definitions on page 10

# **Hospital resource use after surgery**

We will collect some basic data to describe the treatment resources patients received after surgery.

**Level of care would be the level of care patient entered immediately after surgery.**

**High Care**

A postoperative ward which is dedicated to providing increased postoperative care, when compared to the normal postoperative surgical ward.

## **Critical Care**

We have defined a critical care unit as a facility routinely capable of admitting patients who require single or multiple organ support such as invasive ventilation overnight.

**Days in hospital after surgery:** Total number of days in hospital from the day of surgery to the day the patient leaves your hospital. This will not be adjusted for delays relating to provision of social care

**Status at hospital discharge or 30th postoperative in-hospital day:** The survival status of the patient at hospital discharge, or at the 30th in-hospital day (if the patient had not yet been discharged following surgery). The study is censored at the 30th in hospital postoperative day. All patients are followed until hospital discharge or for thirty days after surgery whichever is the shortest.

# **Abbreviations List:**

AIDS : Acquired Immunodeficiency Syndrome

ASA : American Society of Anaesthesia

BMV : bag mask ventilation

BP : blood pressure

CC : Critical Care

CVS : cardiovascular system

DOB : date of birth

ENT : Ear Nose and Throat

ETT : endotracheal tube

Gender : M = male F = female

GIT : gastrointestinal system

HIV : Human Immunodeficiency Virus

RRT : renal replacement therapy

URTI : upper respiratory tract infection

WHO : World Health Organisation

Y : Yes N : No

0C : degrees celcius

# **References**

Available on request