



The Royal College of Pathologists

Guidelines on Autopsy Practice

Scenario 8: Sudden unexpected deaths in infancy (SUDI)

The role of the autopsy

- To establish whether the death is attributable to a natural disease process (infection, metabolic disorder, congenital abnormalities).
- To consider the possibility of accidental death (trauma, poisoning, scalding, drowning).
- To consider the possibility of asphyxia/airway obstruction.
- To consider the possibility of non-accidental injury.
- To document the presence/absence of pathological processes and to contribute to the multidisciplinary clinicopathological evaluation of the death.

Note that these autopsy reports will be anonymously submitted to the Confidential Enquiry into Maternal and Child Health (CEMACH) in England and Wales, and in Scotland to SUDI case review conferences, coordinated by the Scottish Cot Death Trust.

Pathology encountered at autopsy

(The list provided below is not exhaustive and only mentions more common possibilities).

- General:
 - malnutrition
 - sepsis +/- DIC
 - poisoning, drowning, scalding
 - hyperthermia (cystic fibrosis, congenital adrenal hyperplasia)
 - inborn errors of metabolism (e.g. fatty acid oxidation defects).

- Cardiovascular:
 - congenital heart disease (hypoplastic left heart, hypertrophic cardiomyopathy, aortic stenosis)
 - myocarditis
 - cardiomyopathy
 - subendocardial fibroelastosis
 - trauma (aortic rupture, cardiac tamponade)
 - coronary arteritis (Kawasaki disease)
 - total anomalous pulmonary venous drainage
 - idiopathic arterial calcinosis
 - cardiac tumours.
- Respiratory:
 - epiglottitis
 - laryngotracheobronchitis
 - bronchiolitis
 - pneumonia/bronchopneumonia
 - pulmonary hypertension
 - bronchopulmonary dysplasia (chronic interstitial lung disease)
 - impaction of a foreign body.
- Gastrointestinal tract:
 - enterocolitis with dehydration
 - intestinal obstruction (intussusception, volvulus)
 - intestinal perforation with peritonitis
 - ruptured viscus with intraperitoneal haemorrhage.
- Liver:
 - hepatitis
 - fatty liver (metabolic disorder, Reye's syndrome).
- Pancreas:
 - pancreatitis (viral, drug induced).
- Kidney:
 - pyelonephritis
 - evidence of ischaemia.
- Brain:
 - meningitis/encephalitis

- arteriovenous malformation +/- intracerebral bleeding
- cranial/cerebral trauma (skull fractures, subdural haemorrhage, diffuse axonal injury)
- evidence of current or past episodes of hypoxia/ischaemia.
- Musculo-skeletal system:
 - soft tissue/bone: infections/inflammation
 - fractures/dislocations
 - skin and soft tissue injury.

Specific health and safety aspects

None.

Clinical information relevant to the autopsy

- Detailed history, including details of pregnancy, delivery, post-natal history, ante-mortem history and precise circumstances of death including family history (previous sibling deaths, consanguinity, drug use, co-sleeping).
- Event scene investigation report from police officers if available.
- Report of the Coroner's officer/police officer acting for the Procurator Fiscal.
- General practitioner's records.
- Reference to the child protection register.
- Reference to resuscitation procedures and A&E investigations if available, including results of the examination by a consultant paediatrician.
- Results of septic screen, if done in an A&E department.

The autopsy procedure

- Following review of the history and discussion with the Coroner/Procurator Fiscal, consider requesting forensic input (appropriate only for some cases and some pathologists).
- Consider close adherence to the rules of evidence from the outset of involvement (e.g. identification and corroboration of evidence).

- Full autopsy, with attention to weights, measurements, presence/absence of secretions or blood around nose and mouth and petechial haemorrhages on face, conjunctivae or oral mucosa (consider photography for documentation of dysmorphism and/or evidential purposes).
- Any evidence of injury (a full skeletal survey reported by a paediatric radiologist is mandatory in such cases).
- Weights of all major organs.
- If suspicious of intracranial injury, no needles should be placed within the skull or the eye until the scalp, skull and intracranial contents have been examined and injury excluded.

Specific significant organ systems

All organs systematically examined.

Organ retention

- If trauma to the brain/spinal cord is suspected, consider retaining these organs; also consider retaining the eye for specialist neuropathological referral.
- In general, if the clinical history and pathological findings require any particular organ to be retained for further assessment, this should be discussed with the Coroner's/Procurator Fiscal's office.

Minimum blocks for histological examination

- Epiglottis and larynx.
- Trachea (including thyroid).
- Four lobes of lung (H&E, and Perls' method for iron).
- Heart (free wall of left and right ventricle, interventricular septum).
- Thymus.
- Duodenum (including head of pancreas).
- Liver (left and right lobe).
- Spleen.
- Mesentery with lymph node.

- Adrenal glands.
- Kidneys.
- Costo-chondral junction of the sixth rib.
- Muscle (diaphragm and pectoralis major or psoas).
- Blocks of any lesion, including fractured ribs.
- Brain: 4–6 blocks including cerebral hemisphere, brainstem, cerebellum, meninges and spinal cord; dura if there is haemorrhage.

(In cases with no clinical evidence or macroscopic autopsy findings explaining death, it is strongly recommended that the brain is examined only after adequate fixation, for two weeks).

Other samples required

- Bacteriology (blood, CSF, respiratory tract, any infective lesion).
- Virology (post nasal swabs or nasopharyngeal aspirate, lung, CSF and faeces if indicated).
- Biochemistry (urine for metabolic investigations or toxicology; vitreous fluid if dehydration suspected; bile for carnitines; consider blood if there is a strong suspicion of inborn error of metabolism).
- Frozen section – stained with Oil Red O for fat on liver and kidney (mandatory in all unexplained unexpected infant deaths).
- Consider toxicology (minimum: peripheral blood, whole unpreserved in fluoride bottle, urine, vitreous humour, stomach content; request an illicit drug/alcohol screen, specify other drugs as indicated from the history).
- Consider genetic investigation (skin sample or pericardium for fibroblast culture; liaise with local genetics laboratory).

Clinicopathological summary

- Summarise the clinical history and main pathological findings.
- Decide whether the pathology satisfactorily explains the clinical circumstances of the death.

- Consider whether there are features indicating a familial/genetic disease requiring screening and counselling of the family.
- Consider whether there are features sufficient enough to suggest non-accidental injury (NAI).
- If no satisfactory cause of death identified, in an infant with typical epidemiological characteristics, consider Sudden Infant Death Syndrome (SIDS) as a cause of death (preferentially following multidisciplinary case review).
- The report must include details of any samples taken/kept and instructions for their further retention or disposal.

Specimen cause of death opinions/statements

1a. Findings consistent with Sudden Infant Death Syndrome (SIDS)

2. Mild tracheitis (no pathogens isolated)

(For example, an infant of a typical age, previously in good health, put in his/her own cot and found dead in the morning; negative family history; no major pathological findings.)

1a. Findings consistent with Sudden Unexpected Death In Infancy (SUDI)

2. Mild focal pulmonary haemorrhage

(For example, an infant from the age range broader than 2–5 months, previously in good health, put in his/her own cot and found dead in the morning; family history of drug use; very minor pathological findings.)

1a. Unascertained

2. A single rib fracture

(For example, an infant from the broader age range, apparently previously in good health, found dead between the parents in their bed; family history of physical abuse.)

1a. Subdural haematoma

1b. Skull fracture consistent with NAI

2. Multiple rib fractures

References

1. Fleming P, Blair P, Bacon C, Berry J. *Sudden Unexpected Deaths in Infancy: The CESDI/ SUDI Studies*. London: The Stationary Office, 2000.
2. This scenario is incorporated, in a shortened form, in *Sudden Unexpected Death in Infancy: A multi-agency protocol for care and investigation*, the Report of the Working Group of The Royal College of Pathologists and The Royal College of Paediatrics and Child Health, chaired by Baroness Helena Kennedy. London: The Royal College of Pathologists, 2004. www.rcpath.org/publications

The RCPATH Working Party on the Autopsy

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