



**Guidelines on autopsy practice:  
Postoperative deaths  
May 2019**

**Series authors:** Dr Michael Osborn, Imperial College Healthcare NHS Trust

**Specialist authors:** Dr Julian Burton, The Medico-Legal Centre, Sheffield  
Professor S Kim Suvarna, Royal Hallamshire Hospital, Sheffield

Unique document number	G174
Document name	Guidelines for autopsy practice: Postoperative deaths
Version number	1
Produced by	Dr Julian Burton is lead coronial pathologist at the Medico-Legal Centre in Sheffield. Professor S Kim Suvarna is a consultant histopathologist at the Royal Hallamshire Hospital, Sheffield.
Date active	May 2019
Date for full review	May 2024
Comments	In accordance with the College's pre-publication policy, this document was on the Royal College of Pathologists' website for consultation from 7 February to 7 March 2019. Responses and authors' comments are available to view on request. This document is part of the 'Guidelines on autopsy practice' series. <b>Dr Brian Rous</b> <b>Clinical Lead for Guideline Review</b>

The Royal College of Pathologists  
6 Alie Street, London E1 8QT  
Tel: 020 7451 6700  
Fax: 020 7451 6701  
Web: [www.rcpath.org](http://www.rcpath.org)

Registered charity in England and Wales, no. 261035  
© 2019, The Royal College of Pathologists

This work is copyright. You may download, display, print and reproduce this document for your personal, non-commercial use. Requests and inquiries concerning reproduction and rights should be addressed to the Royal College of Pathologists at the above address. First published: 2019.



## Contents

Foreword.....	3
1 Introduction.....	4
2 The role of the autopsy.....	4
3 Pathology encountered at autopsy.....	5
4 Specific health and safety aspects.....	5
5 Clinical information relevant to the autopsy.....	6
6 The autopsy procedure.....	6
7 Specific organ systems to be considered.....	8
8 Organ retention.....	9
9 Histological examination.....	9
10 Toxicology.....	10
11 Other relevant samples.....	10
12 Imaging.....	11
13 Clinicopathological summary.....	12
14 Examples of cause of death opinions/statements.....	12
15 Criteria for audit.....	13
16 References.....	14
Appendix A Summary table – Explanation of grades of evidence.....	15
Appendix B AGREE II guideline monitoring sheet.....	16



NICE has accredited the process used by the Royal College of Pathologists to produce its autopsy guidelines. Accreditation is valid for 5 years from 25 July 2017. More information on accreditation can be viewed at [www.nice.org.uk/accreditation](http://www.nice.org.uk/accreditation).

For full details on our accreditation visit: [www.nice.org.uk/accreditation](http://www.nice.org.uk/accreditation).

## Foreword

The autopsy guidelines published by the Royal College of Pathologists (RCPATH) are guidelines which enable pathologists to deal with non-forensic consent and coroner's post-mortem examinations in a consistent manner and to a high standard.

The guidelines are systematically developed statements to assist the decisions of practitioners and are based on the best available evidence at the time the document was prepared. Given that much autopsy work is single observer and one-time only in reality, it has to be recognised that there is no reviewable standard that is mandated beyond that of the FRCPath Part 2 exam or the Certificate of Higher Autopsy Training (CHAT). Nevertheless, much of this can be reviewed against ante-mortem imaging and other data. This guideline has been developed to cover most common circumstances. However, we recognise that guidelines cannot anticipate every pathological specimen type and clinical scenario. Occasional variation from the practice recommended in this guideline may therefore be required to report a case in a way that maximises benefit to pathologists, the coroner and the deceased's family.

There is a general requirement from the General Medical Council (GMC) to have continuing professional development in all practice areas and this will naturally encompass autopsy practice. Those wishing to develop expertise/specialise in pathology are encouraged to seek appropriate educational opportunities and participate in the relevant external quality assurance scheme.

The guidelines themselves constitute the tools for implementation and dissemination of good practice.

The following stakeholders were contacted to consult on this document: the Human Tissue Authority and its Histopathology Working Group, which includes representatives from the Association of Anatomical Pathology Technology, the Institute of Biomedical Science, the Coroners' Society of England and Wales, the Home Office Forensic Science Regulation Unit and Forensic Pathology Unit, and the British Medical Association.

The information used to develop this document was derived from current medical literature. Much of the content of the document represents custom and practice, and is based on the substantial clinical experience of the authors. All evidence included in this guideline has been graded using modified SIGN guidance (see Appendix A). The sections of this autopsy guideline that indicate compliance with each of the AGREE II standards are indicated in Appendix B. A literature search was conducted using Medline and PubMed for keywords "postoperative" and/or "operative" cross-referenced to "autopsy" and "necropsy" for the period January 2000 to June 2018, limited to human and English. This revealed no articles that described how postoperative autopsies should be performed.

No major organisational changes or cost implications have been identified that would hinder the implementation of the guidelines.

A formal revision cycle for all guidelines takes place on a five-year cycle. The College will ask the authors of the guideline to consider whether or not the guideline needs to be revised. A full consultation process will be undertaken if major revisions are required. If minor revisions or changes are required, an abridged consultation process will be undertaken whereby a short note of the proposed changes will be placed on the College website for two weeks for members' attention. If members do not object to the changes, the changes will be incorporated into the guideline and the full revised version (incorporating the changes) will replace the existing version on the College website.

The guideline has been reviewed by the Death Investigation Group, Lay Governance Group and Clinical Effectiveness department. It was placed on the College website for consultation with the membership from 7 February to 7 March 2019. All comments received from the membership were addressed by the authors to the satisfaction of the Clinical Lead for Guideline Review.

The guideline was developed without external funding to the writing group. The College requires the authors of guidelines to provide a list of potential conflicts of interest; these are monitored by the Clinical Effectiveness department and are available on request. The authors of this document have declared that there are no conflicts of interest.

## 1 Introduction

Individuals undergoing surgical interventions may die during the intervention (intraoperative deaths) or in the postoperative period (following transfer from the post-anaesthesia care unit to an intensive care unit or general ward). Deaths relating to the operation may occur as a result of issues quite some time after surgery. Death may be due to the disease for which the operation was performed, a complication of the operation and/or its anaesthetic, or an unrelated factor. The subsequent autopsies will vary in their complexity and a thorough systematic approach is required. Although the pathologist performing the autopsy should come to their own conclusions, it may be helpful, with the permission of the coroner, to invite the operative surgeon and/or other clinicians involved in the care of the patient to attend the autopsy.

### 1.1 Target users and health benefits of these guidelines

The target primary users of these guidelines are consultant pathologists performing autopsies on the instruction of a medicolegal authority or with the consent of the relatives of the deceased. The recommendations will also be of value to pathologists in training, particularly those preparing for the Certificate of Higher Autopsy Training. The guidelines may form part of appraisal by demonstration of personal good practice case reviews.

## 2 The role of the autopsy

When death occurs following surgery, the role of the autopsy is to determine the cause of death and the impact, if any, that the surgery had on the cause of death. People who die during or following surgery may die from a wide variety of causes, which can be broadly classified as follows:

- death due to the natural disease for which the operation was performed, for example, death during an emergency aortic aneurysm repair as a result of a retroperitoneal haemorrhage due to a ruptured abdominal aortic aneurysm
- death due to a complication of surgery, for example, death as a result of haemorrhage, wound infection or bone cement implantation syndrome shortly after the instillation of bone cement during a cemented hemiarthroplasty for a fractured osteoporotic femoral neck
- death due to late complications of surgery, for example, death as a result of small bowel infarction due to peritoneal adhesions following a right hemicolectomy
- death due to systemic *Mycobacterium chimaera* infection following coronary artery bypass surgery
- death due to an anaesthetic complication, for example, death as a result of malignant hyperpyrexia or allergic reaction to drugs provided
- death due to metabolic complications, for example diabetic ketoacidosis, paralytic ileus or salt–water imbalance
- death due to an operative or anaesthetic error, for example, death as a result of peritonitis caused by inadvertent perforation of the transverse colon during a laparoscopic cholecystectomy or incorrect size prosthesis being implanted or death as a result of asphyxia caused by premature removal of an endotracheal tube

- death due to an unrelated cause, for example, death resulting from an ischaemic stroke three days after a radical prostatectomy for adenocarcinoma of the prostate, in the absence of disseminated disease.<sup>1</sup>

*[Level of evidence – D.]*

### **3 Pathology encountered at autopsy**

The pathologies encountered during an autopsy investigating a postoperative death will depend on the nature of the operation performed, the age of the patient (and the presence or absence of comorbidities) and the interval between surgery and death.

#### **3.1 Common causes of death**

- Bacterial sepsis (including pneumonia, urinary tract infection, wound infection, peritonitis).
- Pulmonary thromboembolus.
- Anastomotic breakdown, particularly bowel.
- Haemorrhage, potentially at any site.

#### **3.2 Common pathologies that are less often the direct cause of death**

- Ischaemic heart disease.
- Hypertensive heart disease.
- Intracranial haemorrhage.
- Chronic obstructive pulmonary disease exacerbation following abdominal surgery.

#### **3.3 Less commonly encountered pathologies and scenarios**

- Malignant hyperpyrexia.
- Halothane hepatitis.
- Drug-induced hepatitis (e.g. antibiotic induced).
- Anaphylaxis.

*[Level of evidence – GPP.]*

### **4 Specific health and safety aspects**

There are no specific health and safety concerns for autopsies investigating postoperative deaths, beyond those that exist for all autopsies. Good practice reflecting other autopsy scenarios is recommended.

*[Level of evidence – GPP.]*

## 5 Clinical information relevant to the autopsy

Autopsies investigating postoperative deaths ideally should only be undertaken once the clinical history has been reviewed. This allows the autopsy pathologist to plan the autopsy examination and to identify questions that the autopsy should seek to answer. If there are areas of concern, discussion with the surgical, anaesthetic and nursing team may be relevant.

When reviewing the clinical history the following components should receive particular attention:

- pre-admission/admission clerking (past medical history, diagnosis, drug history, allergies)
- consent form
- operation note
- anaesthetic chart (this may need specialist advice in interpretation)
- drug cards
- postoperative care (medical and nursing)
- any ante-mortem histopathology, clinical chemistry, haematology and/or microbiology results (these facilitate understanding of the whole picture and may obviate the need for repeat testing).

*[Level of evidence – GPP.]*

## 6 The autopsy procedure

### 6.1 External examination

Following a postoperative death, the external examination often determines the approach to the internal structures and any devices that exist. Consequently, careful inspection of the body to identify all surgical wounds/scars, cannulae and sites of prior placement of lines, catheters, drains, fixators, etc. is important. These should be recorded in terms of size, if appropriate, with additional commentary on features of infection, poor healing or other pathology if present.<sup>2,3</sup>

The general status of the body should be considered in terms of nutrition, jaundice, oedema, tissue swelling and/or ulceration (often decubitus). Evidence of a sepsis-related process in terms of marbling and disseminated intravascular coagulation should be considered and photography may be of particular assistance. If sepsis is likely, appropriate samples for microbiology should be collected before the body is opened.

*[Level of evidence – D.]*

### 6.2 Evisceration

The evisceration of the body tissues should be performed by the pathologist undertaking the autopsy, or at least by the anatomical pathology technician in concert with the pathologist, to avoid missing vital pathology. The body cavities will need to be opened sequentially, depending on the issues of the case. Thus, incisions may be made outside standard protocols to inspect the under surface of the skin and subcutaneous tissues with regard to drainage lines and other devices.<sup>4,5</sup>

The body cavities may be opened likewise in a non-standard fashion to test for issues with the devices implanted. The position of the device and its status (e.g. haemorrhage, infection, misplacement) is often best appreciated at the start of evisceration rather than after organs and tissues have been removed.<sup>6,7</sup> Photography of any pathology is of benefit, as the case progresses.

The evisceration should therefore include:

- opening the body cavities (exploring the surgical wound in the process)
- inspection of the contents of body cavities in situ before evisceration
- noting the placement of devices and the presence or absence of any local complications
- removal of pacemakers, defibrillator units, nerve stimulators and other devices. This may be assisted if radiology has already clearly identified the position and range of the devices. As the devices cross skin boundaries and other tissue zones, careful inspection of the tissue parenchyma may indicate issues related to scarring, infection and other lesions.
- inspection of surgical anastomoses for evidence of dehiscence. When considering anastomotic sites, particularly in the bowel, it is very important to dissect these without tension/traction being placed on the anastomotic site, which could inadvertently tear the tissues. This degree of caution should prevent false/incorrect identification of anastomosis breakdown.
- photography of the organs and devices in situ
- evisceration as usual, taking care to work towards anastomoses so as not to place tension on them/cause artifactual dehiscence.

It is not necessary to inspect every device if the pathology is elsewhere. For example, where coronary stenting is followed by a secondary complication of thrombosis and the sudden death of the patient, a previous uncomplicated hip replacement prosthesis does not need to be explanted (unless there is an associated issue under consideration).

*[Level of evidence – D.]*

### **6.3 Dissection**

The dissection of the body will normally follow exactly the same principle as that of a standard autopsy without devices or previous surgical/medical intervention.<sup>1,8</sup> However, our particular interest is the possibility of sepsis, often originating from unusual sites (deep soft tissues, bone/osteomyelitis, discitis, middle ear, etc.) When considering possible abdominal lesions, one should avoid missing the possibility of sub-diaphragmatic collections or extension of infection into the retroperitoneal compartment. Knowledge of the preceding surgical interaction is of vital importance in performing the best autopsy possible, as lines and electrodes, once cut, can never be completely assessed. Photography, undertaken as the dissection proceeds, often provides good information in case of subsequent review.

*[Level of evidence – D.]*

## 7 Specific organ systems to be considered

### 7.1 The postoperative autopsy following hemiarthroplasty for fractured neck of femur

Osteoporotic fracture of the femoral neck is a potentially life-threatening injury, with or without surgical intervention. Deaths that occur during or after hemiarthroplasty for fractured neck of femur may be due to a complication of the surgery (e.g. bone cement implantation syndrome, haemorrhage, infection/sepsis), a result of pre-existing disease (e.g. ischaemic heart disease, cerebrovascular disease) and/or a result of reduced mobility due to the fracture (e.g. pneumonia, pulmonary thromboembolus).

The autopsy following such deaths should include examination of the operative site, which is often facilitated by removal of the femur, unless there is gross sepsis or massive haemorrhage. Full explanation of the prosthesis is used to determine whether the prosthesis has been correctly articulated and explored for the presence or absence of occult infection and haemorrhage.

Additional samples, beyond those taken in the standard autopsy, are recommended. Where death has occurred during surgery, blood should be sampled for immunology (mast cell tryptase) and lung tissue should be sampled for frozen section histopathological lung examination with an Oil Red O stain to identify fat emboli. Where death occurs after the immediate operative period, deep tissue samples should be collected from the operative site for microbiological culture.

*[Level of evidence – GPP.]*

### 7.2 Medical devices

There are two broad groups of medical devices that can be considered. Although the range and types of tissue involved with devices is widespread, they are perhaps best seen as, firstly, those that are structural and, secondly, those which have direct tissue interaction/functionality.

The first group includes metal prostheses associated with joint surgery (hip repair, intramedullary nail, joint spacers, etc.) and the well-recognised intrauterine device for contraception. Of increasing importance are mesh devices used for abdominal and sometimes perineal reconstruction. Close attention to possible sepsis and pronounced sclerosis around these items should be made.<sup>6,7</sup>

The more interactive types of device include classic forms of permanent pacemakers (single lead, dual lead), although defibrillator pacemakers are increasingly seen as standard medical therapy. Likewise, central nervous systems stimulators for epilepsy, auditory loops and bladder stimulators (for cases of spinal/cord disease) are to be considered as part of the standard autopsy if they are present. Such implanted electronic devices must be deactivated before the autopsy examination and should be handled in accordance with the *Guidance for pathologists conducting post-mortem examinations on individuals with implanted electronic medical devices*.<sup>9</sup>

From the orthopaedic perspective there are some bone lengthening devices (e.g. Fixion) that require consideration as well as the reality that they need removal if cremation is to be subsequently undertaken. Unusual devices in unusual sites include penile pumps. These can potentially be a source of fatal occult sepsis.<sup>6,7</sup>

*[Level of evidence – D.]*

## 8 Organ retention

In general, whole organ retention is not required, particularly if photography is available. Retention of the heart to permit detailed examination by a cardiac pathologist following complex cardiac surgery may be required (see *Guidelines on autopsy practice: Sudden death with likely cardiac pathology*).<sup>10</sup>

[Level of evidence – D.]

## 9 Histological examination

Gross observation alone may miss infections, ischaemia and embolic phenomena. Histological examination of the major organs, generally the heart, lungs, liver and kidneys, is always recommended.<sup>11</sup> However, while these four main tissues may not require sampling on every occasion, they may well provide useful information in terms of the general pathophysiology of the dying person and circumstances (for example, disseminated intravascular coagulation, disseminated neoplasia, sepsis) that may have caused death.

Samples of the heart may include one or more pieces of native/graft vasculature, which can usually be mounted in the same block but often also require decalcification for full analysis. The number of blocks from cardiac tissues for analysis can be a matter of one or two blocks but could potentially include multiple samples from the mid-ventricular level tissues and/or samples of the cardiac conduction tissues (pacemaker cases).

Anastomotic sites often benefit from histology assessing tissue integrity or breakdown. The key issue with an anastomotic breakdown is to demonstrate features of leakage and inflammation at this site, to exclude concerns that trauma to an anastomosis may have been caused during the autopsy. Dating of the leak is complex but some commentary on this matter may assist case understanding.

[Level of evidence – GPP.]

### 9.1 Tissue sampling

The following represents the best/ideal practice for cases. This is the recommended minimum if histology is to be sent for expert/medicolegal review.

**Table 1: Recommended tissue sampling.**

Organ	Recommended sampling
Heart	<ul style="list-style-type: none"><li>• Five blocks from a mid-horizontal slice: anterior and posterior right ventricle and the four quadrants of the left ventricle</li><li>• Epicardial coronary arteries, if stenosed</li></ul>
Lungs	<ul style="list-style-type: none"><li>• One sample per lobe and arterial emboli/thrombi, if present</li><li>• Where death has followed orthopaedic surgery, one sample from each lower lobe for frozen section and Oil Red O staining to look for fat emboli</li></ul>
Spleen	<ul style="list-style-type: none"><li>• As per local protocols</li></ul>
Liver	<ul style="list-style-type: none"><li>• As per local protocols</li></ul>
Pancreas	<ul style="list-style-type: none"><li>• Sample if there is a suspicion of pancreatitis, or if death followed pancreatic surgery</li></ul>
Kidney	<ul style="list-style-type: none"><li>• As per local protocols</li></ul>

Organ	Recommended sampling
Brain	<ul style="list-style-type: none"> <li>As per local protocols</li> </ul>
Bone	<ul style="list-style-type: none"> <li>Lumbar vertebral bone where surgery has been undertaken to treat osteoporotic fractures. This also allows CD68 assessment of marrow in cases of sepsis</li> </ul>
Other	<ul style="list-style-type: none"> <li>Anastomotic sites</li> <li>Septic foci not already sampled</li> <li>Histopathological examination of any specimens removed at surgery</li> </ul>

With the exception of samples retained for frozen section, tissue samples should ideally be fixed in a 10% solution of buffered formalin. Thereafter, routine processing to paraffin is appropriate.

*[Level of evidence – GPP.]*

## 10 Toxicology

If the clinical history raises concerns that death may have been due to a drug overdose or metabolic derangement (such as ketoacidosis), samples should be collected for toxicological analysis. The pathologist should determine whether blood samples obtained in life still exist, as these typically are the most useful for testing. This should be done as a matter of urgency if the samples are to be retained before they are discarded by the laboratory. (Most laboratories have only limited storage space for routine blood samples.) At autopsy, samples of blood, urine, vitreous humour and gastric contents should be collected.

*[Level of evidence – GPP.]*

## 11 Other relevant samples

A wide variety of additional samples may be required to reach or refine the cause of a postoperative death. The samples needed will depend on the clinical history and the operation performed.

### 11.1 Microbiology

Where the clinical history suggests that death may be due to sepsis, blood from the neck veins or heart should be obtained for culture ideally before the body is opened. Additional samples will depend on whether the history and macroscopic findings suggest a focus of infection. Where a focus is evident, bacteriological samples should be obtained for microscopy, culture and sensitivity.

Where the history suggests sepsis but no focus is evident, the following samples should be collected as a minimum.

**Table 2: Recommended microbiological sampling.**

Tissue	Samples
Blood	<ul style="list-style-type: none"> <li>Aspirated 10–20 ml from the neck veins or heart before opening the body</li> </ul>
Lungs	<ul style="list-style-type: none"> <li>One sample from each lower lobe. Collect each sample using new sterile instruments</li> </ul>

Spleen	<ul style="list-style-type: none"> <li>One sample, collected with sterile instruments, on opening the abdomen</li> </ul>
Bile	<ul style="list-style-type: none"> <li>Aspirate 5–10 ml from the fundus of the gallbladder on opening the abdomen</li> </ul>
Urine	<ul style="list-style-type: none"> <li>Aspirate 5–10 ml from the fundus of the urinary bladder either before opening the body or on opening the abdomen. If the bladder is empty, open the bladder using sterile instruments and take a bacteriological swab</li> </ul>
Cerebrospinal fluid	<ul style="list-style-type: none"> <li>Aspirate 5–10 ml from the cisterna magna before opening the body</li> </ul>
Other	<ul style="list-style-type: none"> <li>Swab any apparent focus of infection</li> <li>Examine the sites of occult sepsis – discitis, psoas abscess, middle ears</li> </ul>

*[Level of evidence – GPP.]*

## 11.2 Virology

It is not necessary to retain samples for virology in every autopsy. Where there is suspicion that death may have been caused or contributed to by a viral infection, samples should be collected for virology. Where no focus of infection is evident, a nasal swab or bronchial swab, and solid fragments of lung tissue, myocardium and brain are required. Samples of cerebrospinal fluid or other fluid collections may be relevant and should be retained for analysis.

*[Level of evidence – GPP.]*

## 11.3 Immunology

It is not necessary to retain samples for immunology in every postoperative death autopsy. Blood should be retained for immunology if the clinical history raises the possibility of anaphylaxis as a cause death (for mast cell tryptase analysis). If the clinical history raises the possibility of hepatitis, blood should be retained for serology and an autoantibody screen.

*[Level of evidence – GPP.]*

## 12 Imaging

Imaging of the body has been available for many decades. Traditionally, plain X-rays have been used, although increasingly post-mortem computed tomography and, to a lesser extent, post-mortem magnetic resonance imaging are available. Any autopsy case with imaging assessment should always have an external review but can proceed to radiological review promptly, unless the mortuary has a policy of scanning all cases. This is particularly useful in cases of multiple trauma where assessment of bony structures and body compartments can be readily appreciated in transverse section or reconstructed format. The possibility to combine this with injection of dye into vessels or other hollow structures may assist in understanding the role of any leakage, thrombosis or obstructions.

Imaging-based post-mortem examination should never be undertaken without an appropriate and thorough external examination of the body having been performed by a medical practitioner with appropriate expertise/qualifications, in line with current RCPATH/Royal College of Radiologists guidance.

*[Level of evidence – GPP.]*

### **13 Clinicopathological summary**

The clinicopathological summary should set out the pathological sequence logically. The clinicians and relatives are going to study the autopsy report very closely, as may lawyers and indeed the general public/press.

- Explain the cause of death in lay terms.
- Consider whether death occurred despite surgery or because of surgery.
- Consider whether the autopsy reveals evidence of surgical or anaesthetic error.
- Consult a more experienced pathologist to review the case, autopsy photographs and histology, if the pathology and cause of death are not clear.

The autopsy alone may not resolve the cause of death in all perioperative and postoperative deaths and a multidisciplinary approach with input from surgeons, anaesthetists and other clinicians may assist the pathologist in identifying the most probable/reasonable cause of death.

*[Level of evidence – GPP.]*

### **14 Examples of cause of death opinions/statements**

Where death occurs after a surgical intervention, the surgical intervention should be included in the cause of death formulation if it has contributed to the death.<sup>1</sup> Inclusion of surgical interventions in the cause of death formulation does not necessarily denote operative (or other) error.

- 1a. Cardiac tamponade
- 1b. Right ventricle rupture by temporary pacing wire
- 1c. Complete heart block following myocardial infarct
  
- 1a. Haemothorax
- 1b. Laceration of the right subclavian vein
- 1c. Thoracoscopic pulmonary lobectomy for adenocarcinoma of the lung
  
- 1a. Faecal peritonitis
- 1b. Ischaemic anastomotic dehiscence
- 1c. Sigmoid colectomy for adenocarcinoma of the sigmoid colon
  
- 1a. Bone cement implantation syndrome
- 1b. Cemented right hip hemiarthroplasty
- 1c. Osteoporotic fracture of the right femoral neck
2. Ischaemic heart disease

- 1a. Cardiac air embolus
- 1b. Central venous catheter placement
- 2. Adrenalectomy for adrenal phaeochromocytoma
  
- 1a. *Escherichia coli* septicaemia
- 1b. *Escherichia coli*-infected sacral pressure sores
- 1c. Reduced mobility following right hemicolectomy for adenocarcinoma of the ascending colon
- 1a. Pulmonary thromboembolus
- 1b. Reduced mobility
- 1c. Osteoporotic fracture of the left femoral neck (operated)

## 15 Criteria for audit

The following standards are suggested criteria that might be used in periodic reviews to ensure that post-mortem reports for coronial autopsies conducted at an institution comply with the national recommendations provided by the 2006 NCEPOD study ([www.ncepod.org.uk/2006Report/Downloads/Coronial%20Autopsy%20Report%202006.pdf](http://www.ncepod.org.uk/2006Report/Downloads/Coronial%20Autopsy%20Report%202006.pdf)):

- supporting documentation:
  - standards: 95% of supporting documentation was available at the time of the autopsy
  - standards: 95% of autopsy reports documented are satisfactory, good or excellent
- reporting internal examination:
  - standards: 100% of autopsy reports must explain the description of internal appearance
  - standards: 100% of autopsy reports documented are satisfactory, good or excellent
- reporting external examination:
  - standards: 100% of autopsy reports must explain the description of external appearance
  - standards: 100% of autopsy reports documented are satisfactory, good or excellent.

A template for coronial autopsy audit can be found on the Royal College of Pathologists' website ([www.rcpath.org/profession/quality-improvement/conducting-a-clinical-audit/clinical-audit-templates.html](http://www.rcpath.org/profession/quality-improvement/conducting-a-clinical-audit/clinical-audit-templates.html)).

## 16 References

1. Burton JL. Perioperative and postoperative deaths. *In: Burton JL, Rutty GN (eds). The Hospital Autopsy: A Manual of Fundamental Autopsy Practice (3rd edition)*. London, UK: Hodder Arnold, 2010.
2. Rutty GN. The external examination. *In: Burton JL, Rutty GN (eds). The Hospital Autopsy: A Manual of Fundamental Autopsy Practice (3rd edition)*. London, UK: Hodder Arnold, 2010.
3. Lloyd KL, Suvarna SK. External examination. *In: Suvarna SK (ed.). Atlas of Adult Autopsy: A Guide to Modern Practice*. Heidelberg, Germany: Springer International Publishing, 2016.
4. Rutty GN, Burton JL. The evisceration. *In: Burton JL, Rutty GN (eds). The Hospital Autopsy: A Manual of Fundamental Autopsy Practice (3rd edition)*. London, UK: Hodder Arnold, 2010.
5. Coe MS, Suvarna SK. Evisceration. *In: Suvarna SK (ed.). Atlas of Adult Autopsy: A Guide to Modern Practice*. Heidelberg, Germany: Springer International Publishing, 2016.
6. Burton JL, Saunders S, Hamilton S. Medical procedures and devices encountered at autopsy. *In: Burton JL, Saunders S, Hamilton S (eds). Atlas of Adult Autopsy Pathology*. Boca Raton, USA: CRC Press, 2015.
7. Suvarna SK. Devices: Foreign items encountered during the autopsy. *In: Suvarna SK (ed.). Atlas of Adult Autopsy: A Guide to Modern Practice*. Heidelberg, Germany: Springer International Publishing, 2016.
8. Burton JL, Rutty GN. Dissection of the internal organs. *In: Burton JL, Rutty GN (eds). The Hospital Autopsy: A Manual of Fundamental Autopsy Practice (3rd edition)*. London, UK: Hodder Arnold, 2010.
9. Johnson C, Lowe J, Osborn M. *Guidance for pathologists conducting post-mortem examinations of individuals with implanted electronic medical devices*. London, UK: The Royal College of Pathologists, 2015. Available at: [www.rcpath.org/profession/guidelines/specialty-specific-publications.html](http://www.rcpath.org/profession/guidelines/specialty-specific-publications.html)
10. Sheppard M, Suvarna SK. *Guidelines on autopsy practice: sudden death with likely cardiac pathology*. London, UK: The Royal College of Pathologists, 2015. Available at: <https://www.rcpath.org/profession/guidelines/autopsy-guidelines-series.html>
11. Lucas SB. The role of the autopsy in the diagnosis of sepsis and related fatal syndromes. *In Flanagan A (ed.). Recent Advances in Histopathology: 24*. London, UK: JP Medical Ltd., 2016.

## Appendix A Summary table – Explanation of grades of evidence

(modified from Palmer K *et al. BMJ* 2008;337:1832)

Grade (level) of evidence	Nature of evidence
Grade A	At least one high-quality meta-analysis, systematic review of randomised controlled trials or a randomised controlled trial with a very low risk of bias and directly attributable to the target population or A body of evidence demonstrating consistency of results and comprising mainly well-conducted meta-analyses, systematic reviews of randomised controlled trials or randomised controlled trials with a low risk of bias, directly applicable to the target population.
Grade B	A body of evidence demonstrating consistency of results and comprising mainly high-quality systematic reviews of case-control or cohort studies and high-quality case-control or cohort studies with a very low risk of confounding or bias and a high probability that the relation is causal and which are directly applicable to the target population or Extrapolation evidence from studies described in A.
Grade C	A body of evidence demonstrating consistency of results and including well-conducted case-control or cohort studies and high-quality case-control or cohort studies with a low risk of confounding or bias and a moderate probability that the relation is causal and which are directly applicable to the target population or Extrapolation evidence from studies described in B.
Grade D	Non-analytic studies such as case reports, case series or expert opinion or Extrapolation evidence from studies described in C.
Good practice point (GPP)	Recommended best practice based on the clinical experience of the authors of the writing group.

## Appendix B AGREE II guideline monitoring sheet

The autopsy guidelines of the Royal College of Pathologists comply with the AGREE II standards for good quality clinical guidelines. The sections of this autopsy guideline that indicate compliance with each of the AGREE II standards are indicated in the table.

AGREE standard	Section of guideline
<b>Scope and purpose</b>	
1 The overall objective(s) of the guideline is (are) specifically described	Introduction
2 The health question(s) covered by the guideline is (are) specifically described	Introduction
3 The population (patients, public, etc.) to whom the guideline is meant to apply is specifically described	Foreword
<b>Stakeholder involvement</b>	
4 The guideline development group includes individuals from all the relevant professional groups	Foreword
5 The views and preferences of the target population (patients, public, etc.) have been sought	Foreword
6 The target users of the guideline are clearly defined	Introduction
<b>Rigour of development</b>	
7 Systematic methods were used to search for evidence	Foreword
8 The criteria for selecting the evidence are clearly described	Foreword
9 The strengths and limitations of the body of evidence are clearly described	Foreword
10 The methods for formulating the recommendations are clearly described	Foreword
11 The health benefits, side effects and risks have been considered in formulating the recommendations	Foreword and Introduction
12 There is an explicit link between the recommendations and the supporting evidence	2–14
13 The guideline has been externally reviewed by experts prior to its publication	Foreword
14 A procedure for updating the guideline is provided	Foreword
<b>Clarity of presentation</b>	
15 The recommendations are specific and unambiguous	2–14
16 The different options for management of the condition or health issue are clearly presented	N/A
17 Key recommendations are easily identifiable	2–14
<b>Applicability</b>	
18 The guideline describes facilitators and barriers to its application	Foreword
19 The guideline provides advice and/or tools on how the recommendations can be put into practice	2–14
20 The potential resource implications of applying the recommendations have been considered	Foreword
21 The guideline presents monitoring and/or auditing criteria	15
<b>Editorial independence</b>	
22 The views of the funding body have not influenced the content of the guideline	Foreword
23 Competing interest of guideline development group members have been recorded and addressed	Foreword