Occasional article

The confidential enquiry into maternal deaths: its role and importance for pathologists

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SUMMARY Comparatively few pathologists seem to know of the existence of the confidential enquiry into maternal deaths and fewer still know anything of its aims or its methods of obtaining confidential information. As the success of any such enquiry depends greatly on the accuracy and completeness of necropsy, histological, and other laboratory reports a brief account of the report itself and the role of pathologists in it may not be out of place.

History and aims of the enquiry

The beginning of serious enquiry into maternal deaths dates back to 1928 when the then minister of health set up a departmental committee to look into problems of maternal mortality and morbidity. Its terms of reference included *An investigation into the actual circumstances of a large number of maternal deaths*. Information was collected by medical officers of health in England and Wales and an interim report was published in 1930 followed by a final one in 1932. In it the committee introduced the concept of primary avoidable factors, which they defined as "some departure from the (then) acceptable standards of satisfactory care from which ensued the train of events resulting in the death". At that time there were 4.4 deaths per 1000 live births. The committee continued its work until the end of 1951, by which time the mortality had fallen to 0.8 per 1000 live births, and published its findings in the annual reports *On the State of the Public Health*. A brief summary of this early history is available in the first triennial report.¹

In 1951 the minister decided to institute a more thorough assessment which should pinpoint the major continuing causes of maternal mortality and define more precisely the primary avoidable factors. After a full discussion at the 12th British Congress on Obs-

tretrics and Gynaecology, a new system was adopted whereby enquiries were initiated by the minister of health in every local health authority area, using a pre-prepared form from which the present form MCW 97 has been developed. The local consultant obstetrician, or, in the case of home delivery, the patient's own family doctor, usually supplied the relevant clinical information and all details were then sent to the regional assessor in obstetrics for the region concerned (see below). He or she made appropriate comments and forwarded the forms to the chief medical officer (CMO). The CMO in turn requested the help of his central consultant advisors in obstetrics and anaesthetics who surveyed all the forms and wrote the final report. These reports have been published at three yearly intervals, beginning with the years 1952-4, and their content is described more fully below. An avoidable factor was subsequently redefined as one which did "not necessarily mean that a death would have been prevented. It does mean that the possibility of further precaution is identified for the future." The term itself has now been replaced by "substandard care" which is used "to take into account not only failures in clinical care but also some of the underlying factors which may also have produced a low standard of care for the patient. These include shortage of resources for staffing facilities and administrative failure in the maternity services and back-up facilities such as anaesthetic, radiological and pathology services".² In the present financial climate pathologists will appreciate the importance of this redefinition.

Regional assessors in anaesthetics were appointed

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to work with their obstetric colleagues in 1973. Pathologists will note with interest and perhaps consternation, though possibly without surprise, that, though the whole enquiry and subsequent report depend by their very nature on accurate and complete necropsy and laboratory reports with appropriate histological assessment, in the first 20 years no pathologist had any official role in assessments or in the writing of the published triennial reports. In the 1973–5 report, published in 1978, however, the then CMO wrote as follows, “The importance of accurate diagnosis of the cause of death becomes greater as the number of deaths diminishes. Post-mortem examinations were carried out in 344 of the 390 deaths investigated but the authors and the regional assessors have all expressed concern that the reports available were not all as helpful as they might have been. The assessors need full details of the post-mortem and all histological examinations. More discussion between the clinician and the pathologist as to the cause of death at the time of the examination might help to elucidate some of the problems”.³ In 1980 the central consultant advisor in histopathology was invited to join the central assessors in obstetrics and anaesthesia as central assessor in pathology to the enquiry, and this was followed in 1981 by the appointment of regional pathology assessors. Their role was discussed at two meetings and various views on it were expressed. The consensus of opinion, which was not unanimous, but which in practice seems to have worked well, was that assessors could not and should not be expected to perform necropsies on every maternal death in their region, though they would naturally do those which fell to them in their own hospitals. They should be qualified and prepared to give advice to a colleague before or after he or she had performed a maternal necropsy; to advise on, and if the pathologist concerned agreed, to undertake to report or review the relevant histological data; to study all of the reports on maternal deaths which arose in their region, whether a necropsy had been performed or not, and make their comments on them; and to obtain additional information where this was desirable and available.

Scotland and Northern Ireland used to publish their own reports separately on similar but not identical lines. Following recent discussions it has been agreed that, although they will (or may) continue this practice, their comments and figures will in future be pooled with those from England and Wales to form a single United Kingdom Report for 1985–1987, and probably for future years.

Organisation and methods of obtaining information

These have little importance for pathologists and are therefore summarised briefly.

In England there are currently four central assessors, two in obstetrics, one in anaesthesia, and one in pathology. They work with a senior medical officer (SMO) from the DHSS and a representative from the Office of Population Censuses and Surveys (OPCS) who advises on statistical aspects of the Report. Each English region now has an assessor in obstetrics, anaesthesia, and pathology. The Welsh cases are collected separately by the Welsh Office and assessed by the Welsh assessors in the aforementioned disciplines. The OPCS, working on information supplied by the registrar general, provides the SMO responsible for the enquiry with a confidential copy of all death certificates on which any mention of pregnancy or related conditions occurs. This information is also supplied to district medical officers (DMOs), or the equivalent doctors giving advice to health districts whose staff scan all death certificates returned to them for their district. There is an obvious potential gap in that, in certain deaths, particularly those occurring late in the puerperium, the fact of a previous pregnancy may not be known or recorded, but DMOs often have accurate local knowledge of these and are also able to initiate the individual reports on these cases. Their staff and the staff of OPCS also look carefully at all death certificates for women of child-bearing age and follow these up to ensure that no death associated with pregnancy has been missed. In practice, the central assessors believe that they learn of virtually all deaths directly attributable to obstetric causes and are able to obtain confidential information on almost all of them. The coverage of indirect obstetric and fortuitous deaths is almost certainly less complete; fortunately these are of less interest to the enquiry.

When a DMO learns of a maternal death he or she sends out a special form, the MCW 97 (ID), which notifies the regional obstetric and regional pathology assessors that he or she is initiating enquiries to obtain information from the professional staff involved with the patient's care. These members of staff complete the main form, MCW 97. When the DMO considers that the information is complete he or she passes the MCW 97 form to the regional obstetric assessor, who makes any further necessary enquiries and adds confidential comments. If the patient received an anaesthetic the regional obstetric assessor then passes the MCW to the regional assessor in anaesthetics who will add further comments. All MCWs, irrespective of whether there has been a necropsy, are then normally sent to the regional pathology assessor, who will add comments and return the MCW to the regional obstetric assessor for onward transmission to the CMO at the DHSS. The forms are then made anonymous before they are seen by the central assessors. Although the procedure may sound cumbersome and can be time consuming, it

attempts to ensure that the regional pathology assessor sees the MCW 97 on every maternal death in the region, whether or not a necropsy has been performed.

The role of the regional pathology assessors

The regional pathology assessor acts as an advisor and an assessor. He or she expects to receive from the regional obstetric assessor MCWs on all maternal deaths notified to the region, irrespective of whether necropsy has been performed and of its standard. He or she comments on the absence of a necropsy when it seemed to be desirable or essential. If a necropsy seems to be incomplete or further information may be available he or she may contact the pathologist concerned and ask for help and collaboration. He or she will advise when requested, and will give an opinion on or undertake histological assessment if asked to do so. In no sense does he or she sit in judgement on colleagues, and his or her comments, which are seen only by the regional obstetric assessor and the central assessors are destroyed once the triennial report is written. The central assessors and many individual pathologists within the regions have found the help of their regional pathology assessor invaluable.

Confidentiality

It is necessary to give specific reassurance on this subject. The enquiry is both voluntary and entirely confidential. Although coroners are, in general, helpful in releasing to the central assessors copies of all necropsy reports which are their property, no attempt is made to coerce any individual pathologist into supplying additional information or material for histological assessment against his or her wishes, though the help of the pathologist concerned may be requested. No criticisms are ever made of any individual by name, nor are names of hospitals, patients, clinicians or pathologists mentioned at any stage in the report. All MCW 97 forms are numbered and rendered anonymous before they are seen by the central assessors and are destroyed before a triennial report is published. The aim of the enquiry is simply to further the achievement of high standards of care and to point out desirable and undesirable practices, whether clinical or related to the necropsy; it is not and never has been its object or wish to reflect on individuals. The assessors feel that the report has contributed to the fact that the number of maternal deaths has fallen in every successive triennium since its publication began and that the standard of maternal necropsies is rising as each year passes.

Classification of information obtained

TIME RELATION

All the triennial reports up to 1979–81 have included deaths from the time of first recognition of pregnancy to one year after delivery or miscarriage. Because data in some of the late deaths are difficult to obtain and certificates often do not record a previous pregnancy the assessors are, in the 1982–4 triennium, limiting detailed enquiry after birth to 42 days after miscarriage or delivery, which corresponds with the international definition of maternal death. This may exclude some small but important groups, particularly some of the suicides which are associated with puerperal depression, but the decision was taken because the data available become increasingly incomplete after that time. It may be modified for future triennia.

CATEGORIES OF DEATH

All deaths are placed in one of three subcategories, defined in ICD 9 and in the 1976–78 report as follows:

Direct deaths

Those resulting from obstetric complication of the pregnant state (pregnancy, labour, and puerperium), from interventions, omissions, incorrect treatment, or from a chain of events resulting from any of the above.

Indirect deaths

Those resulting from previous existing disease, or disease that developed during pregnancy and which was not due to direct obstetric causes, but which was aggravated by physiological effects of pregnancy.

Fortuitous deaths

Those in which the pregnancy played no part.

There is sometimes difficulty in deciding into which category certain deaths should fall, and what should be the single cause of death when there is more than one possibility. When this happens each death is discussed by the assessors and the final decision is made by consensus.

CLASSIFICATION OF CAUSES OF DEATH

All deaths are first allotted a single main cause and are then classified using the International Classification of Diseases, Injuries and Causes of Death (ICD) coding. They are then allocated to appropriate chapters and are there counted and discussed more fully, with cross reference to other chapters when required. The chapters in the 1982–84 triennial report are expected to be as follows: introduction; hypertensive diseases of pregnancy; haemorrhage; pulmonary embolism; ectopic pregnancy; amniotic fluid embolism; genital sepsis; ruptured uterus; deaths from miscellaneous causes; cardiac disease associated with pregnancy;

abortion, caesarean section; deaths associated with anaesthesia; indirect causes of maternal death; fortuitous deaths: "late" deaths; the maternal necropsy; summary and conclusions; overall assessment.

Each chapter is written initially by one of the central assessors. It is discussed at an assessors' meeting, revised, and then circulated to regional assessors for their comments. These are incorporated and the chapter rewritten and rediscussed. Finally, all chapters are correlated with each other and tables and statistics are checked by OPCS before submission to the CMO and the minister for their approval prior to publication.

Substandard care in pathology

The central assessors hold the view that because the success of the enquiry depends greatly on accurate and comprehensive necropsy reports, the most recent definition of substandard care on the part of clinicians given above should be extended to include the performance of a less than adequate necropsy or one which omits necessary histological data or other investigations. This is particularly relevant as most necropsies are done at the request of the coroner, who is necessarily more concerned with establishing the cause of death in as short a time as is reasonably possible than with the sequence of events leading to death or with detailed histological data. These data have, in the past, often been omitted from the report made at the time of inquest or certification, though they may be of vital importance to the clinician. The assessors believe that the realisation of the importance of a thorough necropsy of high standard with appropriate histological data and results of other necessary investigations will lead to an improvement of the quality of reports. Not all pathologists have specialised experience in maternal deaths, but regional assessors are always available for help or advice in particular instances and welcome receiving duplicate blocks or sections from pathologists who feel unable or unwilling to rely entirely on their own observations. A survey of necropsy reports over three consecutive triennia permits some observations on common deficiencies—and errors—some general, some concerned with particular diseases.

The maternal necropsy

Advice can always be obtained from the regional assessor in pathology before beginning a maternal necropsy, as to the particular points to look for or techniques to use. Published material is available for guidance,⁴ and the regional pathology assessor will always advise as to what blocks should be taken for histological assessment and, if need be, report on them

or look them over him or herself. Some important points to bear in mind, both in general and in particular suspected disease processes, are briefly summarised below.

CLINICAL HISTORY

Always try to talk with the clinicians and to the anaesthetist if relevant before starting the necropsy; get them to attend if possible and insist on a clear concise written summary of events. This can be difficult to obtain in coroner's cases, especially when the mortuary is not attached to the hospital in which death occurred but should always be insisted on.

NECROPSY

No specialised skills are needed. Always look carefully for pneumothorax, which can follow the introduction of intravenous catheters, for air and pulmonary emboli, and for the source of each if present; pelvic veins are as commonly thrombosed as leg veins. Always take a sterile blood sample at the start for possible culture or toxicology, even if you discard it later. If the cause of death is uncertain clinically or if sepsis is suspected also take uterine and vaginal swabs and ask for anaerobic as well as aerobic cultures. Split the pubic symphysis and open the uterus, cervix, and vagina anteriorly. Make a careful note of any tears or lacerations and then fix the organs entire for possible further examination later. Try to get hold of the placenta, or at least see a histological report on it, if one has been made. Always record the weight of at least the heart, liver, spleen and both kidneys. Always examine and weigh the brain, even in the absence of a history suggesting cerebral disease, and look carefully at cerebral venous sinuses for thrombosis. Make a careful note of all operation incisions and the sites and rough amounts of any internal haemorrhage.

MATERIAL FOR HISTOLOGICAL ASSESSMENT

Blocks from the following should be preserved in every case: pituitary; right and left ventricles; all lobes of each lung; liver; both kidneys; placental site; cervix; any other tissues which appeared abnormal to the naked eye. They should be fixed, blocked, and labelled even if the pathologist does not intend to examine them. Maternal deaths are rare occurrences and a full histological examination is always essential.

SPECIAL REQUIREMENTS IN PARTICULAR SUSPECTED CONDITIONS

Some particular conditions require particular additional histological processing, or other techniques; they are listed here in the same order as they are discussed in the report. Many appear self-evident, but it is surprising how often they have either not been performed or the results not recorded.

Hypertensive diseases

Weight heart and describe valves, chambers, and coronary arteries accurately. Examine and weigh kidneys. Take blocks from both kidneys, uterine placental bed, and left ventricle to look for evidence of previous hypertension and eclamptic changes in arterioles.

Haemorrhage

Describe the exact location of any bleeding into body cavities or tissues and try to assess the amount. Look for purpura or ecchymoses. Look carefully for tears or lacerations in the genital tract. Examine the placental site; has there been adherence and is there any evidence of previous caesarean section? Histologically look for evidence of diffuse intravascular coagulation (DIC) and microthrombi. These may be difficult to find; an Martius-scarlet-blue stain may help.

Pulmonary embolism

Describe size and site of embolism and presence or absence of infarct in lungs. Search carefully for site of origin, especially in pelvic veins. Take blocks from both lungs, even if no obvious infarct is present.

Ectopic pregnancy

State exact site, and if tubal, which side and whether rupture or leakage of blood has occurred. If tubal take blocks from either side of the ectopic tube if possible, and from the opposite tube to assess previous tubal disease.

Amniotic fluid embolism (AFE), DIC, and sepsis

As these can be confused with and complicate one another, adopt the same procedure for each, especially when there is a clinical history of sudden collapse. Study the clinical history and laboratory haematology reports carefully and consult the haematologist if relevant. Take blood and swabs for aerobic and anaerobic culture. Look carefully in pulmonary trunk and main branches for amniotic material (very rarely recognisable by naked eye). Look carefully for uterine tears and lacerations. Take blocks from all lobes of both lungs (histological confirmation of AFE is obligatory) and from any lacerations present and also material to look for evidence of DIC.

Cardiac disease

Weight heart and describe fully, paying special attention to valves, chambers, outflow tracts and coronary arteries. Examine carefully and weigh kidneys; look at aorta. If cardiomyopathy is suspected pay special attention to outflow tracts and label tissue blocks carefully with exact site of origin.

Abortion

Make careful records of uterine size and appearance; look carefully for tears or other signs of injury. Take blood and swabs for culture. Examine both tubes carefully.

Miscellaneous

Always take blood at the start for possible culture or toxicological analysis. Always weigh and take blocks from liver. Otherwise proceed appropriately for the suspected cause of death.

Anaesthetic deaths

These can be particularly difficult, especially when life has been maintained on a support machine and the original disease has changed with treatment, or disappeared. Insist on talking personally with the anaesthetist concerned. Examine carefully the oesophagus for evidence of trauma or misplaced insertion of an endotracheal tube, and the trachea and bronchi for evidence of inflammation, trauma, or inhalation of gastric content. Take blood and swabs for culture. Describe lungs accurately and take material from all lobes to look for evidence of infection, collapse, shock lung etc.

Fields for research

Maternal deaths are, fortunately, rare enough for practising pathologists only to see a handful in a lifetime. This means that research into some of the interesting but rare conditions which cause death has to be planned centrally after a study of the records of all the regions. A start has been made, and a short interim report on progress covering the triennia 1976–78, 1979–81 and 1982–84 concludes this paper.

THE NORMAL LIVER IN LATE PREGNANCY

A study of those necropsy reports on deaths from the 38th week of pregnancy up to the end of the first week of the puerperium in which the weight and micro-

Table Arterial aneurysms in the triennia 1970–1984

Site	Triennium				Total
	70–72	73–75	76–78	79–81	
Aorta with Marfan	1	2	—	1	4
Aorta without Marfan	—	—	2	—	2
Aorta, Marfan not specified	5	3	—	2	10
Splenic	6	1	1	2	10
Cerebral	10	2	8	8	28
Coronary	—	—	—	1	1
Other (liver, renal)	—	—	2	—	2
Total	22	8	13	14	57

This table is reproduced from the *Report on Confidential Enquiries into Maternal Deaths in England and Wales 1982–1984* (by permission of HMSO).

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scopic appearances of the liver were recorded shows that, irrespective of the cause of death, the liver always weighed more than 2000 g and in some cases as much as 2500 g. In those patients in whom the cause of death was totally unrelated to liver damage—for example, amniotic fluid embolism or road accident—the histological appearance varied; there was some evidence of congestion that did not seem by itself to be sufficient to account for the increase in weight, a moderate degree of fatty change, and probably some actual hypertrophy of liver cells, though no accurate measurements were made. It would be interesting if all regional assessors in pathology could ascertain liver weights and histological appearances in all deaths after 28 weeks of pregnancy.

CARDIOMYOPATHY OF PREGNANCY

Those examples of cardiomyopathy which seem to arise primarily in pregnancy have been incompletely studied. Furthermore, much fuller reports including very detailed anatomical descriptions and extensive histological data are needed to determine the nature of this condition.

ARTERIAL ANEURYSMS

There has been a definite increase in the number of aneurysms occurring in pregnant as opposed to non-pregnant women in the 15–44 age group. In the period 1970–1984 there were 33 (table). Unfortunately, histological reports are neither numerous nor detailed, and further information is needed, particularly on the presence of connective tissue degeneration and medionecrosis, and the presence or absence of stigmata of Marfan's syndrome or Ehlers-Danlos syndrome, type 4.

CEREBRAL VENOUS THROMBOSES

Venous sinus thrombosis is a well recognised complication of the puerperium, particularly after preterm delivery. The explanation for this is not known, the lesion is not well recognised by pathologists, and the descriptions given of those cases where the diagnosis has been made generally inadequate.

My thanks are due to my fellow central assessors in obstetrics (Professors A G Turnbull, V R Tindall, and R Beard) and Anaesthetics (Sir G Robson) for much helpful discussion; to all regional assessors in pathology who have done so much to obtain additional information when needed and to improve the standards in this field of pathology; and especially to Dr Elizabeth Cloake, the senior medical officer attached to the enquiry, who read and criticised the manuscript and detected errors and omissions.

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