



Pediatric and Fetal Postmortem Imaging: Implementation in Clinical Practice: A Multi-Society Statement

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Purpose or Learning Objective:

This Statement aims to systematically address the challenges, propose consensus recommendations, and to provide practical tips to facilitate the successful implementation of postmortem imaging (PMI) in medical imaging departments.

Methods or Background:

Postmortem imaging following fetal, perinatal and pediatric demise is increasingly used in clinical practice, either as a non-invasive adjunct or alternative to conventional autopsy. Use of such techniques in clinical departments may face numerous barriers and challenges, varying between centers, countries and continents, influenced by differences in healthcare systems, funding sources and local regulations. Furthermore, different issues arise for each specific indication of pediatric PMI (such as intra-uterine demise, termination of pregnancy for confirmation of anatomical abnormalities, and forensic investigations of infants and childhood deaths) since the processes, goals of the investigation, and involved teams vary.

For radiologists and clinicians interested in providing a fetal and/or pediatric postmortem imaging service, where to start and what to do first can be unclear.

This multi-society position statement has been drawn up and endorsed by international experts across a variety of pediatric imaging societies including the: Society for Paediatric Radiology (SPR), the European Society of Paediatric

Radiology (ESPR), Asian Oceanic Society of Paediatric Radiology (AOSPR), Sociedad Latinoamericana de Radiologia Pediatrica (SLARP), the International Association of Forensic Radiographers (IAFR) and the World Federation of Pediatric Imaging (WFPI).

Results or Findings:

This statement aims to systematically address the challenges and propose agreed recommendations across a number of key themes:

1. Practical Considerations for PMI:

Table 1 describes some theoretical prerequisites to consider before starting a PMI service, along with key references for further reading.

2. Funding streams and scanner availability for PMI

Despite the decline in parental acceptance for conventional autopsies and the increased use of PMI in clinical settings, evidence suggests that the primary barrier to widespread implementation includes the lack of dedicated funding, incomplete or partial funding, or research grant funding instead of standard clinical imaging remuneration [32-34]. Where cross-sectional PMI has shifted from research to routine clinical practice, mainstream funding for service provision has often not followed.

In a recent survey conducted among members of the ESPR Postmortem taskforce, only a third of institutions reported receiving full funding or reimbursement for their current medical (non-forensic) PMI practice, whereas forensic postmortem imaging was fully reimbursed in over 50 % of institutions [10]. In North America, PMI regardless of indication was reimbursed in less than 15% of institutions surveyed [11], and costs were typically absorbed by the radiology department or the hospital itself; none was derived from medical insurance. The primary sources of funding for PMI were national/state funding streams or prearranged fees per study through coroners or medical examiners. In order to begin a PMI service, hospital administrators must first be persuaded to support a program that currently lacks reimbursement, without a clear mechanism for future sustainability, for example through specific billing codes. Most survey respondents believed that national/state funding or an insurance-based stream would be the preferred method for funding postmortem imaging services [10]. The development of national and/or international guidelines for postmortem imaging referral, acquisition and reporting - initiatives supported by multiple international postmortem task forces - could help standardize practice and strengthen the case for formal funding and reimbursement pathways [35,9].

In some countries with more mature workflow (e.g., the Netherlands, Switzerland, UK, Australia, Japan, the USA, and Canada), several pathology departments or forensic medicine facilities are equipped with dedicated MRI and/or CT scanners, and imaging is already integrated as part of a comprehensive postmortem assessment. In such settings, imaging is performed on-site - alleviating pressure on busy hospital clinical scanners (although the current throughput of 10 – 100 cases/year suggests that this is not a significant factor [35]) - and the resulting studies are interpreted separately by radiologists or experienced pathologists. The medical imaging departments then invoice the coroner's office for the radiology report. Another potential strategy to optimize scanner time and availability for these relatively unpredictable cases is to schedule postmortem imaging before the start or after the end of the routine clinical schedule. Although this approach may incur additional costs due to extended personnel time e.g. MRI technologists or mortuary staff, it facilitates body transport without interfering with clinical patient flow, addressing both logistical and privacy concerns. Indeed, emotional and psychological considerations must also be acknowledged when scheduling postmortem imaging alongside routine clinical scans. Some patients or their families may feel distressed upon learning that a deceased individual was recently imaged on the same scanner, regardless of whether they witnessed the transfer or were assured of appropriate cleaning protocols.

Given the long imaging waiting lists for both emergent and non-emergent clinical cases, funding for PMI may not be seen as a priority. Health economic impact assessments have yet to be conducted, but they may provide valuable insights into how and where PMI may offer cost-saving opportunities and improve efficiency within pathology and mortuary services. In addition, PMI can provide critical information in cases where parents decline conventional autopsy, supporting both diagnostic clarification and offering closure to aid in the grieving process. The potential cost savings involved in preventing future pregnancy losses if phenotyping through PMI enables a genetic diagnosis to be made remains largely unrecognised and unquantified. This will vary by clinical indication and by the local availability and cost of genetic testing, particularly for single-gene disorders. Key statements to improve funding are summarized in **Table 2**.

3. Regulatory and organizational considerations for PMI

PMI is widely used in Europe and Oceania, with minimal English-language published information on how this is conducted in Africa or Latin/South America. There has been slower uptake in North America, which may partially be related to billing complexities, but more than 50% of the 18 surveyed institutions in a recent SPR survey used PMCT and

24% PMMRI [10]. While similar challenges are encountered globally, medicolegal systems vary significantly between countries and continents, and it is important to understand the specific local regulations surrounding pediatric death investigations, and to establish good communication with local Departments of Justice, coroners and medical examiners and pathologists, to ensure effective collaboration with medical imaging departments.

Before the first PMI case is conducted in the imaging department, a clear and detailed protocol must be established. This should cover the transport of the body to the scanner, including a designated route through the hospital (ideally separated from outpatient areas), identification of an appropriate transport box, assignment of responsible personnel and adequate scheduling. Ideally, the body should be transported by medical personnel or a mortuary technician (in medical cases) or the investigator/police officer (in forensic cases). In forensic cases this person should also remain with the body in the imaging department throughout the examination in order to guard the chain of evidence. Radiographers should be trained in PMI not only on how it should be done, but even more so on the rationale behind PMI. Discussions need to include all relevant stakeholders, including referring clinicians, technologists, radiologists, pathologists, and administrative assistants, to allow for effective organizational and logistical communication. In each department, a dedicated group of, trained imaging professionals who are or used to dealing with PMI should be established to manage all related cases. Current recommendations for PMCT suggest scanning should be performed without removing medical devices (especially in legal cases) [36]; although some metalwork must be removed prior to MRI.

Imaging results should be communicated directly with the referring clinician and/or the pathologist who is performing the limited or conventional autopsy, via the established reporting pathway. Establishing an expected turnaround time for the radiology report is crucial, especially when only a small number of radiologists are designated to read these studies, or during weekends and holiday periods. This is particularly important if an autopsy is to be performed, and in the cases of faith deaths where a rapid burial may be sought. If the PMI is not reported prior to the autopsy, valuable information might be lacking that could direct the procedure, target biopsies, and limit the necessary scope of the autopsy. Direct communication with the requesting physician is essential throughout the process - from the initial request to discussing the final results. Key statements around regulation and organization of PMI are summarized in **Table 2**.

4. Practical tips from successfully implemented services

- Radiographer engagement and support
- Using a research-to-clinical approach
- Promoting PMI service
- Engage the Pathology Department
- Flexible scheduling
- Use of imaging equipment in pathology/forensic departments
- Communication, communication, communication!

5. Education and PMI literacy

The ESPR, the SPR and the International Society of Forensic Radiology and Imaging (ISFRI) all have dedicated paediatric postmortem imaging subcommittees and can provide guidance on training opportunities and may facilitate informal visits with specialist centers that routinely perform PMI.

Key statements around PMI education are summarized in **Table 2**.

Conclusion:

Fetal and pediatric postmortem imaging plays a very valuable role for families and clinicians following the death of a fetus or child. To improve and sustain high quality service provision, it is essential to formalize jurisdictional referral pathways, establish consistent funding mechanisms, and develop dedicated educational resources.

Personal Information:

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	Technical guidance
Imaging	<p>Depends on relevant indicators, age of the child/gestational fetus and availability of local resources and expertise.</p> <p>For forensic death, the imaging findings should be kept as per normal death, not the dead body.</p> <p>For adult forensic imaging, the 2015 European Society of Radiology (ESR) guidelines for forensic imaging techniques such as high resolution CT, MRI, and ultrasound (US) should be followed, with additional considerations for forensic imaging (1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,42,43,44,45,46,47,48,49,50,51,52,53,54,55,56,57,58,59,60,61,62,63,64,65,66,67,68,69,70,71,72,73,74,75,76,77,78,79,80,81,82,83,84,85,86,87,88,89,90,91,92,93,94,95,96,97,98,99,100,101,102,103,104,105,106,107,108,109,110,111,112,113,114,115,116,117,118,119,120,121,122,123,124,125,126,127,128,129,130,131,132,133,134,135,136,137,138,139,140,141,142,143,144,145,146,147,148,149,150,151,152,153,154,155,156,157,158,159,160,161,162,163,164,165,166,167,168,169,170,171,172,173,174,175,176,177,178,179,180,181,182,183,184,185,186,187,188,189,190,191,192,193,194,195,196,197,198,199,200,201,202,203,204,205,206,207,208,209,210,211,212,213,214,215,216,217,218,219,220,221,222,223,224,225,226,227,228,229,230,231,232,233,234,235,236,237,238,239,240,241,242,243,244,245,246,247,248,249,250,251,252,253,254,255,256,257,258,259,260,261,262,263,264,265,266,267,268,269,270,271,272,273,274,275,276,277,278,279,280,281,282,283,284,285,286,287,288,289,290,291,292,293,294,295,296,297,298,299,300,301,302,303,304,305,306,307,308,309,310,311,312,313,314,315,316,317,318,319,320,321,322,323,324,325,326,327,328,329,330,331,332,333,334,335,336,337,338,339,340,341,342,343,344,345,346,347,348,349,350,351,352,353,354,355,356,357,358,359,360,361,362,363,364,365,366,367,368,369,370,371,372,373,374,375,376,377,378,379,380,381,382,383,384,385,386,387,388,389,390,391,392,393,394,395,396,397,398,399,400,401,402,403,404,405,406,407,408,409,410,411,412,413,414,415,416,417,418,419,420,421,422,423,424,425,426,427,428,429,430,431,432,433,434,435,436,437,438,439,440,441,442,443,444,445,446,447,448,449,450,451,452,453,454,455,456,457,458,459,460,461,462,463,464,465,466,467,468,469,470,471,472,473,474,475,476,477,478,479,480,481,482,483,484,485,486,487,488,489,490,491,492,493,494,495,496,497,498,499,500,501,502,503,504,505,506,507,508,509,510,511,512,513,514,515,516,517,518,519,520,521,522,523,524,525,526,527,528,529,530,531,532,533,534,535,536,537,538,539,540,541,542,543,544,545,546,547,548,549,550,551,552,553,554,555,556,557,558,559,560,561,562,563,564,565,566,567,568,569,570,571,572,573,574,575,576,577,578,579,580,581,582,583,584,585,586,587,588,589,590,591,592,593,594,595,596,597,598,599,600,601,602,603,604,605,606,607,608,609,610,611,612,613,614,615,616,617,618,619,620,621,622,623,624,625,626,627,628,629,630,631,632,633,634,635,636,637,638,639,640,641,642,643,644,645,646,647,648,649,650,651,652,653,654,655,656,657,658,659,660,661,662,663,664,665,666,667,668,669,670,671,672,673,674,675,676,677,678,679,680,681,682,683,684,685,686,687,688,689,690,691,692,693,694,695,696,697,698,699,700,701,702,703,704,705,706,707,708,709,710,711,712,713,714,715,716,717,718,719,720,721,722,723,724,725,726,727,728,729,730,731,732,733,734,735,736,737,738,739,740,741,742,743,744,745,746,747,748,749,750,751,752,753,754,755,756,757,758,759,760,761,762,763,764,765,766,767,768,769,770,771,772,773,774,775,776,777,778,779,780,781,782,783,784,785,786,787,788,789,790,791,792,793,794,795,796,797,798,799,800,801,802,803,804,805,806,807,808,809,810,811,812,813,814,815,816,817,818,819,820,821,822,823,824,825,826,827,828,829,830,831,832,833,834,835,836,837,838,839,840,841,842,843,844,845,846,847,848,849,850,851,852,853,854,855,856,857,858,859,860,861,862,863,864,865,866,867,868,869,870,871,872,873,874,875,876,877,878,879,880,881,882,883,884,885,886,887,888,889,890,891,892,893,894,895,896,897,898,899,900,901,902,903,904,905,906,907,908,909,910,911,912,913,914,915,916,917,918,919,920,921,922,923,924,925,926,927,928,929,930,931,932,933,934,935,936,937,938,939,940,941,942,943,944,945,946,947,948,949,950,951,952,953,954,955,956,957,958,959,960,961,962,963,964,965,966,967,968,969,970,971,972,973,974,975,976,977,978,979,980,981,982,983,984,985,986,987,988,989,990,991,992,993,994,995,996,997,998,999,1000).</p>
Imaging	<p>For forensic death, the imaging findings should be kept as per normal death, not the dead body.</p> <p>For adult forensic imaging, the 2015 European Society of Radiology (ESR) guidelines for forensic imaging techniques such as high resolution CT, MRI, and ultrasound (US) should be followed, with additional considerations for forensic imaging (1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,42,43,44,45,46,47,48,49,50,51,52,53,54,55,56,57,58,59,60,61,62,63,64,65,66,67,68,69,70,71,72,73,74,75,76,77,78,79,80,81,82,83,84,85,86,87,88,89,90,91,92,93,94,95,96,97,98,99,100,101,102,103,104,105,106,107,108,109,110,111,112,113,114,115,116,117,118,119,120,121,122,123,124,125,126,127,128,129,130,131,132,133,134,135,136,137,138,139,140,141,142,143,144,145,146,147,148,149,150,151,152,153,154,155,156,157,158,159,160,161,162,163,164,165,166,167,168,169,170,171,172,173,174,175,176,177,178,179,180,181,182,183,184,185,186,187,188,189,190,191,192,193,194,195,196,197,198,199,200,201,202,203,204,205,206,207,208,209,210,211,212,213,214,215,216,217,218,219,220,221,222,223,224,225,226,227,228,229,230,231,232,233,234,235,236,237,238,239,240,241,242,243,244,245,246,247,248,249,250,251,252,253,254,255,256,257,258,259,260,261,262,263,264,265,266,267,268,269,270,271,272,273,274,275,276,277,278,279,280,281,282,283,284,285,286,287,288,289,290,291,292,293,294,295,296,297,298,299,300,301,302,303,304,305,306,307,308,309,310,311,312,313,314,315,316,317,318,319,320,321,322,323,324,325,326,327,328,329,330,331,332,333,334,335,336,337,338,339,340,341,342,343,344,345,346,347,348,349,350,351,352,353,354,355,356,357,358,359,360,361,362,363,364,365,366,367,368,369,370,371,372,373,374,375,376,377,378,379,380,381,382,383,384,385,386,387,388,389,390,391,392,393,394,395,396,397,398,399,400,401,402,403,404,405,406,407,408,409,410,411,412,413,414,415,416,417,418,419,420,421,422,423,424,425,426,427,428,429,430,431,432,433,434,435,436,437,438,439,440,441,442,443,444,445,446,447,448,449,450,451,452,453,454,455,456,457,458,459,460,461,462,463,464,465,466,467,468,469,470,471,472,473,474,475,476,477,478,479,480,481,482,483,484,485,486,487,488,489,490,491,492,493,494,495,496,497,498,499,500,501,502,503,504,505,506,507,508,509,510,511,512,513,514,515,516,517,518,519,520,521,522,523,524,525,526,527,528,529,530,531,532,533,534,535,536,537,538,539,540,541,542,543,544,545,546,547,548,549,550,551,552,553,554,555,556,557,558,559,560,561,562,563,564,565,566,567,568,569,570,571,572,573,574,575,576,577,578,579,580,581,582,583,584,585,586,587,588,589,590,591,592,593,594,595,596,597,598,599,600,601,602,603,604,605,606,607,608,609,610,611,612,613,614,615,616,617,618,619,620,621,622,623,624,625,626,627,628,629,630,631,632,633,634,635,636,637,638,639,640,641,642,643,644,645,646,647,648,649,650,651,652,653,654,655,656,657,658,659,660,661,662,663,664,665,666,667,668,669,670,671,672,673,674,675,676,677,678,679,680,681,682,683,684,685,686,687,688,689,690,691,692,693,694,695,696,697,698,699,700,701,702,703,704,705,706,707,708,709,710,711,712,713,714,715,716,717,718,719,720,721,722,723,724,725,726,727,728,729,730,731,732,733,734,735,736,737,738,739,740,741,742,743,744,745,746,747,748,749,750,751,752,753,754,755,756,757,758,759,760,761,762,763,764,765,766,767,768,769,770,771,772,773,774,775,776,777,778,779,780,781,782,783,784,785,786,787,788,789,790,791,792,793,794,795,796,797,798,799,800,801,802,803,804,805,806,807,808,809,810,811,812,813,814,815,816,817,818,819,820,821,822,823,824,825,826,827,828,829,830,831,832,833,834,835,836,837,838,839,840,841,842,843,844,845,846,847,848,849,850,851,852,853,854,855,856,857,858,859,860,861,862,863,864,865,866,867,868,869,870,871,872,873,874,875,876,877,878,879,880,881,882,883,884,885,886,887,888,889,890,891,892,893,894,895,896,897,898,899,900,901,902,903,904,905,906,907,908,909,910,911,912,913,914,915,916,917,918,919,920,921,922,923,924,925,926,927,928,929,930,931,932,933,934,935,936,937,938,939,940,941,942,943,944,945,946,947,948,949,950,951,952,953,954,955,956,957,958,959,960,961,962,963,964,965,966,967,968,969,970,971,972,973,974,975,976,977,978,979,980,981,982,983,984,985,986,987,988,989,990,991,992,993,994,995,996,997,998,999,1000).</p>
Imaging	<p>For forensic death, the imaging findings should be kept as per normal death, not the dead body.</p> <p>For adult forensic imaging, the 2015 European Society of Radiology (ESR) guidelines for forensic imaging techniques such as high resolution CT, MRI, and ultrasound (US) should be followed, with additional considerations for forensic imaging (1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,42,43,44,45,46,47,48,49,50,51,52,53,54,55,56,57,58,59,60,61,62,63,64,65,66,67,68,69,70,71,72,73,74,75,76,77,78,79,80,81,82,83,84,85,86,87,88,89,90,91,92,93,94,95,96,97,98,99,100,101,102,103,104,105,106,107,108,109,110,111,112,113,114,115,116,117,118,119,120,121,122,123,124,125,126,127,128,129,130,131,132,133,134,135,136,137,138,139,140,141,142,143,144,145,146,147,148,149,150,151,152,153,154,155,156,157,158,159,160,161,162,163,164,165,166,167,168,169,170,171,172,173,174,175,176,177,178,179,180,181,182,183,184,185,186,187,188,189,190,191,192,193,194,195,196,197,198,199,200,201,202,203,204,205,206,207,208,209,210,211,212,213,214,215,216,217,218,219,220,221,222,223,224,225,226,227,228,229,230,231,232,233,234,235,236,237,238,239,240,241,242,243,244,245,246,247,248,249,250,251,252,253,254,255,256,257,258,259,260,261,262,263,264,265,266,267,268,269,270,271,272,273,274,275,276,277,278,279,280,281,282,283,284,285,286,287,288,289,290,291,292,293,294,295,296,297,298,299,300,301,302,303,304,305,306,307,308,309,310,311,312,313,314,315,316,317,318,319,320,321,322,323,324,325,326,327,328,329,330,331,332,333,334,335,336,337,338,339,340,341,342,343,344,345,346,347,348,349,350,351,352,353,354,355,356,357,358,359,360,361,362,363,364,365,366,367,368,369,370,371,372,373,374,375,376,377,378,379,380,381,382,383,384,385,386,387,388,389,390,391,392,393,394,395,396,397,398,399,400,401,402,403,404,405,406,407,408,409,410,411,412,413,414,415,416,417,418,419,420,421,422,423,424,425,426,427,428,429,430,431,432,433,434,435,436,437,438,439,440,441,442,443,444,445,446,447,448,449,450,451,452,453,454,455,456,457,458,459,460,461,462,463,464,465,466,467,468,469,470,471,472,473,474,475,476,477,478,479,480,481,482,483,484,485,486,487,488,489,490,491,492,493,494,495,496,497,498,499,500,501,502,503,504,505,506,507,508,509,510,511,512,513,514,515,516,517,518,519,520,521,522,523,524,525,526,527,5</p>