

Data-driven insights into post-autopsy consultations: causes of perinatal mortality and parental outcomes

Rosario Barranco^{1*}, Matteo Lorenzoni^{2*}, Francesco Ausania², Francesco Ventura^{1,3}, Riccardo Guglielmo^{4,5}, Maria Teresa Divizia⁶, Simone Ferrero^{4,7}, Pierangela De Biasio⁸, Cesare Arioni⁹, Chiara Maria Biatta¹⁰, Gabriele Gaggero¹¹, Michele Paudice^{12,13*}, Valerio Gaetano Vellone^{11,12*}

¹ Department of Health Sciences (DISSAL), University of Genoa, Genoa, Italy; ² Department of Diagnostic and Public Health, Section of Forensic Medicine, University of Verona, Italy; ³ Forensic Medicine Unit, IRCCS Ospedale Policlinico San Martino, Genoa, Italy; ⁴ Department of Neurosciences, Rehabilitation, Ophthalmology, Genetics, Maternal and Child Health (DINO-GM), University of Genoa, Genoa, Italy; ⁵ Psychiatry Unit IRCCS Ospedale Policlinico San Martino, Genoa, Italy; ⁶ Genomics & Clinical Genetics, IRCCS Istituto Giannina Gaslini, Genoa, Italy; ⁷ Obstetrics & Gynecology University Unit, IRCCS Ospedale Policlinico San Martino, Genoa, Italy; ⁸ Prenatal Diagnosis and Perinatal Medicine Unit, IRCCS Ospedale Policlinico San Martino, Genoa, Italy; ⁹ Neonatology Unit, IRCCS Ospedale Policlinico San Martino, Genoa, Italy; ¹⁰ Pathology Unit, IRCCS Istituto Oncologico Veneto (IOV), Padua, Italy; ¹¹ Pathology Unit, IRCCS Istituto Giannina Gaslini, Genoa, Italy; ¹² Department of Integrated Diagnostic and Surgical Sciences (DISC), University of Genoa, Genoa, Italy; ¹³ Pathology University Unit, IRCCS Ospedale Policlinico San Martino, Genoa, Italy

* These authors share senior authorship

Summary

Objective. Perinatal mortality deeply affects parents and healthcare providers. Post-autopsy consultations (PACs) help parents understand the causes of fetal death and offer emotional support. This study evaluates their effectiveness in emotional healing, preventing medico-legal disputes, and identifying key death causes.

Methods. This retrospective study analyzes 360 fetal autopsies at San Martino Hospital, Genoa (2013-2021). Among them, 120 parents sought PACs. Causes of fetal death were classified using the relevant condition at death (ReCoDe) system, and parental emotional outcomes were evaluated based on consultation timing.

Results. Fetal causes, mainly congenital anomalies, accounted for 52.5% of deaths, while placental causes were 46.7%. PACs performed within 5 months of loss led to better emotional outcomes, whereas delayed PACs were linked to ongoing distress. Parents who attended with partners reported greater emotional stability. Additionally, PACs helped reduce medico-legal disputes by clarifying causes of death.

Conclusions. PACs are crucial for helping parents cope with fetal loss, offering emotional closure and reducing legal disputes. A multidisciplinary approach with clear communication from healthcare professionals addresses both the medical and emotional aspects of perinatal mortality. Tailored follow-up care is essential for supporting grieving parents and managing future pregnancies.

Key words: fetal death, postmortem examination, post-autopsy consultation, placental pathology, emotional response

Introduction

Perinatal mortality remains a critical concern in modern healthcare. With this term, the World Health Organization (WHO) encompasses stillbirths from 22 weeks of gestation and early neonatal deaths (0 to 6 days) ¹ and recommends that all fetuses and infants weighing at least 500 g at birth, whether alive or dead, should be included in the statistics. Nevertheless,

Received: February 16, 2025
Accepted: May 27, 2025

Correspondence

Valerio Gaetano Vellone
E-mail: valerio.vellone@unige.it;
valeriovellone@gaslini.org

How to cite this article: Barranco R, Lorenzoni M, Ausania F, et al. Data-driven insights into post-autopsy consultations: causes of perinatal mortality and parental outcomes. *Pathologica* 2025;117:357-365 <https://doi.org/10.32074/1591-951X-N1059>

© Copyright by Società Italiana di Anatomia Patologica e Citopatologia Diagnostica, Divisione Italiana della International Academy of Pathology



OPEN ACCESS

This is an open access journal distributed in accordance with the CC-BY-NC-ND (Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International) license: the work can be used by mentioning the author and the license, but only for non-commercial purposes and only in the original version. For further information: <https://creativecommons.org/licenses/by-nc-nd/4.0/deed.en>

many countries' definitions of perinatal mortality may differ to some extent ², based on the gestational age threshold (some countries still use 24 or 28 weeks), the inclusion of a birth weight criterion (often set at 500 or 1000 grams), or on the extension of the early neonatal death interval up to 28 days. For international comparisons, the WHO includes only stillborn fetuses with a birth weight of 1000 grams or more or a gestational age of 28 weeks or more (late stillbirths) ³. Despite advances in prenatal care and medical interventions, perinatal mortality rates continue to present a significant challenge worldwide, with an estimated 1.9 million stillbirths occurring annually ⁴. The incidence of perinatal mortality varies globally, with higher rates observed in low-income countries ⁵.

In Italy, perinatal mortality remains a pressing issue, and healthcare professionals request more training on the psychological and emotional management of stillbirth to better support parents ⁶. Declining birth rates, combined with the growing medicalization of pregnancy, have contributed to heightened expectations of flawless pregnancy outcomes ^{7,8}. However, when miscarriage or stillbirth occur, they can lead to profound grief and a need for answers, often culminating in the request for a PAC. In recent years, a significant decline in Italy's birth rates has been documented: according to the Italian National Institute of Statistics (ISTAT), 393,000 live births were listed in 2023, a significant 1.7% drop from 2022. This decline, coupled with a decrease in the average number of children per woman and an increase in the age of first-time mothers, underscores the importance of addressing perinatal mortality systematically. The medicalization of conception and pregnancy has led to increased reliance on Assisted Reproductive Technologies ⁹ and prenatal diagnostics; while offering significant benefits, this may also contribute to unrealistic expectations regarding pregnancy outcomes. The perception that medical science can control all aspects of reproduction has fostered a misconception that any adverse outcome could be attributable to malpractice. From Italy's perspective, the Maternal-Child Area (including Gynecology and Obstetrics, Pediatrics, Neonatology, and NICU Operating Units) is a primary source of medicolegal claim litigations, and based on author's experience the average cost per claim compensation analysis reveals that the highest expenses are associated with Operating Units within this sector.

The primary aim of this study is to understand and evaluate the role of PAC in helping parents comprehend the causes of fetal death, processing and overcoming grief, and guiding future pregnancy choices. Since parents often feel overwhelmed by guilt, conversations with family members should prioritize hon-

esty, compassion, and the pathologist's professional judgment to provide clear and comprehensive information ¹⁰.

From the pathologist's perspective who leads the PAC, this study seeks to sort the main causes of fetal deaths using the relevant condition at death (ReCoDe) classification system ¹¹, providing clear insights into the fetal, placental, and maternal aspects involved. By exploring correlations between demographic factors (such as maternal age, gestational age at the time of loss, and timing of consultation requests) and the outcomes of the PACs, the study tries to identify patterns that could improve the support provided to parents.

Another objective of the study is to evaluate whether clear and compassionate communication during PACs can help prevent medicolegal disputes by providing parents with detailed explanations of the adverse outcome that occurred, thereby reducing uncertainty, dissatisfaction, and thus the likelihood of medicolegal litigation.

Ultimately, this research aims to offer evidence-based recommendations for enhancing the PAC procedure, ensuring that pathologists can provide both accurate medical information and compassionate support.

Materials and methods

This observational study was conducted as a retrospective analysis focusing on PACs following adverse pregnancy outcomes. The research was carried out at the Pathology University Unit of the IRCCS Ospedale Policlinico San Martino University Hospital. The study adhered to the principles outlined in the STROBE guidelines for reporting observational studies ¹².

STUDY DESIGN AND POPULATION

The study involved a retrospective review of cases in which PACs were requested by parents following a fetal autopsy.

The inclusion criteria were:

- cases in which PACs were requested by the parents between January 1, 2013, and March 1, 2021.
- cases in which a fetal autopsy was performed, using a standard institutional protocol that included both macroscopic and microscopic examination, as well as histological analysis of the placenta.
- availability of complete medical records and autopsy reports.
- PACs conducted by a dedicated pathologist with expertise in gynecological and fetoplacental pathology who also performed the autopsies.

The exclusion criteria were the following:

- cases where no PAC was requested by parents.

- incomplete autopsies or those not adhering to the standard protocol.
- incomplete or missing medical records that prevented comprehensive data collection.

AUTOPSY AND HISTOPATHOLOGICAL EXAMINATION

All fetal autopsies were conducted using a comprehensive protocol that included external examination, internal examination, and microscopic examination of tissues. The placental examination followed an institutional protocol substantially adherent to the Amsterdam Placental Workshop Group Consensus Statement of 2016¹³. This protocol emphasizes standardized procedures for sampling and evaluating placental pathology to ensure accurate and consistent diagnoses. Particular regard was given to placental examination, which is critical for identifying conditions such as placental insufficiency, abruptio placentae, and other abnormalities that might contribute to fetal death. Histopathological features, such as chorioamnionitis, placental infarcts, and villous maturation defects, were documented. Autopsy findings were recorded using a checklist-based protocol, ensuring consistency and thoroughness in identifying the causes of death and any associated conditions.

PAC PROCESS

The PAC process was designed to provide parents with a comprehensive explanation of the autopsy findings. Consultations were typically initiated around 60 days after the fetal death, allowing sufficient time for the autopsy and histological analysis to be completed. The PAC was scheduled by contacting the pathologist through the Pathology Unit's administrative office, with the meeting set up within two weeks of the request. The consultation time could be accelerated on specific requests.

DATA COLLECTION

Data collection involved a systematic review of medical records and autopsy reports to gather relevant information about each case. Key parameters included patient demographics (such as age and gestational age at the time of loss), type of fetal loss (categorized as elective or spontaneous), and main causes of fetal death (classified into fetal, maternal, or placental causes). Cases of fetal death were classified according to the ReCoDe classification system¹¹, which provides a standardized framework for categorizing the underlying conditions associated with fetal loss. Emotional responses of the parents during PACs, including comprehension of the autopsy findings and the state of mind, were documented.

The data on medico-legal litigation were obtained

through a review of compensation claims at the University Institute of Legal Medicine of Genoa, focusing on health litigation cases from San Martino Hospital between 2013 and 2021. Neonatology, gynecology, and obstetrics cases were extracted, and those involving fetal and perinatal deaths were analyzed to determine the occurrence of litigation and instances of medical malpractice, including cases where compensation was conferred.

To minimize selection bias, clear and consistent inclusion and exclusion criteria were applied, including only cases with complete autopsy reports and medical records. Information bias was reduced by using standardized data collection and autopsy protocols, ensuring uniformity in assessments. Multiple team members reviewed the data to enhance reliability and reduce subjective interpretation. A sensitivity analysis does not apply to this retrospective study, which focuses on fixed variables and observed outcomes in PACs, rather than exploring hypothetical variations. To maintain confidentiality and comply with ethical standards, all data were anonymized before analysis. The anonymized data were then entered into a Microsoft ExcelTM database, which served as the primary data management tool.

STATISTICAL ANALYSIS

Statistical analysis was conducted using MedCalcTM, a statistical software program designed for biomedical research. Descriptive statistics were generated to summarize the data, including means, standard deviations, and frequency distributions for continuous variables while discrete variables are expressed in total number and percentage. Chi-squared tests were used to assess the relationships between categorical variables, such as the type of fetal loss and the primary cause of death, as well as to examine the association between parental emotional responses and the outcomes of the autopsy findings. This approach allowed for a comprehensive analysis of the data, providing insights into the factors contributing to fetal loss and the impact of the PAC process.

Results

During the study period, 360 fetal autopsies were performed at San Martino Hospital, of which 120 cases involved PACs, representing 33% of the total autopsies conducted, including 5 twin pregnancies and a patient who underwent two PACs for two different pregnancies. The results presented here provide a comprehensive overview of the demographics, causes of fetal death, the impact of PACs on parental understanding, and correlations between various factors.

DEMOGRAPHICS AND PREGNANCY DETAILS

The maternal age of the participants ranged from 20 to 54 years, with a mean age of 34.3 years (SD = 6.22). The gestational age at the time of fetal death varied from 7 to 42 weeks, with a mean of 21.3 weeks (SD = 7.42). The types of adverse pregnancy outcomes for which PACs were requested were nearly evenly split between elective abortion (49.2%) and spontaneous fetal loss (50.8%), which included both miscarriages and stillbirths (Tab. I).

Table I. Continuous variables.

	Minimum	Maximum	Mean	Median	SD
Age (years)	20	54	34.342	34	6.2221
Gestational Age (weeks)	7	42	21.208	20	7.4348
PAC Gap (months)	0	35	5.558	3	6.2816

CAUSES OF FETAL DEATH

The analysis distinguished three main groups regarding the causes of fetal death: fetal, placental, and maternal causes. A significant proportion of deaths were attributed to fetal causes (52.5%), primarily due to congenital anomalies. Placental causes accounted for 46.7% of the deaths, while maternal causes were responsible for only 0.8%.

When examining the elective abortion group separately, 55.9% of deaths were attributed to congenital anomalies, consistent with prenatal diagnostic findings. Placental causes were more prevalent in the spontaneous fetal loss group, accounting for 54.9% of cases. Only 1% of fetal deaths in this group were attributed directly to maternal causes.

ReCoDe CLASSIFICATION AND DETAILED PATHOLOGY

The ReCoDe classification system was applied to categorize the ultimate cause of fetal death. According to this classification, the most common cause was congenital anomalies (Class A1), responsible for 51.7% of the deaths. This was followed by abruptio placentae (Class C1) at 15%, placental insufficiency (Class C4) at 13.3%, and chorioamnionitis (Class D1) at 10.8%. Other less common causes included umbilical cord alterations (Class B4) at 5.8%, with rare cases of cord knots or torsions (Class B1), non-immune hydrops (Class A3), and hypertensive diseases in pregnancy (Class F4), each contributing 0.8% to the total.

PARENTAL INVOLVEMENT AND EMOTIONAL RESPONSES

The timing of the PAC requests varied, with the majority (65%) of mothers seeking a consultation within 5

months of the fetal death. 35% of the parents involved requested consultations between 5 and 20 months after the event, and in two cases, consultations were requested more than 35 months later.

Most women (60%) attended the PAC accompanied by their husbands, while others were accompanied by other family members, such as their mothers (5%) or friends (3.3%). A notable 25.8% of women attended the consultation alone.

The emotional responses of the women after the PAC varied. A significant majority (83.3%) expressed acceptance and serenity by the end of the consultation. Some mothers actively expressed gratitude towards the physicians. However, a smaller proportion of parents experienced ongoing emotional distress. Specifically, 7.5% reported persistent grief or depression, and 3.3% exhibited animosity towards healthcare providers.

COMPREHENSION AND FOLLOW-UP CARE

By the end of the PACs, 97.5% of women displayed a good understanding of the causes of fetal death. However, in two cases, sociocultural differences led to communication challenges, resulting in poor comprehension. In one case, the consultation was marked by numerous and persistent questions from the mother. Following the PACs, various follow-up actions were recommended based on the autopsy findings and the specific circumstances of each case. The most common follow-ups included gynaecological care (26.4%) for mothers at increased risk of placental pathologies in future pregnancies. Genetic counseling was recommended for 22.5% of the women, particularly those whose fetal deaths were due to congenital anomalies. A multidisciplinary approach, including psychological support and consultations for assisted reproductive technologies, was advised for women who experienced multiple pregnancy losses and had concerns about future pregnancies (Tab. II).

Table II. Categorical data.

Clinical-epidemiological data	N	%
Gravida		
1	46	38.33
2	38	31.67
3	18	15
> 3	14	11.67
N/A	4	3.33
Para		
0	67	55.83
1	34	28.33

2	8	6.67
3	1	0.83
> 3	10	8.33
Trimester		
I	6	5
II	95	79.17
III	19	15.83
Type of fetal loss		
elective	59	49.17
spontaneous	61	50.83
Pathologist's report	N	%
Main cause		
Fetal	63	52.5
Malformations	35	29.17
Cariotype alterations	26	21.67
Fetal neoplasia	1	0.83
Thrombosis chord vein	1	0.83
Maternal	1	0.83
Hypertension	1	0.83
Placental	56	46.67
Retroplacental hemorrhage	18	15
Placental insufficiency & ischemic lesions	16	13.33
Inflammation	12	10
Thrombosis chord vein	4	3.33
Cord brevity	2	1.67
Cord torsion	1	0.83
Ectopic implant	1	0.83
Placental Insufficiency & inflammation	1	0.83
Placental insufficiency & ischemic lesions & cord torsion	1	0.83
ReCoDe		
A1 Congenital anomaly	62	51.67
A3 Non-immune hydrops	1	0.83
B2 Constricting loop or knot	1	0.83
B4 Other umbilical	7	5.83
C1 Placenta abruptio	18	15
C4 Placenta insufficiency	16	13.33
C5 Placenta other	1	0.83
D1 Chorioamnionitis	13	10.83
F4 Hypertensive diseases in pregnancy	1	0.83

post-autoptic consultation	N	%
Accompanying person present at the interview		
Partner	74	61.67
Alone	31	25.83
Family of origin	11	9.17
Other	4	3.33
Comprehension		
Adequate	115	95.83
Cultural barriers	4	3.33
Many questions	1	0.83
Reaction		
1 very negative	6	5
Animosity	2	1.66
Severe depression with guilt	2	1.66
Poorly concealed animosity towards the treating gynecologist	1	0.83
Emotional dysregulation	1	0.83
2 negative	7	5.83
Initial animosity. then serenity	1	0.83
Very distressed	3	2.5
Concern	1	0.83
Psychologically distressed	1	0.83
Shaken	1	0.83
3 curious/unsatisfied	3	2.5
Insistence	1	0.83
Many questions	2	1.67
4 mixed/ambivalent	4	3.33
Distressed. but relieved	2	1.67
Uncommunicated lingering doubts	1	0.83
Serenity but animosity towards the gynecologist remains	1	0.83
5 positive	100	83.33
Serenity	99	82.5
Serenity and gratitude	1	0.83
Follow-up		
No Specific Follow-up	36	30
Gynecologist	34	28.33
Geneticist	27	22.5
Multidisciplinary	20	16.67
Other	3	2.5

MEDICO-LEGAL DATA AND LITIGATION

Between January 1, 2013, and March 1, 2021, three medico-legal disputes related to fetal and perinatal deaths were presented. In the first two cases, involving intrauterine deaths due to umbilical cord complications at 21 and 39 weeks, medico-legal investigations found no evidence of malpractice. In the third case, a newborn died from cord compression and hypoxia during labor, and the midwife was found responsible for not alerting the gynecologists. This case was settled out of court with monetary compensation.

Most notably, no malpractice claims arose in cases where such interviews occurred.

Discussion

Several significant correlations emerged from the analysis, providing insights into the relationships between the type of fetal loss, the cause of death, and the emotional and medical responses of the parents. First, a strong correlation was found between the type of fetal loss and its underlying cause. Elective abortions were significantly associated with fetal causes, particularly congenital anomalies, while spontaneous losses were closely linked to placental causes ($p < 0.0001$). This suggests that congenital anomalies, often detected through prenatal diagnostics, frequently lead to elective termination, whereas spontaneous losses tend to occur because of placental dysfunction, such as placental insufficiency or abruptio placentae. In addition, a significant correlation was observed between the mother's being accompanied during PAC and her emotional response ($p = 0.0206$). Mothers who attended consultations with their partners exhibited greater emotional stability and acceptance compared to those who attended alone. This highlights the crucial role of social support in helping parents cope with the loss, suggesting that encouraging partners to participate in consultations may positively impact emotional recovery.

The types of adverse pregnancy outcomes for which PACs were requested were nearly evenly split between elective abortion and spontaneous loss of pregnancy: this distribution indicates that parents seek PACs regardless of whether the pregnancy loss was therapeutically planned or unexpected.

In our findings, the most common cause of death was fetal in origin, directly followed by placental causes. This emphasizes the importance of prenatal diagnosis for congenital anomalies and at the same time the pivotal placental role in sustaining a pregnancy, highlighting the critical need for monitoring placental function, especially in high-risk pregnancies, as well as for

a thorough postmortem examination of the placenta itself.

The choice to classify the main cause of fetal death with the ReCoDe system was performed focusing on identifying the relevant condition at the time of intrauterine death and organizing causes into a hierarchy of nine main categories since this classification embodies a valuable tool that represents a major advancement in stillbirth classification, enabling better identification of conditions requiring timely intervention, improving clinical management, and offering new strategies to prevent fetal death and has significantly reduced the number of unexplained cases of stillbirths to 10-15%¹¹.

Almost 3 of 4 mothers 3 of 4 decided to attend the PAC alongside a member of the family or a close friend, underlining the importance of an effective family support network in navigating the emotional aftermath of a pregnancy loss and in grief coping.

The study highlights how the timing of PACs significantly influences parents' emotional responses. From a psychological perspective, parents who request earlier consultations are more likely to reach the acceptance phase of grief sooner, as outlined in Elisabeth Kübler-Ross' model of the five stages of grief (denial, anger, bargaining, depression, and acceptance)¹⁴. This early intervention provides emotional closure, helping parents process the trauma more effectively by reducing uncertainty and providing clarity about the loss.

In contrast, delayed consultations may prolong emotional distress, as parents continue to ponder unanswered questions, which can exacerbate feelings of anxiety and grief¹⁵. The lack of timely information may also hinder their ability to fully understand the situation, resulting in ongoing emotional turmoil. Moreover, those who seek early consultations tend to engage in active coping strategies, such as seeking information to regain a sense of control over the circumstances, which fosters greater emotional resolution¹⁶. Conversely, parents who delay consultations may lean towards more passive coping mechanisms, avoiding confrontation with the reality of the loss and remaining stuck in a heightened state of emotional distress.

Our study suggests that PACs play a crucial role in helping parents process the causes of their loss and in providing them with emotional support. The high percentage of parents expressing acceptance and serenity following the consultations underscores their effectiveness in facilitating the grieving process. The consultations revealed significant emotional responses, ranging from acceptance to ongoing distress and, in some cases, animosity towards healthcare providers. These findings highlight the challenges in commu-

nication during such sensitive consultations and the need for healthcare providers to be trained in delivering challenging news with empathy and clarity. The presence of the pathologist during these consultations was crucial in ensuring that parents received accurate information about the causes of death and that any concerns or misunderstandings were promptly addressed. Furthermore, the autopsy findings provided critical insights that guided follow-up care, particularly in cases involving congenital anomalies or placental insufficiency, which are significant predictors of future pregnancy outcomes. The data also indicate that none of the parents involved in PACs pursued medico-legal disputes following these consultations, suggesting that transparent communication and detailed explanations could mitigate the risk of litigation. The analysis of litigation data showed that in the period analyzed, only 3 requests for compensation for damages for alleged medical malpractice were made. In two cases, the medico-legal analysis excluded medical errors and liability, while one case highlighted an incorrect midwife procedure.

This finding is important for healthcare providers, highlighting the value of PACs not only in offering support to grieving parents but also as a tool for risk management and minimizing potential medico-legal litigations. In this concern, it should be noted that the Italian law regulatory framework for diagnostic autopsies is established by the Italian Law No. 31 of February 2, 2006, which regulates diagnostic procedures for stillbirths and sudden infant deaths. This law mandates that infants who die without an apparent cause within their first year of life and fetuses who die without an apparent cause after 25 weeks of gestation must undergo diagnostic examination at authorized centres, provided parental consent. The law differentiates between sudden infant death and unexpected fetal death, each requiring distinct diagnostic protocols. However, other Italian laws clarify that parental authorization is not required for the autopsy; the autopsy consent is governed by other regulations, including D.P.C 170/1999 and the Mortuary Police Regulation (Decree of the President of the Republic, September 10, 1990, No. 285), which mandate autopsies for all stillborns and their post-mortem examinations in hospitals. These regulations emphasize that diagnostic autopsies are a medical obligation, and parental consent is not a prerequisite. The law strictly requires parental authorization if the autopsy findings are used in scientific studies, although sensitive communication with families about the procedures is strictly necessary and cannot be omitted.

Autopsy and PAC can be considered an integral part of the care and diagnosis of perinatal deaths. Sci-

entific studies have demonstrated the importance of postmortem investigations in detecting unexpected pathological findings and allowing the exact diagnosis of death¹⁶. The identification of obstetric factors or genetic conditions is relevant for the evaluation of further pregnancies. Furthermore, discussing the autopsy results with the parents, and understanding the circumstances of the death, can help them process everything and can alleviate the suffering and feelings of guilt that often arise from these traumatic and emotionally devastating events¹⁷. In these cases, the pathologist's communication is essential to make the parents understand that they are not to blame and could not have done anything more to save their child. Concerning medico-legal disputes, the PACs allow the family members to be better informed about what happened and dispel any thoughts of guilt on the part of the physicians as well. A correct and thorough explanation of the reason for the death of the fetus can help the parents to better understand whether the death was an unavoidable and unforeseeable event or whether it was due to a medical mishap.

Nonetheless, the study also has some limitations. One significant weakness is the absence of a control group, which limits the ability to draw definitive conclusions about the effectiveness of PACs compared to situations where such consultations do not occur. The reliance on self-reported emotional responses introduces potential biases, such as recall or social desirability bias, which could affect the accuracy of the data. The study's generalizability may be constrained, as it relies on data from a single institution in Genova, Italy, and may not fully represent practices or outcomes in other cultural or healthcare settings. Lastly, while the study mentions the potential for reducing medico-legal litigation, it lacks a detailed exploration of legal outcomes, which could provide stronger evidence for this claim. Addressing these weaknesses in future research could further strengthen the findings and implications of the study.

The establishment of a Disease Management Team is a key recommendation from clinical audits and national guidelines to improve perinatal care^{2,18}. This multidisciplinary team, comprising obstetricians, neonatologists, midwives, geneticists, pathologists, forensic experts, and mental health professionals, regularly reviews cases of intrauterine death to ensure comprehensive evaluation and management. Geneticists, in collaboration with obstetricians and midwives, play a crucial role in identifying potential genetic causes of fetal death and advising families on recurrence risks, supported by genetic counseling and prenatal diagnostics.

The pathologist is fundamental in this process, con-

ducting a thorough examination of the fetus and placenta to determine the precise cause of death. Their role extends beyond clinical investigation, as they serve as a neutral third party who was not directly involved in the pregnancy's medical management. This objectivity makes the pathologist particularly suited to explaining autopsy findings to grieving parents, helping them understand the reasons for their loss while reducing emotional distress.

Forensic medical experts play an equally essential role by addressing medico-legal aspects of perinatal mortality. Their methodical assessment ensures transparency in ruling out potential malpractice, providing both families and healthcare providers with an objective understanding of the event. This clarity can help mitigate uncertainty, ease parental distress, and reduce the likelihood of legal disputes. Mental health professionals, including psychiatrists and psychologists, are also vital members of the team, offering emotional and psychological support. Their expertise in managing grief, depression, and guilt helps parents process their loss and fosters resilience for future pregnancies.

While a multidisciplinary approach is indispensable for holistic care, it is crucial to balance the involvement of multiple specialists to avoid overwhelming parents. Communication should be clear, sensitive, and well-structured, ensuring that families receive the necessary support without feeling burdened during an already difficult time.

Conclusions

This study emphasizes that PAC is a vital component of care following adverse pregnancy outcomes. It provides parents with essential information about the causes of their loss and helps them process their grief. The pathologist's role in a valuable multidisciplinary team and the need for tailored follow-up care are crucial elements for both guiding future pregnancy management based on a more informed and emotionally grounded approach and ensuring parents receive holistic support through a challenging, life-changing event.

To enhance the effectiveness of PACs, the following recommendations are proposed:

- Hospitals should implement standardized protocols for PACs, ensuring that all parents are offered this opportunity after an adverse pregnancy outcome. This process must be communicated early in the parents' care.
- Healthcare providers should receive specialized training in communication skills, focusing on em-

pathy, clarity, and cultural sensitivity, to better support grieving parents.

- Perinatal mortality management should involve a coordinated multidisciplinary team, ensuring comprehensive care that addresses both medical and emotional needs.
- Ongoing follow-up care is essential for parents after fetal loss, including regular consultations, genetic counseling, and access to psychological support should be readily available for those who need it.
- Hospitals should continually evaluate and improve PAC processes, encouraging research on their long-term impact to develop evidence-based guidelines.
- Involve associations dedicated to maternity and parenting to act in synergy towards family support with the work of healthcare providers.

ACKNOWLEDGEMENTS

We wish to thank the lab technicians of the Pathology Units of IRCCS Ospedale Policlinico San Martino and IRCCS Istituto Giannini for their daily support. Part of this work was defended by Eleonora Caggiano as his MD thesis.

CONFLICTS OF INTEREST STATEMENT

The authors declare no conflicts of interest.

FUNDING

The presented work received no additional funding

AUTHORS' CONTRIBUTIONS

RB and ML wrote the manuscript. CMB collected clinical data. VGV and MP conceived and conducted the study. All other authors contributed to the writing of the paper, drawing on their specific expertise and participating in the multidisciplinary team: forensic medicine (RB, ML, FA, FV), pathology (CMB, GG, MP VGV), obstetrics and gynecology & prenatal diagnosis (PDB, SF), psychology/psychiatry (RG), clinical genetics (MTDV), neonatology (CA).

ETHICAL CONSIDERATION

The study was conducted following ethical guidelines, ensuring the confidentiality and anonymity of patient data. Given the retrospective nature of the study, formal consent was not required from participants. Ethics committee approval was not required due to the following considerations: all data related to patients' identification were anonymized; this study has a speculative aim, and results will not modify in any way the diagnosis and prognosis or add new clinical information useful for patient management. The PAC is approved in our Standard Operating Procedures.

References

- ¹ World Health Organization. Neonatal and perinatal mortality: country, regional and global estimates. Geneva: WHO; 2006.
- ² Baronciani D, Bulfamante G, Facchinetti F. La natimortalità: audit clinico e miglioramento della pratica assistenziale. 2008:1-319.
- ³ Flenady V, Wojcieszek AM, Middleton P, et al. Stillbirths: recall to action in high-income countries. *Lancet*. 2016;387(10019):691-702. [https://doi.org/10.1016/S0140-6736\(15\)01020-X](https://doi.org/10.1016/S0140-6736(15)01020-X).
- ⁴ Hug L, You D, Blencowe H, et al; UN Inter-agency Group for Child Mortality Estimation and its Core Stillbirth Estimation Group. Global, regional, and national estimates and trends in stillbirths from 2000 to 2019: a systematic assessment. *Lancet*. 2021;398(10302):772-85. [https://doi.org/10.1016/S0140-6736\(21\)01112-0](https://doi.org/10.1016/S0140-6736(21)01112-0).
- ⁵ Tavares Da Silva F, Gonik B, McMillan M, et al; Brighton Collaboration Stillbirth Working Group. Stillbirth: case definition and guidelines for data collection, analysis, and presentation of maternal immunization safety data. *Vaccine*. 2016;34(49):6057-68. <https://doi.org/10.1016/j.vaccine.2016.03.044>.
- ⁶ Ravaldi C, Levi M, Angeli E, et al. Stillbirth and perinatal care: are professionals trained to address parents' needs? *Midwifery*. 2018;64:53-9. <https://doi.org/10.1016/j.midw.2018.05.008>.
- ⁷ Povedano MCA, Spada ISSN, de Souza BP, et al. Mother's perceptions and expectations regarding their newborn infants: the use of Broussard's neonatal perception inventory. *Rev Paul Pediatr*. 2011;29(2):239-44. <https://doi.org/10.1590/S0103-05822011000200016>.
- ⁸ Chervenak FA, McCullough LB, Brent RL. The perils of the imperfect expectation of the perfect baby. *Am J Obstet Gynecol*. 2010;203(2):101.e1-5. <https://doi.org/10.1016/j.ajog.2010.01.058>.
- ⁹ Kushnir VA, Barad DH, Albertini DF, et al. Systematic review of worldwide trends in assisted reproductive technology 2004-2013. *Reprod Biol Endocrinol*. 2017;15(1):6. <https://doi.org/10.1186/s12958-016-0225-2>.
- ¹⁰ Hirsch CS. Talking to the family after an autopsy. *Arch Pathol Lab Med*. 1984;108(6):513-4.
- ¹¹ Gardosi J, Kady SM, McGeown P, et al. Classification of stillbirth by relevant condition at death (ReCoDe): population based cohort study. *BMJ*. 2005;331(7525):1113-7. <https://doi.org/10.1136/bmj.38629.587639.7C>.
- ¹² von Elm E, Altman DG, Egger M, et al; STROBE Initiative. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. *Lancet*. 2007;370(9596):1453-7. [https://doi.org/10.1016/S0140-6736\(07\)61602-X](https://doi.org/10.1016/S0140-6736(07)61602-X).
- ¹³ Khong TY, Mooney EE, Ariel I, et al. Sampling and definitions of placental lesions: Amsterdam placental workshop group consensus statement. *Arch Pathol Lab Med*. 2016;140(7):698-713. <https://doi.org/10.5858/arpa.2015-0225-CC>.
- ¹⁴ Kubler-Ross E, Kessler D. Finding the meaning of grief through the five stages of loss. *On grief and grieving*. London: Simon & Schuster Ltd; 2014.
- ¹⁵ Nolen-Hoeksema S. The role of rumination in depressive disorders and mixed anxiety/depressive symptoms. *J Abnorm Psychol*. 2000;109(3):504-11.
- ¹⁶ Gordijn SJ, Erwich JJ, Khong TY. The perinatal autopsy: pertinent issues in multicultural Western Europe. *Eur J Obstet Gynecol Reprod Biol*. 2007;132(1):3-7. <https://doi.org/10.1016/j.ejogrb.2006.10.031>.
- ¹⁷ Laing IA. Clinical aspects of neonatal death and autopsy. *Semin Neonatol*. 2004;9(4):247-54. <https://doi.org/10.1016/j.siny.2003.11.004>.
- ¹⁸ Di Tommaso M, Vannacci A, Mecacci F, et al. Gestione della morte endouterina fetale (MEF). In: *Prendersi cura della natimortalità*. Roma: Fondazione Confalonieri Ragonese su mandato SIGO, AOGOI, AGUI; 2023. p. 1-130.