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Восполнение пробелов: оценка компетентности в области освидетельствования смерти в болгарской системе медицинского образования

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АННОТАЦИЯ

Обоснование. В Болгарии процедура регистрации смерти гражданина регулируется сложной цепочкой нормативных документов. Несмотря на предполагаемую согласованность международных и национальных рекомендаций, практический опыт свидетельствует о недостатках квалификации медицинских работников, особенно в случаях, связанных с предшествующим медицинским вмешательством или системной уязвимостью.

Цель исследования — оценить умение студентов последних курсов медицинских вузов и начинающих врачей ориентироваться в тонкостях освидетельствования смерти, в том числе по результатам анкетирования, а также оформления документов и посмертных процедур для членов семьи умерших, что будет актуально для национальной статистики здравоохранения.

Материалы и методы. Среди студентов 6-го курса и практикующих врачей, в том числе в учреждениях экстренной медицинской помощи и общей практики, выполнено анкетирование по смешанной методике. Результаты статистического анализа с использованием параметрических (t-тест) и непараметрических (хи-квадрат) критериев послужили основой для разработки практических рекомендаций и учебных материалов.

Результаты. Из 143 участников, включённых в исследование, 41% выразил опасения по поводу освидетельствования внегоспитальной смерти. Около 44% заявили, что знакомы с правилами освидетельствования смерти, при этом студенты продемонстрировали хорошую теоретическую подготовку, но не имели достаточных практических навыков. Примечательно, что 74% врачей никогда не проходили формального обучения по освидетельствованию смерти. Выявлены расхождения в оформлении свидетельств о смерти, сроках и процедурах оповещения компетентных органов.

Заключение. Полученные результаты свидетельствуют о различиях в практике врачей в области освидетельствования смерти в зависимости от их специализации. Наибольшую сложность вызывали вопросы оформления документации, сроков и оповещения о смерти. Исследование подчёркивает необходимость повышения уровня подготовки в этой области, особенно для студентов медицинских вузов. Сравнение компетентности опытных специалистов и студентов-медиков, начинающих врачей к различному развитию событий, связанных со смертью, позволило сформулировать практические рекомендации, в первую очередь для начинающих медицинских специалистов.

Ключевые слова: констатация смерти; освидетельствование смерти; внегоспитальная смерть; судебно-медицинская экспертиза; процедуры; медицинское образование.

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Bridging the gap: Assessing death certification competency in Bulgarian healthcare education

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ABSTRACT

BACKGROUND: In Bulgaria, procedural protocols following a citizen's death are governed by an intricate network of normative documents. Despite the presumed alignment between international and national guidelines, practical experiences reveal shortcomings in the proficiency of healthcare providers, particularly in cases involving prior medical interventions or systemic vulnerabilities.

AIM: This study aimed to assess the readiness of final-year medical students and early-career physicians in navigating death certification intricacies, including their responses, documentation precision, and postmortem procedures for bereaved families, with implications for national health statistics.

MATERIALS AND METHODS: By employing a mixed-methods approach, this study distributed questionnaires to sixth-year medical students and practicing physicians, including those in emergency medicine centers and general practice. Data collection included paper-based and digital questionnaires, ensuring anonymity and ethical compliance. Statistical analysis, employing parametric (t-test) and nonparametric (Chi-square) tests, forms the basis for actionable recommendations and educational material development.

RESULTS: This study included 143 participants, of which 41% expressed apprehension about managing out-of-hospital deaths. Approximately 44% claimed familiarity with death certification regulations, with students displaying higher theoretical confidence but lacking practical knowledge. Remarkably, 74% of physicians never received formal training in death certification. Discrepancies in issuing death certificates, timing, and notification procedures were identified.

CONCLUSION: Findings reveal varying practices among physicians according to their specialties. Issues related to documentation, timing, and notification were prevalent. The study emphasizes the need for improved training, particularly for medical students. Emergency medicine doctors exhibited higher preparedness levels. Medical students and early-career physicians urgently require enhanced education in death certification preparedness. Incorporating these topics into medical curricula, offering specialized courses, and disseminating instructional materials can significantly enhance effectiveness. Future studies should assess the quality and accuracy of recorded causes of death, which affect healthcare statistics, public service, and legal procedures, underscoring the societal and administrative significance of death certification practices.

Keywords: diagnosis of death; death certification; out-of-hospital deaths; forensic medicine; procedures; medical education.

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填补空白：评估保加利亚医学教育体系中死亡证明的能力

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简评

论证。在保加利亚，公民死亡登记程序受一系列复杂法规的制约。虽然国际和国内的指导方针应该是统一的，但实际经验表明，医务工作者的技能存在差距，尤其是在涉及先前医疗干预或系统脆弱性的情况下。本研究的目的是评估毕业班医学生和新手医生是否准备应对错综复杂的死亡证明程序（包括问卷调查结果），以及评价为死者家属提供文书工作和尸检程序的准确度。这对国家卫生统计会有现实意义。

该研究的目的。本研究的作者对医学生和新手医生对与死亡有关的各种事态发展的准备情况进行了综合评估，并且将他们的能力与经验丰富的专业人员进行了比较，从而制定出实用的建议，主要针对新手医务人员。这项研究没有评估确定死因的准确度。该研究的目的是提高教育水平，编写信息手册和课程调整建议，以改善医学课程的培训。

材料与方法。本研究采用混合方法对六年级医学生和执业医师（包括急诊和全科医生）进行了问卷调查。数据收集是使用纸质和数字问卷进行的。这确保匿名性并符合了道德标准。使用参数（t检验）和非参数（卡方检验）标准进行统计分析的结果为制定实用建议和培训材料提供了依据。

结果。共有143名参与者被纳入了该研究。其中41%的人对院外死亡证明表示担忧。约44%的人表示，他们熟悉死亡证明的规则。学生们表现出良好的理论背景，但缺乏实践技能。值得注意的是，74%的医生从未接受过正规的死亡认证培训。在死亡证明书的办理、期限和通知主管当局程序方面存在差异。

结论。该研究结果表明，不同专业的医生在死亡证明方面的做法存在差异。文件记录、时间安排和死亡通知是最具挑战性的问题。这项研究强调了在这一领域开展更多培训的必要性，尤其是对医学生而言。急诊医生的培训水平更高。医学生和新手医生急需加强这方面的培训。将这些主题纳入课程、提供专业课程和分发教材的过程可以大大提高学习效果。进一步的研究需要评估死因登记的质量和准确度。死因登记的质量和准确度对于公共卫生服务的医疗统计和法律程序非常重要。这证实死亡证明做法在公共和行政方面的重要性。

关键词：证实死亡；证明死亡；院外死亡；法医学鉴定；程序；医学教育。

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BACKGROUND

Procedural protocols following the death of a citizen in Bulgaria are governed by an array of normative documents. International guidelines and national legislative frameworks are generally assumed to be harmoniously aligned, leaving no procedural gaps of practical significance [1]. However, real-world scenarios reveal that healthcare providers and, to some extent, the overseeing institutions are not sufficiently equipped to manage procedures associated with death certification. This inadequacy is observed not only in routine circumstances but also in the forensic medical practice within Bulgaria, particularly when preceding medical interventions have demonstrable practical implications or expose systemic weaknesses. This disconnect served as the impetus for the present study, which aimed to collate information on the preparedness of graduating medical students and early-career physicians in relation to death certification. This encompasses physicians' responses and actions, documentation specifics, and pertinent follow-up procedures for the bereaved families. The quality of this practice is also instrumental in shaping national health statistics regarding causes of death in Bulgaria.

AIMS

This study primarily aimed to assess the preparedness of medical students in their final year of education and early-career physicians in managing cases of death in both domestic and public settings. This is carried out by comparing their experience and readiness with that of more seasoned medical professionals. This study did not aim to evaluate the accuracy of cause-of-death determinations. Upon completion of data analysis, the study aimed to formulate guidelines that could serve as actionable protocols for such scenarios, specifically targeting the education of emerging medical specialists. Further tasks include the development of an informational brochure for healthcare providers that outlines a step-by-step algorithm for appropriate actions under such circumstances, aiding clinical practice. In addition, based on the uncovered gaps and weaknesses in medical education, the study suggests necessary curriculum adjustments to enhance future training in medical programs. Prior research in this context is existent in Bulgaria, and studies in other countries are limited, mainly focusing on the quality of documenting causes of death in official certificates [2, 3, 4, 5, 6].

MATERIALS AND METHODS

A mixed-methods approach, comprising both multiple-choice and open-ended questions, was employed via a questionnaire survey to gather the required data. The study participants were sixth-year medical students (intern doctors) and practicing physicians, specifically those working in emergency medicine centers (including ambulance medical

service) and general practitioners (family physicians). This cohort was deliberately chosen to evaluate the training and practical readiness of both aspiring and active healthcare providers who are most likely to encounter out-of-hospital deaths. The data collection process was conducted in two formats: paper-based questionnaires were filled out in person, and digital questionnaires were administered via Google Forms. All responses were collected anonymously and only after receiving ethical approval from the Research Ethics Commission (KENID). Identifiers such as the respondent's specialty, employment type, and experience level were noted, without revealing their real name or place of work.

Data were collected between December 2022 and April 2023 and subsequently analyzed using statistical software packages (Excel v.10.0 and SPSS). Both parametric (t-test) and nonparametric (Chi-square) tests were utilized for data analysis. The findings were employed to draw actionable conclusions that have practical implications and develop educational and informational materials aimed at enhancing physicians' preparedness for postmortem examinations and death certification.

RESULTS

The survey encompassed a diverse sample of 143 respondents, including 67 final-year medical students—comprising 17 Bulgarian-speaking and 50 English-speaking students—and 76 practicing physicians. The group of practicing physicians consisted of 31 general practitioners, 37 emergency medicine doctors, four specialists from diagnostic medical centers, three forensic doctors, and one newly graduated, nonworking doctor. Among the practicing doctors, a majority had over 10 years of experience. Notably, 68 of the participants, predominantly students, reported never having issued a death certificate. However, most physicians reported issuing at least one death certificate annually. The sociodemographic characteristics of the participants are detailed in Table 1.

Approximately 41% of all respondents expressed apprehension about managing cases involving out-of-hospital deaths. This concern was more prevalent among students, with 47% reporting uneasiness, compared with 37% among working doctors. Interestingly, 44% of all participants claimed familiarity with the legal documents governing death certification. Students were 2.5 times more confident in their theoretical understanding of these regulations than practicing physicians ($p < 0.0001$). However, this confidence appeared misplaced, as most students struggled to name specific regulatory documents. By contrast, emergency medicine doctors demonstrated the highest level of knowledge in this area.

Approximately 74% of physicians stated that they had never received formal training on issuing death certificates. Conversely, 48% of the students claimed to have undergone such training, and the remaining students were unsure. The

Table 1. Characteristics of the studied individuals

Characteristics	Count	Relative share (%)
Gender:		
• men	53	37%
• women	89	62%
• no answer	1	1%
Employment:		
• 6 th year student	67	47%
• General practitioner	31	22%
• Emergency department doctor	37	26%
• other doctors	8	5%
Acquired medical specialty:		
• General medicine	24	17%
• Emergency medicine	3	2%
• Other medical specialty	22	15%
• No specialty (yet)	94	66%
Work experience:		
• 6 th year student	67	47%
• up to 5 years	12	8%
• from 6 to 15 years	9	6%
• over 15 years	55	38%
Frequency of issuance of death certificate:		
• once or more a week	3	2%
• once a month or more	45	32%
• once a year or more	19	13%
• less than once a year	8	5%
• never issued (not had to issue)	68	48%

difference in training experiences was statistically significant ($p = 0.01$). This formal instruction, combined with a lack of practical exposure, could account for the students' heightened confidence in handling death-related procedures.

DISCUSSION

The study highlights varying practices among doctors when determining causes of death. Although nearly all general practitioners (97%) never declined to issue a death certificate, some emergency doctors did refuse, primarily because of the prevalence of traumatic deaths requiring further investigation. This discrepancy suggests differing levels of comfort and expertise among physicians in handling death cases depending on their specialty.

Regarding documentation, awareness is notably lacking about the correct procedure for issuing death certificates. All emergency center doctors were aware that death certificates should be issued in triplicate (Bulgarian regulation); however, about half of the general practitioners and some hospital doctors were still issuing them in duplicate (older regulation). This divergence is statistically significant ($p = 0.00$) and points to a gap in knowledge about current regulatory requirements. Among students, ignorance was even more widespread; that is, approximately 58% were unaware of the correct number

of copies to be issued. In addition, a majority of doctors were unaware of the designated destinations for the additional copies—one for the medical facility's register and another for the Regional Health Inspection.

Regarding the timing for issuing death certificates, 86% of doctors believed that they could only do so within 24 h post-death. In reality, Bulgarian legislation allows for a window up to 48 h, after which law enforcement and possibly an autopsy are required.

On the topic of notifying authorities, doctors across all specializations demonstrated a strong understanding of when it is mandatory to alert the police. These circumstances include suspected violence or murder, likely or apparent suicide, traffic accidents, other types of trauma, unclear cause of death, decomposition, or when the corpse is unidentified or the absence of immediate family. Medical students also showed a high level of understanding in this topic.

The most commonly accepted causes of death, as indicated by the respondents, were "acute heart failure" and/or "acute or chronic heart disease," aligning with national health statistics. This was followed by cancer, stroke, and other conditions. The approach to determining the date and time of death varied between family doctors and emergency center doctors. Family doctors often rely on information provided by the deceased's family, whereas emergency center doctors consider multiple factors, including the condition of the body and other available medical data [7, 8, 9].

The study also highlighted varying levels of awareness among students and doctors regarding the issuance of death certificates in complex situations, such as multiple casualties or disputed cases. For instance, an autopsy is required when the cause of death is uncertain or requires further investigation, even if relatives are opposed to it. Students were generally less aware of these procedural details.

Regarding training needs, a staggering 98% of respondents felt that additional instruction is necessary, particularly concerning death certification. Moreover, 58% of general practitioners felt confident in communicating with the relatives of the deceased, whereas 63% of emergency room doctors reported challenges in this aspect ($p = 0.00$). Over half of medical students also felt unprepared for such sensitive interactions, indicating a gap in their educational training.

Suggestions for additional training varied widely, which included incorporating this topic into university medical education and offering thematic lectures, specialized courses, online modules, and employer-led briefings. Written guides or brochures were also recommended.

Doctors from emergency medical care centers exhibited the highest level of preparedness in handling death-related procedures, likely because of their frequent exposure to such cases and their structured training programs. By contrast, medical students' primary limitation was their lack of practical experience. For family doctors, lower awareness could be

attributed to the infrequency of such cases and perhaps their more isolated professional environments [7, 10, 11].

Briefly, the study reveals critical gaps in both knowledge and comfort levels across specialties concerning death determination and certification procedures. Nearly all participants agree on the urgent need for more comprehensive training in these areas, emphasizing the need for curricular reforms and additional educational resources.

This extensive analysis offers a strong foundation for improving existing procedural actions related to death certification in Bulgaria, which can be integral in enhancing national health statistics and possibly informing changes in legislation and medical training curricula [12].

CONCLUSION

In this study, the principal takeaway is the urgent need for enhanced, specialized training in areas such as the determination of death, management of deceased patients, and the issuance of death certificates. This applies to both medical students and practicing physicians, regardless of their experience duration. Incorporating educational modules focused on these topics into existing curricula in general medicine and forensic medicine is recommended [13, 14, 15, 16]. Furthermore, offering specialized courses for practicing physicians can help fill this knowledge gap [17, 18]. The long-term effectiveness of such interventions could be further augmented through the dissemination of instruction booklets and comprehensive guides on death determination and certification procedures. These conclusions align with findings from similar studies in other regions [19–30].

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Future research should focus on evaluating the quality and accuracy of the recorded causes of death. This is crucial not only for improving the training of medical professionals but also for understanding its effect on national healthcare statistics. Strategies for improvement have already shown positive outcomes in various international settings.

Finally, practices surrounding the determination of death and issuance of death certificates are integral to the healthcare infrastructure of any country. These practices have far-reaching consequences, which affects medical statistics, public service, and legal procedures. Therefore, the quality of these activities has social and administrative significance.

ADDITIONAL INFORMATION

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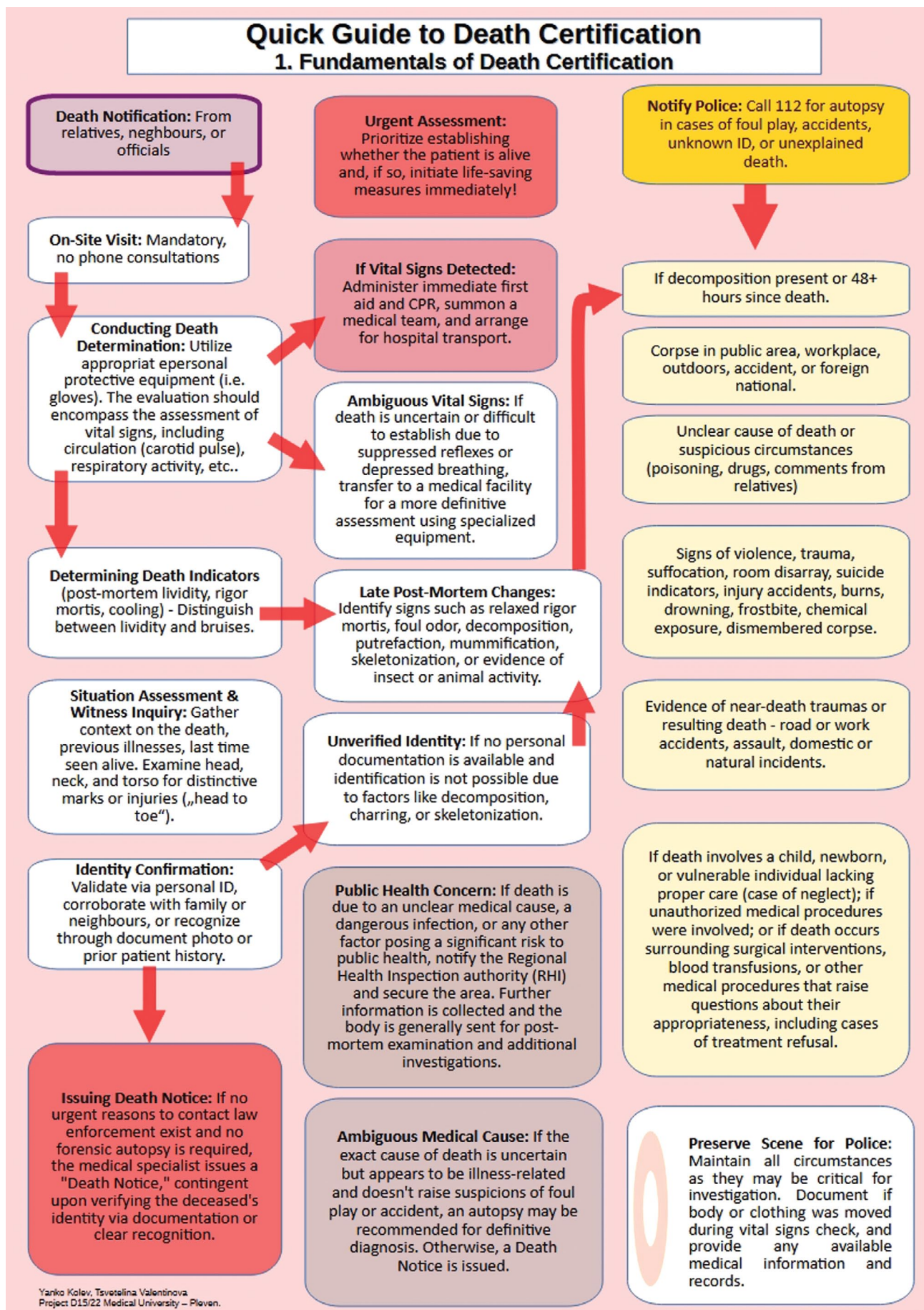
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Appendix 1. Brochure (two pages) on practical advice for death determination and certification "Quick guide to Death Certification".



Quick Guide to Death Certification

2. Issuance of a Death Certificate – “Notice of Death“(BG)

If No Police Involvement Required (See Part 1): A medical specialist may issue a „Death Notice“ if the deceased's identity is confirmed via document or clear recognition, and no forensic autopsy is needed.

If Police Involved but No Crime Suspected: A death certificate may be issued if no criminal evidence is found, aligned with the doctor's internal assessment of the situation.

Form Completion Location: The "Notice of Death" is completed either on-site or in a medical facility by the doctor, after personally confirming the death, its time, and cause.

Notice Copies: Three copies of the "Notice of Death" are issued— one for the deceased's relatives (used to obtain a formal "Death Certificate" from the public register office), one for the medical facility's register, and one for the regional health authority.

Notice Details: The "Notice of Death" requires accurate entry of the deceased's personal information— names, social security number, gender, citizenship, and date of birth (time of birth for newborns up to 30 days old).

Time of Death: The exact time of death is established and recorded, based on witness accounts, post-mortem changes, and other situational data. If discrepancies arise or if there is doubt about the nature of the death, all facts are considered in their entirety. If the exact time is unclear, the moment death was confirmed can be used for fresh corpses. If death occurred more than 48 hours prior to confirmation, a "Notice of Death" is not issued; instead, the police are notified and a forensic autopsy is to be done.

Place of Death: Indicate the location where death occurred (e.g., home, medical facility, workplace, other). Typically, this is the discovery site, but body relocation is possible and subject to verification for suspicious circumstances. The actual place of death is recorded. A "Death Certificate" is later issued by the public register office or local mayor in the jurisdiction where death occurred, not where the body was found.

Specify whether the cause of death was determined through an autopsy or without one.

Cause of Death Specification: In Column I, clearly outline the determined cause of death, adhering to the International Classification of Diseases, 10th Revision (ICD-10). Begin with the immediate physiological condition leading to death (e.g., coronary ischemia), followed by the condition that precipitated the immediate cause (e.g., myocardial infarction), and finally, the foundational or underlying disease (e.g., Coronary Heart Disease). Column II should feature significant comorbidities, which, while not directly causing death, exacerbated the patient's condition and may have contributed to mortality (e.g., arterial hypertension, diabetes mellitus). If the exact cause of death isn't externally obvious but is known through existing medical records or firsthand physician experience, such information should be included. In cases lacking a specific known disease as the cause of death, an autopsy is strongly advised to definitively establish the cause. Generic terms like "acute heart failure" or "natural death" are not sufficient; comprehensive medical documents should also be consulted for accuracy.

Specify the Type of Death: Indicate if the cause of death is illness, occupational disease, occupational accident, suicide, homicide, or an unspecified accident. For most categories other than illness and occupational disease, an autopsy or forensic examination is generally required.

Final Entry by Certifying Doctor: Indicate the type of medical professional completing the death certificate—be it the treating physician, pathologist, or another competent medical specialist (e.g., medical examiner). Include the physician's full name, signature, Personal Identification Number, and Unique Medical Identification Number. Affix the official seal.

Header Details on Death Notice: In the upper section of the document, specify the issuing medical facility or individual practice, its location, and the register number corresponding to the facility. Also, indicate the date on which the death notice was issued.

Document Handling: The death notice is given to a close relative of the deceased. This should be presented, along with the deceased's ID, at the public register office or to the local mayor on the same or following day for issuance of the formal Death Certificate.

Next of Kin Briefing: Relatives may be informed about procedures for body storage and burial.

Consult Expert & Photo Evidence: In case of ambiguities, consult a senior medical specialist. Photos of body and surroundings may be taken for professional use only.

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