RESEARCH ARTICLE (ORIGINAL)

Validation of a forensic evidence collection and preservation protocol in emergency settings: Delphi technique

Validação de protocolo de recolha e preservação de vestígios forenses na urgência: Técnica de Delphi

Validación del protocolo de recogida y conservación de restos forenses en urgencias: Técnica Delphi

Luís Miguel Correia Gonçalves [1]
https://orcid.org/0009-0004-0163-159X

Maria dos Anjos Coelho Rodrigues Dixe [2]
https://orcid.org/0000-0001-9035-8548

Susana Maria Sobral Mendonça [3]
https://orcid.org/0000-0003-2971-945X

[1] Local Health Unit of Castelo Branco, Operating Room, Castelo Branco, Portugal

[2] Polytechnic Institute of Leiria, School of Health Sciences, Leiria, Portugal

[3] University of Évora, S. João de Deus Nursing School, Nursing Department, Évora, Portugal

Abstract

Background: Emergency nurses play a fundamental role in investigating crimes and collaborating with criminal police bodies to collect forensic evidence. This responsibility requires appropriate knowledge, techniques, and equipment. The link between health care and the procedural legal system prevents unnecessary destruction of evidence and improves investigation outcomes.

Objective: To build a forensic evidence collection and preservation protocol for the emergency department and validate its content.

Methodology: A quantitative methodological study with a descriptive approach was carried out with 24 experts: seven nurses, two officers of the National Republican Guard (GNR), six officers of the Portuguese Criminal Investigation Police (PJ), and nine officers of the Public Safety Police (PSP) using the Delphi technique. The content validity index ≥ 0.75 was used.

Results: After Round 2, a content validity index of 0.89 was found for the 19 items included in the protocol.

Conclusion: The protocol is considered an essential tool to improve the collection and preservation of forensic evidence in emergency settings.

Keywords: clinical protocols; nursing assessment; forensic nursing; Delphi technique

Resumo

Enquadramento: Os enfermeiros na urgência desempenham um papel fundamental na investigação de crimes, colaborando com os órgãos de Polícia Criminal na colheita de evidências forenses. Esta responsabilidade exige conhecimentos, técnicas e equipamentos adequados. A articulação entre os cuidados de saúde e o sistema jurídico processual, previne a destruição desnecessária de provas, melhorando os resultados na investigação.

Objetivo: Construir um protocolo de intervenções de recolha e preservação de vestígios forenses para o serviço de urgência; validar o conteúdo do referido protocolo.

Metodologia: Estudo metodológico quantitativo com abordagem descritiva, com recurso à Técnica Delphi realizado com 24 peritos (sete enfermeiros, dois elementos da Guarda Nacional Republicana, seis pertencentes à Polícia Judiciária e nove elementos da Polícia de Segurança Pública). Para a validade de conteúdo utilizou-se o índice de validade de conteúdo ≥ 0,75.

Resultados: Após a segunda ronda determinou-se um índice de validade de conteúdo de 0,89, para os 19 itens do protocolo.

Conclusão: O protocolo foi considerado um instrumento essencial para melhorar a recolha e preservação de vestígios na urgência.

Palavras-chave: protocolo clínico; avaliação em enfermagem; enfermagem forense; técnica Delphi

Resumen

Marco contextual: Los enfermeros de urgencias desempeñan un papel clave en la investigación de crímenes, al colaborar con la policía judicial en la recogida de pruebas forenses. Esta responsabilidad requiere conocimientos, técnicas y equipos adecuados. El vínculo entre la asistencia sanitaria y el sistema judicial evita la destrucción innecesaria de pruebas, lo cual mejora los resultados de la investigación.

Objetivo: Elaborar un protocolo de intervenciones para la recogida y conservación de restos forenses para el servicio de urgencias; validar el contenido de dicho protocolo.

Metodología: Estudio metodológico cuantitativo con enfoque descriptivo, en el que se usó la técnica Delphi, realizado con 24 expertos (siete enfermeros, dos miembros de la Guardia Nacional Republicana, seis miembros de la Policía Judicial y nueve miembros de la Policía de Seguridad Pública). Para la validez de contenido se utilizó el índice de validez de contenido ≥ 0,75.

Resultados: Tras la segunda ronda, se determinó un índice de validez de contenido de 0,89 para los 19 ítems del protocolo.

Conclusión: El protocolo se consideró una herramienta esencial para mejorar la recogida y conservación de restos en urgencias.

Palabras clave: protocolo clínico; evaluación en enfermería; enfermería forense; técnica Delphi

Corresponding author

Luís Miguel Correia Gonçalves

E-mail: luismiguel10@gmail.com

Introduction

In recent years, there has been an exponential increase in violence, which is a violation of human rights. According to the 2022 Annual Internal Security Report, there has been an increase in general crime (14.1%), violent and serious crime (14.4%), domestic violence (15%), and juvenile delinquency (50.6%) compared to 2021 (Sistema de Segurança Interna, 2023).

Most victims of aggression present to the emergency department (ED), and nurses are usually the first professionals to interact with them. As a result, they are in a privileged position for early detection, identification, collection, and preservation of evidence and referral to the competent authorities. Although the priority of care is to preserve life, it is crucial to recognize and document procedures with potential medicolegal relevance (Lynch & Duval, 2011). The collection of evidence is the responsibility of the Criminal Police Bodies (*Órgãos de Polícia Criminal*, OPC). However, emergency nurses should be prepared for this role, as they often care for the victims. For example, nurses specializing in medical-surgical nursing care of critically ill patients must provide health care and ensure the preservation of evidence of a crime (Regulamento n.º 429/2018 da Ordem dos Enfermeiros, 2018). Similarly, nurses with specific skills in Forensic Nursing (FN) have responsibilities in the process of collecting and preserving evidence of medicolegal interest (Regulamento n.º 728/2021 da Ordem dos Enfermeiros, 2021), within the legal limits and as part of the multidisciplinary ED team. The lack of adequate protocols for forensic evidence collection and preservation in the ED affects the effectiveness of criminal investigations (Silva & Santos, 2022). Without clear and standardized protocols, nurses may inadvertently destroy or contaminate critical evidence while caring for victims, which can be essential to identifying suspects and solving crimes. Therefore, this problem justifies the need to develop and implement clear and comprehensive guidelines for nursing care that focus on the best interests of the victim, family, or community, as provided for in Regulation No. 728/2021 of the Portuguese nursing regulator (Ordem dos Enfermeiros [OE]; 2021).

In light of the above, this study aimed to create and validate a tool to guide nursing practice, namely to build a forensic evidence collection and preservation protocol for the ED and to validate its content.

Background

FN is defined as a field of practice that aims to respond to the problems of the individual, family, and community in scenarios of violence, while preserving relevant evidence in a criminal context and working with the justice system to defend their rights (Regulamento n.º 728/2021 da Ordem dos Enfermeiros, 2021).

The ED is often the first place where victims of crime are assisted. It is an environment rich in opportunities for the identification, collection, and preservation of forensic evidence. In this setting, nurses are the first professional group to interact with the victims during the triage process (Donaldson, 2020) and have a duty to preserve evidence with potential medicolegal significance (Berishaj et al., 2020).

Within the scope of their competence, nurses provide effective nursing care to preserve evidence of a crime, identify situations of suspected crimes, and refer them to the competent authorities (Regulamento n.º 429/2018, 2018).

In addition, nurses are responsible, within legal limits, for participating in the collection and preservation of relevant criminal evidence, complying with the basic rules based on the requirements of the chain of custody and collaborating with the entities involved in the investigative process, respecting the standards and protocols (Regulamento n.º 728/2021 da Ordem dos Enfermeiros, 2021). In light of this, nurses should have the most current knowledge to facilitate the implementation of best practices in victim care regarding the collection and preservation of forensic evidence (Pires, 2021). In addition, Foresman-Capuzzi (2014) recognizes that nurses' activities in the ED should be guided by protocols and techniques using evidence collection kits to establish the chain of custody.

On the other hand, FN must take into account the legal assumptions and limitations in the management of forensic evidence to ensure its legal-procedural validity. Legally, law enforcement officials are responsible for material evidence (Sheridan et al., 2011). However, nurses' work is crucial for preserving the integrity of the evidence (Lynch & Duval, 2011). From the nurses' perspective, failure to preserve this evidence can be an obstacle to the application of justice, otherwise human rights, legal standards, ethical principles, and professional ethics will not be upheld. However, their intervention should not be aimed at conducting criminal investigations (McGillivray, 2005). It is important to improve the knowledge and technical skills of professionals in the field, including strengthening collaboration skills (Direção-Geral da Saúde [DGS], 2016). It is also desirable that the principle of the duty to collaborate should prevail as a facilitator of cooperation between the health and justice sectors, thereby helping to increase the effectiveness of criminal investigations. It is therefore essential to approximate the languages in order to deepen the common knowledge about the procedures carried out (DGS, 2016). In this context, the lack of training and protocols for the care of crime victims is an obstacle to the collection and preservation of evidence, as concluded by Dumarde et al. (2022), Furtado et al. (2021), Sakallı and Aslan (2020), and Silva and Santos (2022). Pires (2021) and Ribeiro (2020) recognize the development of forensic protocols as a fundamental pillar of evidence-based FN in the ER.

Research questions

What items should be included in a forensic evidence collection and preservation protocol for the emergency department?

Did the forensic evidence collection and preservation protocol for the emergency department reach validity using the Delphi technique?

Methodology

To answer the research questions, a methodological study with a quantitative and descriptive approach was conducted in two phases: the development of the forensic evidence collection and preservation protocol for the ED and, subsequently, the validation of its content with a group of experts using the Delphi technique. The development of the protocol started with an integrative literature review that included previous studies, technical reports, procedure manuals, and relevant scientific research from the past 10 years. The literature was reviewed by two forensic experts to ensure a protocol based on sound evidence.

The next phase was to validate the content using the Delphi technique. As pointed out by Scarparo et al. (2012), the Delphi technique is used in situations where there is a lack of data, a lack of historical data, or a lack of multidisciplinary approaches, or to develop new ideas. In this study, a purposive non-probability sample was used because it allows the selection of participants based on their relevance and the value they can add to the study (Marôco, 2010).

Considering the multidisciplinary nature of the collaboration between the different entities, the sample initially consisted of 30 experts, including nurses trained in forensic sciences, members of the Technical Support Center of the National Republican Guard (*Guarda Nacional Republicana*, GNR), members of the Scientific Police Laboratory of the Criminal Investigation Police (*Polícia Judiciária*, PJ), and members of the Technical Police Section of the Public Security Policy (*Polícia de Segurança Pública*, PSP). Inclusion criteria were: voluntary participation in the study; nurses recognized by the OE and the Associação Nacional de Enfermagem Forense (National Association of Forensic Nursing, ANEFOR) with postgraduate training in forensic science/legal medicine; and members of the OPC (PSP, GNR, and PJ) recognized by their hierarchies as experts with more than 5 years of experience in criminal investigation. Melo et al. (2011) argue that expertise is achieved with a minimum experience of 2 or 5 years. The experts were identified in collaboration with the OE, ANEFOR, GNR Doctrine and Training Command, PJ National Directorate, and PSP National Directorate. Contacts with the experts were established after their authorization.

The protocol was validated in two rounds. In accordance with Chang et al. (2010), the Content Validity Index (CVI) ≥ 0.75 was used as the criterion for deciding on the validity of each item and, consequently, the protocol as a whole. The convergence or divergence of the experts' suggestions and recommendations were used as additional criteria for the final review of the protocol. The experts rated the content of each item using a Likert scale with five response options (1 - *strongly disagree*; 2 - *disagree*;

3 – *neither agree nor disagree*; 4 - *agree*; 5 - *strongly agree*). The CVI score was calculated as the sum of answers 4 and 5 divided by the total number of answers (Alexandre & Coluci, 2011). For each item, there was a descriptive section for the experts to provide their opinions and suggestions on the procedures proposed in each forensic situation.

Data were collected using an online questionnaire (Google forms) consisting of two sections. The first section aimed at the sociodemographic characterization of the sample and the second included the 19 items of the protocol.

Data were processed using Microsoft Excel and IBM SPSS, version 28.0. Descriptive statistical techniques were used, namely absolute and relative frequencies, as well as measures of central tendency such as mean and standard deviation. CVI scores per item and the overall CVI were also calculated.

Data were collected in compliance with all ethical procedures, through the signing of the informed consent form and the approval of the Ethics Committee (Registration no. 839 of February 14, 2022) of a Local Health Unit in Central Portugal.

Results

The literature review identified best practices, techniques, and methodologies in the forensic field, which were incorporated into 19 items to be submitted to the experts. Six items were included to contextualize the protocol: Introduction, Objective, and Scope of the Protocol, Concepts, Who Implements, and Legal Framework. The remaining 13 items addressed the technical procedures recommended for situations involving: Forensic Evidence Management; Preservation of Clothing, Hair, Body Fluids/Blood/Secretions; Approach to Victims of Sexual Assault, Victims of Sharp Force Injuries, Victims of Firearm Injuries, Victims of Road Traffic Accidents, Victims of Poisoning, Victims of Asphyxia, Situation of Death in the ED, and creation of a forensic evidence collection and preservation kit.

In Round 1 of the validation phase, 24 responses were obtained. With regard to sociodemographic characterization, 29.2% (n = 7) of the sample were nurses, 8.3% (n = 2) were GNR officers, 25% (n = 6) were PJ officers, and 37.5% (n = 9) were PSP officers. A heterogeneous group was created to obtain a multidisciplinary assessment based on different perspectives and experiences. In the group of 24 experts, women were in the minority (12.5%; n = 3), while men were in the majority (87.5%; n = 21). The experts' age ranged from 38 to 58 years (mean = 54.4 ± 4.99). With regard to their academic qualifications, 42% (n = 10) had completed secondary school, 4% (n = 1) had a *bacharelato* degree, 29% (n = 7) had a bachelor's degree, 21% (n = 5) a master's degree, and 4% (n = 1) a doctorate.

With regard to training in forensic science, the majority (59.1%; n = 13) had technical training, 22.7% (n = 5) had a postgraduate degree, 13.6% (n = 3) had a master's degree, and 4.5% (n = 1) had a Ph.D. in forensic science.

Two experts did not answer this question, although they had extensive experience in criminal investigation.

Regarding the frequency with which they interacted with victims and/or crime scenes, 33.3% (*n* = 8) of the experts reported that they interacted with victims or crime scenes at least three times a week, and only 8.3% (*n* = 2) reported that they never interacted with this type of situation in their professional activity, although they met the inclusion criteria.

The experts had been working between 6 and 33 years (mean = 21.8 ± 6.83). To ensure different professional experiences, experts were selected from different areas of the country: 62.5% (*n* = 15) from the central region, 20% (*n* = 5) from the southern region, 8.3% (*n* = 2) from the northern region and 4.2% (*n* = 1) from each of the autonomous regions.

Table 1 below shows all the items in the proposed protocol. In Round 1, the overall CVI was 0.82, ranging from 0.75 to 0.88 for each item, and mean responses ranging from 4.13 ± 0.99 to 4.58 ± 0.72 on a scale of 1 to 5.

Table 1

Content Validity Index after Round 1

	CVI	M	SD
Introduction of the Protocol	0.88	4.38	0.82
Objective of the Protocol	0.79	4.25	1.03
Scope of the Protocol	0.83	4.35	0.89
Concepts	0.79	4.50	0.83
Who Implements	0.79	4.13	0.85
Legal Framework	0.75	4.21	0.83
Forensic Evidence Management	0.88	4.58	0.72
Clothing	0.83	4.42	1.02
Hair	0.79	4.38	0.82
Body fluids/Blood/Secretions	0.88	4.38	0.71
Injuries	0.79	4.38	0.82
Victims of Sexual Assault	0.83	4.46	0.78
Victims of Sharp Force Injuries	0.75	4.25	0.85
Victims of Firearm Injuries	0.83	4.29	0.86
Victims of Road Traffic Accidents	0.88	4.50	0.72
Victims of Poisoning	0.88	4.42	0.72
Victims of Asphyxia	0.83	4.38	0.77
Dead body	0.83	4.29	0.75
Kit	0.79	4.13	0.99

Note. CVI = Content validity index*; M* = Mean; *SD* = Standard deviation.

After analyzing the results and suggestions, a new questionnaire was sent out to improve the instrument, focusing on aspects of technical language, legislation, and competencies of the OPC and nurses. As a result, the Legal framework was one of the items with the lowest CVI (0.75). The recognition of the importance of evidence preservation (rather than collecting it) and nursing records for the protection of victims and, consequently, for the application of justice was highlighted. Eighteen experts participated in Round 2 (five nurses, four PJ officers, and nine PSP officers), all of whom confirmed that they had participated in Round 1. The overall CVI was 0.89, ranging from 0.78 to 0.94 for each item, and mean responses above 4 on a scale of 1 to 5 (Table 2).

Table 2

Content Validity Index after Round 2

	CVI	*M*	*SD*
Introduction of the Protocol	0.89	4.44	0.86
Objective of the Protocol	0.94	4.56	0.62
Scope of the Protocol	0.94	4.61	0.78
Concepts	0.94	4.53	0.80
Who Implements	0.89	4.50	0.86
Legal Framework	0.89	4.50	1.04
Forensic Evidence Management	0.83	4.33	1.19
Clothing	0.83	4.22	1.00
Hair	0.89	4.39	0.85
Body fluids/Blood/Secretions	0.83	4.39	0.92
Injuries	0.83	4.22	1.06
Victims of Sexual Assault	0.83	4.17	0.86
Victims of Sharp Force Injuries	0.78	4.28	0.96
Victims of Firearm Injuries	0.83	4.28	1.02
Victims of Road Traffic Accidents	0.89	4.50	0.86
Victims of Poisoning	0.94	4.56	0.78
Victims of Asphyxia	0.83	4.39	0.92
Dead body	0.94	4.28	0.90
Kit	0.94	4.33	0.97

Note. CVI = Content validity index; *M* = Mean; *SD* = Standard deviation.

Discussion

The literature review identified the latest methodologies for identifying the items that should be included in a forensic evidence collection and preservation protocol for the ED. For example, the protocol should ensure a solid chain of custody with detailed procedures in the documentation, from the collection of evidence to its delivery to the competent authorities, in compliance with DGS recommendations (2016). On the other hand, the protocol specifies the use of appropriate packaging and containers for the different types of evidence, based on the guidelines of the DGS (2016) and the National Institute of Legal Medicine and Forensic Sciences (2013). The best practices and forensic techniques identified in the literature review were translated into specific actions in the protocol, reinforcing its credibility and usefulness in a set of situations that Gomes (2014) and Filmalter et al. (2018) believe are common in the ED and require specific interventions.

The proposed protocol was validated by a multidisciplinary team of experts through a Delphi panel. The Delphi technique proved advantageous because it is based on the assumption that the multiplicity of perspectives of an expert group will produce a more valid result than the judgement given by an individual expert (Niederberger & Spranger, 2020). Similarly, the creation of heterogeneous groups is useful when multidimensional and multidisciplinary validation is desired (Marques & Freitas, 2018). The results obtained in Round 1 reached an overall CVI of 0.82, indicating the overall agreement of the experts with the items in the protocol. For all items, suggestions were made for content changes related to the competencies of nurses and OPC in evidence management. In response to the experts' suggestions, Round 2 was held to improve the protocol.

In Round 2, after reformulating the protocol, the overall CVI increased to 0.89, indicating that the experts considered the content to be improved and adequate for what was proposed (Alexandre & Coluci, 2011). We The maximum CVI of 0.94 was found in the Objective of the Protocol, Scope of the Protocol, and Concepts items, which reflects the recognition of the importance of forensic evidence collection and preservation protocols in the ED, as concluded in the studies by Dumarde et al. (2022), Furtado et al. (2021), Sakallı and Aslan (2020), and Silva and Santos (2022). The CVI of 0.94 found for the Kit item represents a convergence of opinions among the experts regarding the existence of specific materials for standardizing forensic procedures, which is in line with Foresman-Capuzzi (2014). Overall, the

experts maintained an agreement of more than 0.78 on the items selected in the literature review and included in the protocol, reinforcing its relevance and validity. The experts mentioned that "the rationale is pertinent and justifies the creation of the protocol" and that "it addresses the fundamental aspects for the context and shows the relevance of systematized action protocols/procedures". However, they underlined their opinion on the division of responsibilities between OPC and nurses. As McGillivray (2005) points out, nurses should not focus their work on criminal investigations, but rather on the preservation of evidence at risk of being destroyed. Similarly, they reinforced the idea that law enforcement officers are legally responsible for material evidence (Sheridan et al., 2011). On the other hand, the use of online questionnaires allowed the participation of experts from the mainland and the autonomous regions, promoting participant reflection and adherence while reducing costs and time spent (Marques & Freitas, 2018). Both questionnaires were sent to the 30 experts who initially agreed to participate in the study. The abstention rate (20% in Round 1 and 40% in Round 2) was within the expected range for this type of technique, as it is normal for participants to drop out during the course of the rounds (Marques & Freitas, 2018). Therefore, the number of responses may be a limitation of this study. However, the number of responses obtained was sufficient to obtain satisfactory results (Skulmoski et al., 2007). In addition, the experts who participated in Round 2 reported that they had participated in Round 1, which indicates a high level of interest and adherence. On the other hand, the legal recognition of forensic nurse interventions in evidence collection and the fact that this protocol was aimed directly at nurses may have limited its implementation in their interdependent and dependent roles within the multidisciplinary team in the ED.

The protocol was validated by a multidisciplinary team based on the concept of FN related to the collaboration between the health system and the procedural legal system. It supported the results found by Mota et al. (2021), highlighting the importance of creating national and institutional guidelines based on the latest evidence of FN. This study shows that the creation of multidisciplinary teams, including health professionals and other entities involved in the investigation process, increases the quality of the care provided to victims of crime.

Finally, as advocated by Marques and Freitas (2018), no further rounds were conducted because the responses were stable, with a low degree of divergence and no new relevant suggestions.

Conclusion

In conclusion, this study identified the items of a forensic evidence collection and preservation protocol for the ED and validated its content, answering the research questions and achieving the proposed objectives with an overall CVI of 0.89. The protocol is currently part of the internal procedures of an ED in central Portugal and is periodically evaluated in order to improve it and allow its replication in other EDs. This study has filled an important gap in FN in the ED by promoting the safety and efficacy of FN and the effective collaboration between the healthcare and legal systems. However, the lack of legal validation of evidence collected by professionals other than OPC is a limitation to its practical application. This study focused only on nurses, creating a working tool to be used by them in the ED, within their competencies and legal limits and as part of a multidisciplinary team. This study should be expanded to include physicians and other professionals in the ED team. However, it is important to note that nurses must preserve and, exceptionally, collect evidence at risk of being destroyed or in situations where OPC are not yet present. In summary, nurses aim to provide care that is focused on the best interests of the victims, their families, and the community, while ensuring that no forensic procedure takes precedence over emergency care.

Author contributions

Conceptualization: Gonçalves, L., M.
Data curation: Gonçalves, L., M.
Formal analysis: Dixe, M. A., Mendonça, S. M.
Investigation: Gonçalves, L., M.
Methodology: Gonçalves, L., M.
Project administration: Gonçalves, L., M., Dixe, M. A., Mendonça, S. M.
Resources: Gonçalves, L., M.
Software: Gonçalves, L., M.
Supervision: Dixe, M. A., Mendonça, S. M.
Validation: Dixe, M. A., Mendonça, S. M.
Visualization: Dixe, M. A., Mendonça, S. M.
Writing - original draft: Gonçalves, L., M.
Writing - review and editing: Gonçalves, L., M., Mendonça, S. M.

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