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On tackling abuse of older people: The forensic challenges in fatal cases investigation

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ABSTRACT

The World Health Organization recently presented the priorities for tackling abuse of older people in a coordinated and strategic way. However, data on the forensic scenario is still lacking. In this context, the aim of the present work was to provide a comprehensive literature review of this inherently complex phenomenon in the post-mortem setting, in order to better characterize it from a forensic point of view. A comprehensive literature search was performed in three electronic databases following the PRISMA guidelines. Sociodemographic and medical data of victims and perpetrators, post-mortem data, types of abuse and risk factors were extracted from non-aggregated data. Forty-eight papers dealing with abuse in the post-mortem setting were included, with a predominance of case reports and case series. The review showed that neglect was the most common type of abuse and victims are predominantly older women who are abused in a domestic setting by trusted family member. To generate more and better data, expanded research in the forensic field requires standardized methods and the raise of professional awareness about abuse of older people.

1. Introduction

The United Nations (UN) Decade of Healthy Ageing 2021–2030 ("the Decade") is defined as a global collaboration to improve the lives of older people, their families and the communities in which they live, and offers the opportunity to address abuse of older people in a concerted, sustained and coordinated way. This is the context in which the recent document of the World Health Organization (WHO) entitled "Tackling abuse of older people" presents the priorities for tackling abuse of older people in a coordinated and strategic way [1].

Firstly, "elder abuse" or "abuse of older people" has been defined by the World Health Organization (WHO) as a single or repeated act or a lack of appropriate action, occurring in any relationship involving an expectation of trust that causes harm or distress to an older adult [2]. Generally, it can take many forms, including physical abuse, emotional or psychological abuse, financial abuse/material exploitation, sexual abuse and neglect [3,4]. The latter implies the refusal or failure to provide the vulnerable person with life necessities, such as food, water, clothing, shelter, personal hygiene, medicine, comfort, personal safety and other essentials. Neglect was defined as active, when the caregiver consciously fails to meet the basic need of older people, or passive, when the caregiver causes harm unconsciously and does not intend to injure the older person [5].

Nevertheless, a universally accepted definition of the abuse of older people is still lacking, and significant debates over the definition continue. These center around culturally specific forms of abuse of older people, how far the "expectation of trust", at the heart of the definition, should extend (e.g. to strangers, financial institutions, government); the inclusion of self-neglect, financial fraud and scams, and systemic or institutional abuse of older people within the definition [1]. Even if abuse of older people has received little attention from the public and from the scientific community, it has been always recognized as a universal phenomenon that involves all the cultural and socio-economic classes [6]. In the public health framing, like other forms of family violence or interpersonal violence, it is associated with serious consequences, such as physical and mental health morbidities, as well as an increased health care utilization [7]. Limited research has been conducted on the association with mortality, and the results showed that

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abuse is an independent risk factor for death [8] with high mortality rate [9]. However, in a more recent study, self-reported elder mistreatment does not appear to raise the risk of premature death [10].

WHO has estimated that in the community setting approximately one out of six elders (aged > 60 years) experiences during the past year some kind of abuse [2,11], and even higher rates are reported in the institutional setting, e.g. nursing homes and other long-term care facilities, where two of three staff seemingly abused an older person in the past year [12].

Nevertheless, accurate data on prevalence and incidence estimates is difficult to obtain and the reporting of abuse to the authorities is not frequent [13]. Although major advances have occurred in detection and analysis of prevalence, risk factors and consequences [4,14], identifying the abuse and neglect of older people remains a challenge, given that old age leads to physical disorders that may mimic the abuse and various factors hamper the capability of older people to report violence [15–17].

In addressing abuse of older people, the WHO identified a list of challenges among which the needs of better instruments to measure the prevalence of abuse of older people in the community and in institutions, more and better prevalence surveys, especially from low- and middle-income countries, and better global, regional, and national prevalence estimates in the community and in institutions [1].

Forensic medicine is involved, together with other healthcare professionals, in the clinical activity taking place in the emergency departments (ED) and general practice, for the identification and management of cases of abuse of older people. Moreover, it has a fundamental role in the assistance to law enforcement and judicial authority in finding and gathering evidence in older people violent deaths or in natural death cases showing the signs of omission of relevant caring acts to an older adult [18]. As recently shown in a clinical context [19], forensic medicine could contribute to the scientific research on the topic and play its part in the detection of the risk factors and key features associated with older adult abuse. However, in the forensic scenario a clear and comprehensive picture of the phenomenon still lacks, as international literature is mainly limited to case reports or a relatively small collection of cases. Moreover, divergent definitions and sector/system specific differences in data elements, collection, interpretation, or reporting represent severe impediments to data comparison and population monitoring, as well as, ultimately, to the prevention and control of abuse [3].

Following the tackling abuse of older people WHO document, the aim of our study was to provide an overview of the scientific literature dealing with cases of abuse of older people in the post-mortem setting and to discuss the main epidemiological and autoptic features, also taking into account data collected *in vivo*, in order to better characterize this complex phenomenon from a forensic point of view, and to enable data comparison on a research topic which is often affected by methodological troubles.

2. Materials and methods

A literature comprehensive search was conducted in multiple electronic databases (Pubmed, Scopus and Web of Science) from January 1990 until December 2022, using a combination of free text protocols, as follows: “elder abuse” AND (“post-mortem examination” OR “autopsy” OR “forensic pathology” OR “death” OR “fatal”). The term “elder abuse” was used as a search term, given its wide diffusion in publications. However, according to the suggestions of the WHO [1], in the present study it has been avoided in favor of “abuse of older people”, in order to avoid ageist connotations [20].

The following pre-determined eligibility criteria were applied to the title and abstracts of the retrieved papers:

A. English language;
B. relevance to the topic of abuse of older people, according to the definition of the WHO [1];
C. methodology, i.e. performance of at least an external examination or a full post-mortem examination.

A two-phases selection process was done using the above-mentioned criteria A-C with an increasing selectivity. A first selection of records was performed by two independent, blind forensic pathologists, who screened titles and abstracts aiming to be as inclusive as possible. Thus, in order not to lose older people abuse cases, only records excluded by both authors were discarded. During a second selection, two other forensic pathologists blindly and independently revised the full texts of the retrieved articles and selected papers with agreement of the two. In cases of discrepancies, a third forensic pathology expert, with a greater experience in the field, was consulted.

References of all the retrieved manuscripts were also manually examined for possible inclusion.

Cases in which murder occurred as a result of robbery or other violent acts outside of a relationship of trust between victim and perpetrator were not specifically searched, but were not discarded when found, to be as inclusive as possible.

For each paper included in the literature review, title, authors, journal, year and type of publication (case reports; case series, when >2 cases were presented; original article, when original data was presented and statistics was applied; systematic/non-systematic reviews) were extracted. Papers were further classified into literature forensic cases and literature aggregated data.

2.1. Literature forensic cases, data extraction and statistical analyses

A database of literature forensic cases was built in Excel by selecting, from all the retrieved articles, those which contained extractable and non-aggregated data.

For each literature forensic case, the following data was additionally extracted: socio-demographic and medical data on victims, including gender, ethnicity, age and clinical history; sociodemographic data on perpetrators, including relationship with the victim, number of perpetrator (1, 2 or >2) and gender; post-mortem data including place of death, autopsy findings, cause of death, methodology of assessment (with particular reference to toxicological, genetic or additional analyses); types of abuse and risk factors were extracted, when available.

For clinical history, after the collection of data, the following pre-categories were used to summarize findings: anemia, bedridden, cardiovascular pathologies, dementia or neurologic disease, endocrinological diseases (e.g. diabetes mellitus), kidney diseases, osteoporosis, pulmonary diseases and psychiatric illness.

Considering the relationship between victim and perpetrator, the following predefined categories were used for classification: family member/relative, i.e. someone sharing a relationship by blood or marriage; caregiver or acquaintance, i.e. a provider associated with a formal service system or a care custodian with no blood or marriage relationship, or a person known or recognized by the victim but with whom no substantial personal relationship exists; unknown person, i.e. a stranger with whom no personal pre-existing relationship exists [3].

Places of death were included into one of the predefined following categories: home/house of the victim or of a family member, hospital or community-dwelling older adults and others.

Autopsy findings were collected as reported in the corresponding articles.

After the collection of the causes of death as reported in the corresponding article, this item was re-classified in the following categories: cardiovascular diseases, sepsis or infection, asphyxia, hypothermia, starvation/dehydration, mechanical trauma, or other causes. Moreover, causes of death allowed to classify cases as traumatic violent deaths (asphyxia, mechanical trauma, hypothermia, other violent deaths) and natural deaths (sepsis or infection, starvation/dehydration, other natural causes).

Abuse was classified according to the five subtypes categories above

mentioned [4] as financial abuse/material exploitation, emotional or psychological abuse, physical abuse, sexual abuse and neglect, following the classification made by the authors.

Risk factors were reported as described by authors and then classified in the following non-mutually exclusive categories, i.e.: cognitive impairment of the victim, dependence/disability of the victim, mental disease of the perpetrator, financial problem of the perpetrator, familiar conflicts.

For all data, descriptive statistics was provided. For numerical variables, the scattering of data through histogram was used to check for a normal distribution. When a normal or Gaussian distribution could not be used, non-parametric tests were applied. Association between categorical variables was attempted by means of Chi-square analysis. For all statistical analysis, $p < 0.05$ was set for significance. Statistics was performed with Stata (1985–2017, StataCorp LLC, Texas, USA, version 15.1) and figures with Prism (1994–2021, GraphPad Software, LLC, version 9.3.0).

2.2. Literature aggregated data

Articles containing non-extractable or aggregated data were used to build a second database of literature case series and were extracted for the same data obtained for forensic literature cases, although no reclassification was performed.

3. Results

3.1. Literature comprehensive search

Overall, 277 hints were found, duplicates excluded, by the literature search. After the title, abstract and full-text selections, and after checking references of the manuscripts, 48 papers [15,17,21–64] dealing with abuse of older people in post-mortem setting fulfilled the inclusion criteria and were, thus, included in the analysis (See Prisma Flow chart in Fig. 1). Of these, 24 articles presented disaggregated data and were thus included among the literature forensic cases; 24 papers, not containing disaggregated data, were considered as literature aggregate data and are shown in Table A of the Supplementary material.

Out of the 48 papers, 31.2 % (n = 15) consisted of case reports, 50 % (n = 24) of case series, 14.6 % (n = 7) of original articles and 4.2 % (n = 2) of descriptive or systematic reviews.

3.2. Sociodemographic and medical data on victims

Overall, 122 cases of abuse of older people were described within the literature forensic cases, involving men in 32 cases (26.2 %) and women in 90 (73.8 %). Among the 118 cases in which the information was available, the mean age was 78 years (SD = 7), ranging from 65 to a maximum of 94. As shown in Fig. 2, women were older than men and the difference was statistically significant ($p = 0.001$). The ethnicity was only specifically reported in 15 cases (12.3 %), being 8 subjects white/

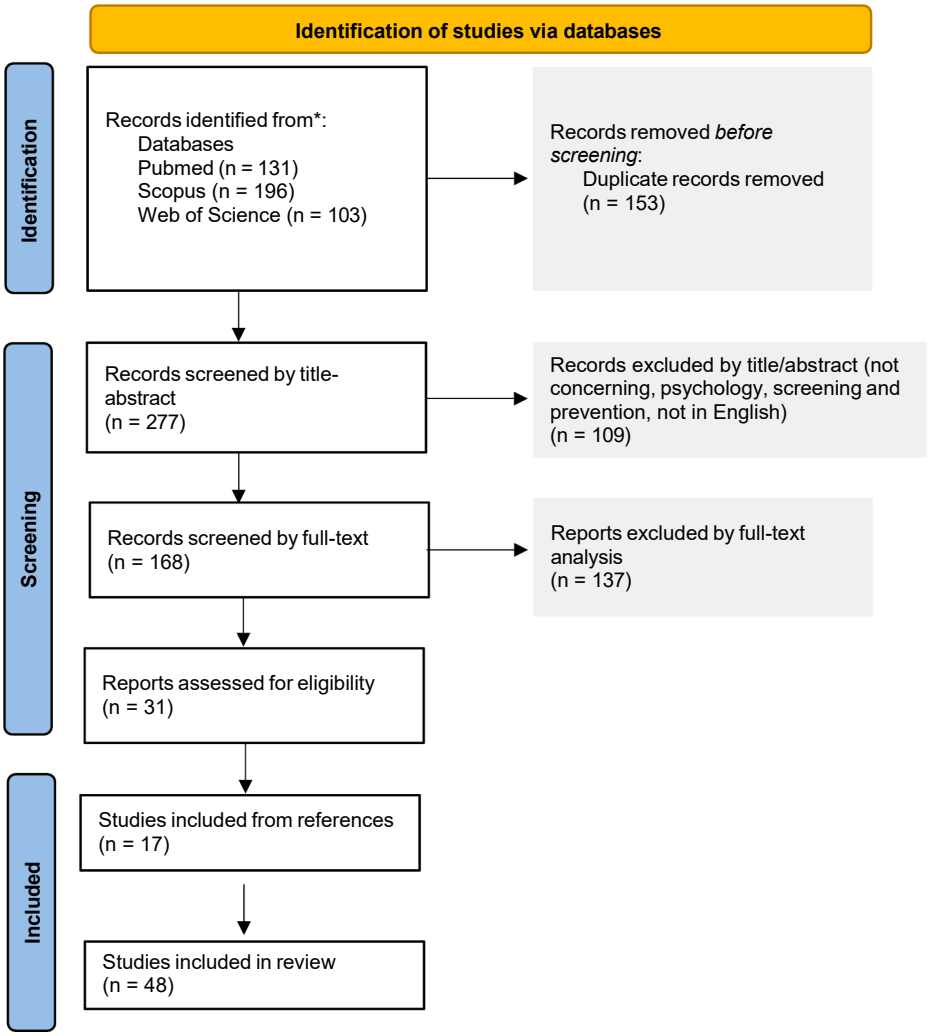

Fig. 1. PRISMA 2020 flow diagram for new systematic reviews which included searches of databases [80].

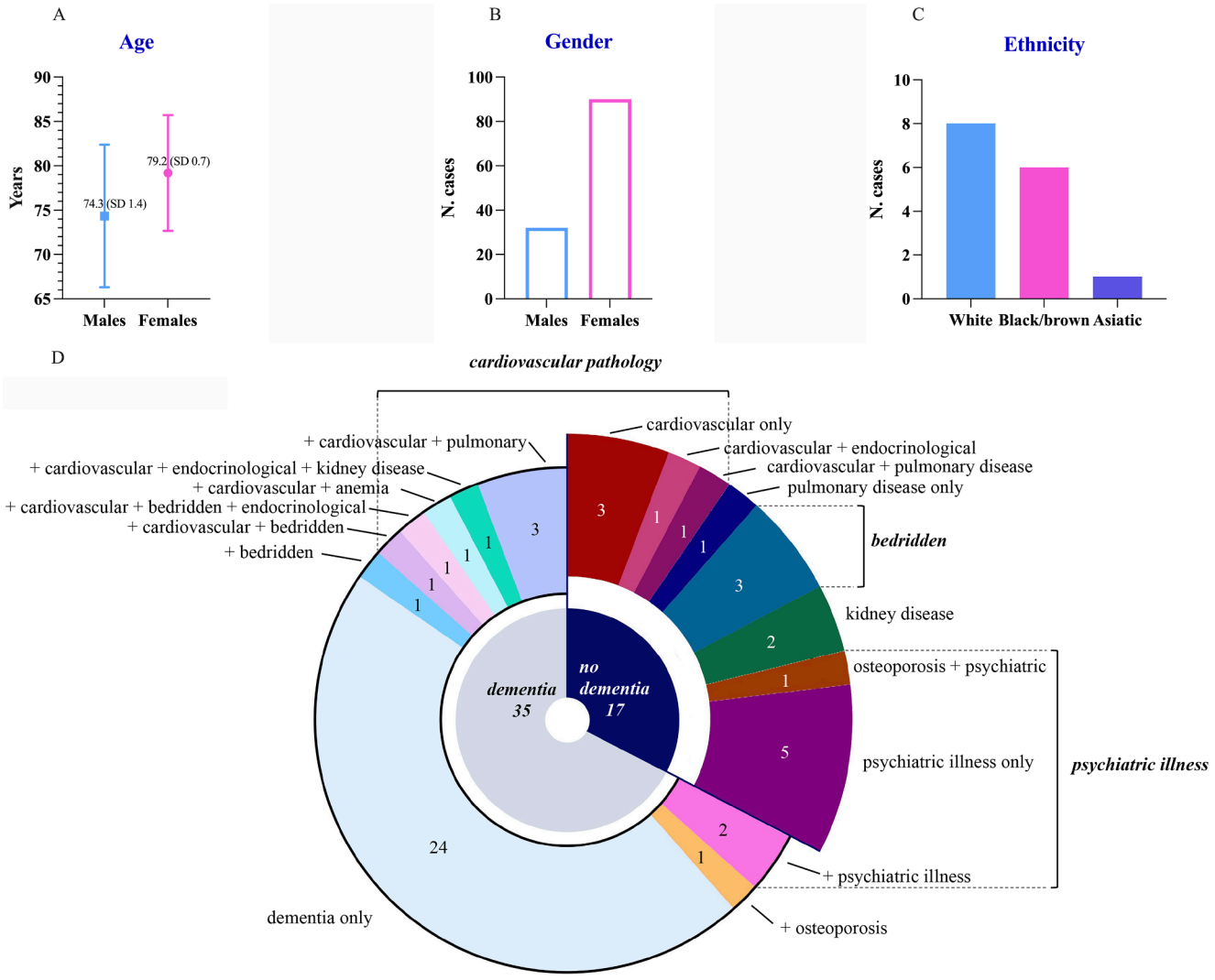

Fig. 2. Epidemiology data on victims, regarding age (A), gender (B), ethnicity (C) and clinical history (D). In D, the inner circle represents the presence or absence of dementia, the outer circle represents in detail the other diseases, with or without dementia. Data is shown as number (N.) of cases.

Caucasian, 6 subjects black/brown and one Asiatic.

The clinical history was reported in 52 cases (42.6 % of the total) in particular: dementia in 35 cases, cardiovascular pathologies in 12 cases, psychiatric illness in 8 cases, bedridden in 6 cases and pulmonary diseases in 5 cases. Diabetes mellitus, kidney diseases, osteoporosis and anemia were described in a minority of cases. More details are given in Fig. 2. No association was found between clinical history and gender except for an association between the presence of cardiovascular disease and men ($p = 0.047$).

3.3. Perpetrators characteristics

Data regarding the relationship between victim and perpetrator was available in 78 cases (63.9 %). The perpetrator was more frequently a family member of the victim (73.1 %), particularly a son or a daughter, or a caregiver/acquaintance (25.6 %). These were mostly represented by formal caregivers, except for one friend as well as care custodian, and one acquaintance. The perpetrator was an unknown person only in one case (1.3 %).

Out of the 71 cases (58.2 %) with extractable data regarding this information, the majority involved a single perpetrator (77.5 %), while a minority of abuse was performed by a couple or more than two persons, respectively 14.1 % and 8.4 %. In 58 cases (47.5 %) the gender of the perpetrator was reported, and involved men in 70.7 % of cases, women in 17.2 % and both in 12.1 %. More details are given in Fig. 3.

A statistically significant association was found between the victim-perpetrator relationship and the gender of the victim (Table 1). An association was also found between the victim-perpetrator relationship and the number and gender of the perpetrator, being a male family member in 73.6 % of cases and being represented by a single person in 81.8 % of cases (Table 1).

All other associations tested non-significant.

3.4. Post-mortem examination

The place of death was reported in 74 cases (60.7 %), among which it was mostly represented by the home of the victim or of a family member (67.6 %, of which only two cases occurred at the house of a relative) or alternatively by a hospital or residential cares or other institutions (32.4 %).

The place of death was statistically significantly associated with the victim-perpetrator relationships, since 86.4 % of deaths occurring at home were perpetrated by a family member, while 60.9 % of death in a hospital or residential cares or institutions was perpetrated by an acquaintance or caregiver.

Post-mortem findings were described in 59 cases (48.4 %), among which cachexia was reported in 47.4 %, with a reported weight ranging from 27.2 to 50 kg, pressure ulcers and signs of trauma both in 45.7 %,

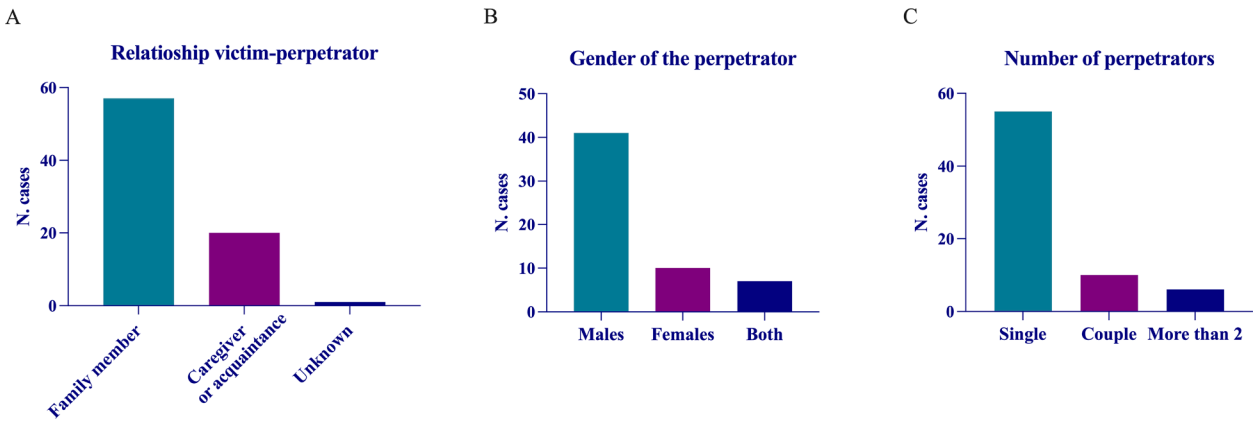

Fig. 3. Data on perpetrators, particularly relationship with the victim (A), gender of the perpetrator (B), as well as number of perpetrators (C).

Table 1
Chi-square analysis between the victim-perpetrator relationship, the gender of the victims, the number (N.) and the gender of perpetrators.

		Family member	Acquaintance/ caregiver	Unknown
Victims' gender	Women	49 (86 %)	12 (60 %)	0
	Men	8 (14 %)	8 (40 %)	1 (100 %)
p = 0.009				
N. perpetrator	1	45 (81.8 %)	9 (60 %)	1 (100 %)
	2	10 (18.2 %)	0	0
	>2	0	6 (40 %)	0
p = 0.001				
Perpetrators' gender	Women	7 (13.2 %)	3 (60 %)	0
	Men	39 (73.6 %)	2 (40 %)	0
	Both	7 (13.2 %)	0	0
p = 0.027				

signs of infection in 22.0 %, natural diseases in 20.3 %, poor hygienic conditions of the living environment in 20.3 %, presence of insects or animals on the scene in 10.2 %. More rarely, signs of aspiration (6.8 %) and of hypothermia (5.1 %) were noted. These findings were not mutually exclusive.

The causes of death were reported in 115 of 122 (94.3 %) forensic literature cases, among which sepsis was reported in 28.7 % of cases, mechanical trauma in 26.9 %, asphyxia in 12.2 %, starvation/dehydration also in 12.2 %, natural death due to cardiovascular diseases in 6.9 %, hypothermia in 4.4 % and other causes in 8.7 %, including intoxication, hanging, drowning, burning, fatal hyperglycemia and mixed causes.

A statistically significant association was found between the cause of death and the place of death (p = 0.020) as shown in Table 2.

Based on the cause, deaths were also classified as natural, which occurred in 48.7 % of the cases, and traumatic/violent, which occurred in 51.3 % of cases. No statistically significant association was found between victims' or perpetrators' characteristics and type of death.

Regarding the methodology of assessment, in all cases at least an external examination or a complete autopsy was performed, as stated in the inclusion criteria.

Additional analyses were performed in 26 cases (21.3 %) and most frequently consisted in 2 additional analyses, ranging from 1 to 4. Toxicological analyses were performed in 14.7 % of all literature forensic cases, post-mortem electrolytes analysis on vitreous humor in 11.5 %, ante-mortem serum/blood/microbiological analyses in 8.2 % and post-mortem microbiological analyses also in 8.2 %.

Post-mortem data are shown in detail in Fig. 4.

3.5. Type of abuse

The type of abuse was acknowledged in 91 cases (74.6 %) and neglect was the most frequently reported (54 cases, 59.3 %), followed by physical abuse (29 cases, 31.9 %), and neglect combined with other type of abuses in 8.8 % (Fig. 5, inner circle). Psychological abuse and financial abuse were only reported in combination with neglect or physical abuse and no case of sexual violence was described. Among neglect cases, 14.8 % involved self-neglect and 3.7 % corresponded to a homicide by neglect, as defined by the authors (Fig. 5, outer circle). Among cases of physical abuse, 27.6 % consisted of homicides, as defined by the authors. More details can be found in Fig. 5, outer circle.

Risk factors were reported in 69 cases (56.6 %). Being non-mutually exclusive, dependence/disability was described in 53.6 % cases, cognitive impairment in 47.8 %, mental disease of the perpetrator in 23.2 %, financial problem of the perpetrator in 15.9 %, social isolation in 11.6 % and familiar conflicts in 4.3 %. Risk factors are also shown in Fig. 5.

Considering those deaths in which neglect occurred, the place of death more frequently consisted of home (73.7 %) (p = 0.016), as shown in Table 3.

The presence of neglect was statistically significantly associated with cachexia, pressure ulcers, natural diseases, and poor hygienic conditions, as well as to the absence of blunt trauma. Moreover, it showed a statistically significant association to the cause of death (p = 0.001) as shown in Table 3.

3.6. Literature aggregated data

Within literature aggregated data (Table A, Supplementary Material), a total number of 15,542 cases were described, consisting predominantly of male victims (9,173 men vs 6,116 women). Age ranged from 55 to 96 years, with most articles reporting a mean age around 70–75 years.

Several case series and original articles on homicides were retrieved,

Table 2
Chi-square analysis showing the association between the place and the cause of death.

	Asphyxia	Starvation or dehydration	Hypothermia	Cardiovascular diseases	Sepsis or infection	Mechanical trauma	Other causes
Home	4 (100 %)	5 (38.5 %)	4 (100 %)	5 (62.5 %)	22 (78.6 %)	2 (28.6 %)	3 (75 %)
Hospital	0	8 (61.5 %)	0	3 (37.5 %)	6 (21.4 %)	5 (71.4 %)	1 (25 %)

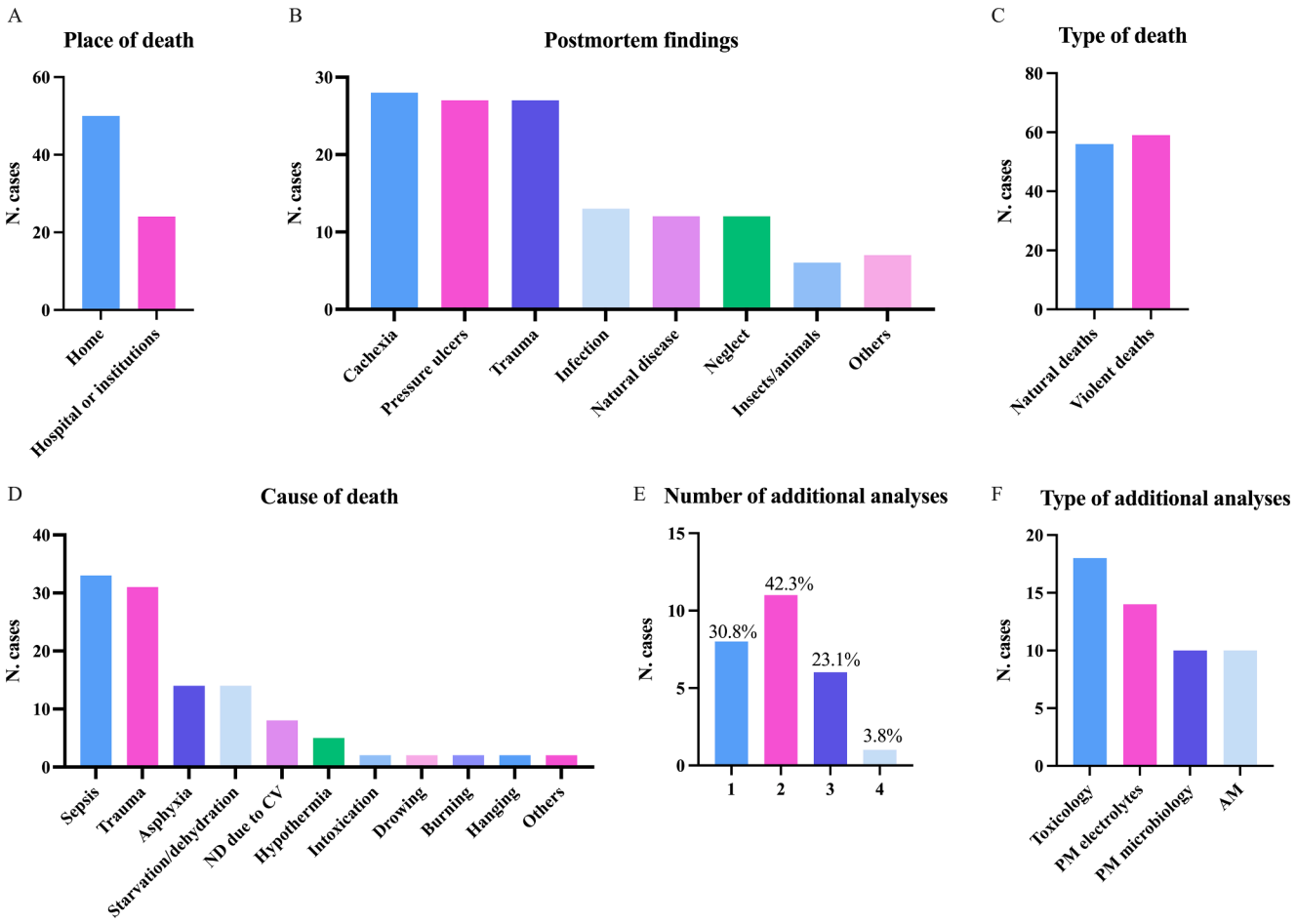

Fig. 4. Place of death (A), post-mortem findings (B), type (C) (natural vs traumatic violent) and cause of death (D) as well as number (E) and type (F) of additional analyses. All results are displayed by number (N.) of cases. ND: natural death; CV: cardiovascular disease. PM: post-mortem; AM: ante-mortem.

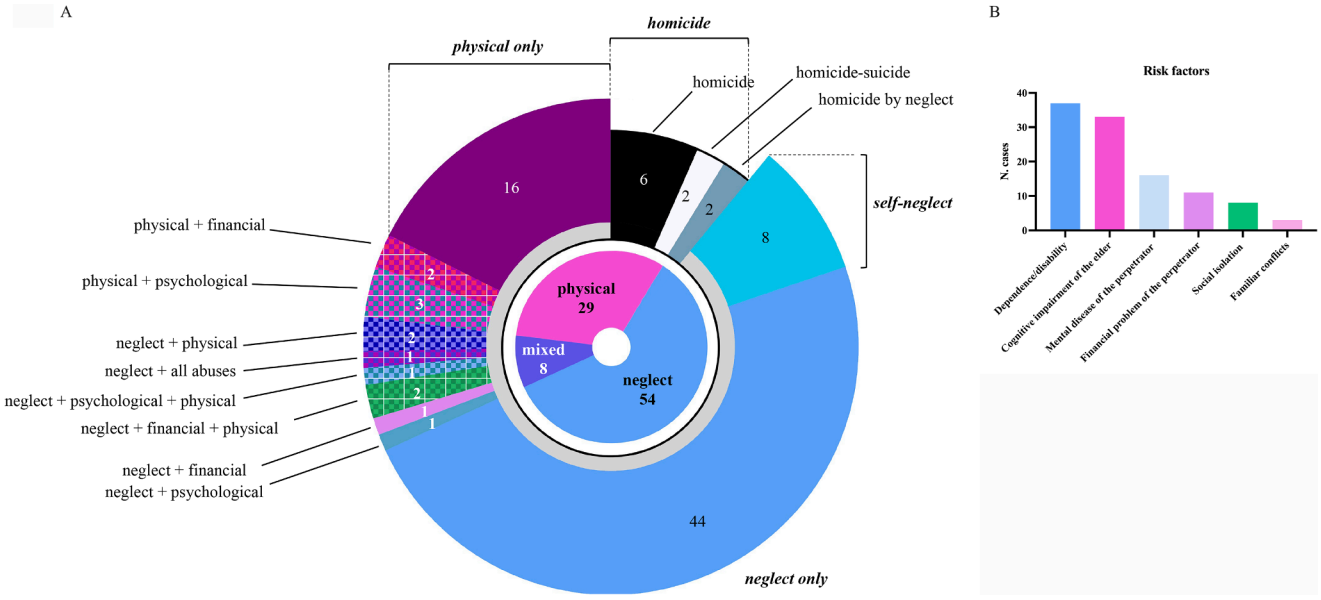

Fig. 5. Type of abuse (A) and risk factors (B). In A: abuse is classified as physical, mixed and neglect in the inner circle. In the outer circle, more details are given. Data is shown as number (N.) of cases.

Table 3
Chi-square analysis showing the association between the presence of neglects and several post-mortem findings as well as with the cause of death.

		Neglect	No neglect
Place of death	Home	42 (73.7 %)	3 (33.3 %)
	Hospital	15 (26.3 %)	6 (66.7 %)
Post-mortem findings	Cachexia	27 (58.7 %)	1 (7.7 %)
	No cachexia	19 (41.3 %)	12 (92.3 %)
	Pressure ulcers	27 (58.7 %)	0
	No pressure ulcers	19 (41.3 %)	13 (100 %)
	Signs of blunt trauma	15 (32.6 %)	12 (92.3 %)
	No signs of blunt trauma	31 (67.4 %)	1 (7.7 %)
	Natural disease	34 (73.9 %)	0
	No natural disease	12 (26.1 %)	0
	Poor hygienic conditions	12 (26.1 %)	0
	No poor hygienic conditions	34 (73.9 %)	13 (100 %)
Cause of death	Asphyxia	5 (9.3 %)	5 (16.7 %)
	Starvation or Dehydration	10 (18.5 %)	0
	Hypothermia	4 (7.4 %)	0
	Cardiovascular diseases	8 (14.8 %)	0
	Sepsis or infection	23 (42.6 %)	1 (3.3 %)
	Mechanical trauma	2 (3.7 %)	18 (60 %)
	Other causes	2 (3.7 %)	6 (20 %)

with various motives for killing, spanning from robbery to burglary, felony, sexual assault, arguments, frivolous reasons, etc. Causes of death included gunshot wounds, stabbing/strangulation, blunt force injuries, asphyxia, but also natural causes of death (e.g. bronchopneumonia and sepsis) in cases of neglect.

4. Discussion

The world-wide change in sociodemographic factors, with particular reference to the aging population, allows to predict a future increase of the prevalence of abuse of older people. International organizations and experts have repeatedly stated that improved scientific knowledge concerning abuse of older people is the key to developing effective prevention and treatment strategies and that research should be promoted world-wide [4,65]. Given the priorities and challenges recently highlighted for tackling abuse of older people [1], including the need to generate more data and to fill the gaps of knowledge by research, a comprehensive literature review has been conducted considering the forensic data source.

Our review shows that articles addressing the issue of fatal abuse of older people published in the forensic literature mostly consisted of case reports and case series, that, considered together, amounted to 81.2 % of all retrieved papers. To the best of the authors' knowledge, only 2 systematic reviews were recently published regarding homicide of elder people [40,41], but the present one represents the widest collection of casework on the specific topic of elder abuse.

Concerning case reports and case series collected, most of the victims were women in their 70's, cared for and abused by a single male family member, especially a son or a non-marriage relative, as already reported [17,58,66]. This prevalence of women victims might be partially explained by the overlap between violence against women and against older people, both predominantly perpetrated by men, and confirms the typical features emerged from studies in the clinical forensic scenario [19]. Another possible explanation resides in the long life-expectancy of women, who were also older than male victims in the present study [17]. It should also be considered that articles containing extractable data mainly included cases of neglect, while cases of physical abuse culminating in homicide, most represented in literature aggregated data, more frequently involved male victims [21–23,27,30,31,34,36,38]. However, those articles also included a high percentage of strangers within perpetrators [21,22,32,36,38] and of robbery as motives for crime, suggesting that the death occurred outside a relationship of trust, which is one of the debated issues on the WHO definition of abuse of older people.

In the forensic investigation, the victim's medical history is often entirely or partly lacking [58] as well as the risk factors of the abuse. On the basis of the few available data, our study showed a high percentage of dementia among the victims, with or without further pathologies. Severe cognitive impairment requires a high degree of care, especially if associated with other clinical factors, e.g. behavioral disturbances or bedridden or inability to fulfill daily activities [17]. Although dependence/disability and cognitive impairment of the victim were identified as the most common risk factors in the forensic cases of fatal abuse here collected, the extent to which older people are dependent upon a caregiver is rarely reported and the use of screening criteria in the forensic setting was suggested [67]. Accordingly, disability and dependence were recognized as highly prevalent issue in older people seeking medical attention for domestic violence, with a prevalence of 1 out of 3, and they might prevent older people from seeking assistance [19,68].

Given the prevalence of the family member perpetrators, as found also in a study conducted on living older people [19], it is not surprising that most deaths occurred inside the victim's home, as already seen for femicides, and were perpetrated by the son of the victim [17]. Even if in the revised forensic cases it was not possible to ascertain whether victims cohabited with the perpetrator, the cohabitation is a well-known risk factor for abuse of older people, increasing the opportunities for contact between the perpetrator and the victim and leading to conflicts and tension in a context of shared life [58]. Moreover, this situation is usually associated with social isolation at home and absence of health support, further risk factors for abuse [4]. Interestingly, home as a place of death was common also among homicidal cases reported within our literature aggregated data [21,22,25,26,30,32,36,62,64], maybe because robbery was frequently stated as the motive of homicide.

However, a non-negligible percentage of abuses took place in a hospital or in community-dwelling older adults, devoted to fulfilling the needs for care of the victims. In these settings, the relationship of trust between the victim and the perpetrator is established with acquaintances or formal caregivers, with no blood or marriage relationship, likely exasperated by the continuous requests for attention by challenging hosts or by the absence of adequate training [69].

The place of death was also associated with the type of abuse and particularly the home of the victims was a frequent scenario for neglect which, in our comprehensive literature revision, was the most frequent type of abuse, followed by physical abuse and combination of the two. This is apparently in contrast with data provided by WHO, which shows that older people are subjected to psychological abuse in 11.6 %, financial abuse in 6.8 %, neglect in 4.2 % and then physical abuse in 2.6 %. Nevertheless, in a recent literature review, the most common type of abuse identified in older adults accessing the ED was neglect, followed by physical abuse [68]. It is conceivable that these two types of abuse most frequently lead to seeking medical care or even death, considering their greater impact on physical health, compared to other forms of abuse having a more complex psycho-physical impact.

However, the setting of our study, focused on fatal forensic cases, highlights the difficulties in detecting signs of psychological or financial abuse from a comprehensive post-mortem examination and in determining them as a potential contributing factor to the death [70]. On the other hand, it allows to uncover cases in which the violence is perpetrated by omissive attitudes and acts, typical of neglect, which might not come to the attention of the clinical setting [19], or might not be recognized in the absence of a specialized teem. Indeed, when a Vulnerable Elder Protection Team (VEPT) is launched in the ED, the rate of detected neglect becomes nearly as high as that of physical abuse. [71].

To widen the possibility of detecting abuse of older people, as learned from the experience of Elder Abuse Fatality Review Teams (EAFRTS) [70], financial exploitation experts and forensic psychiatrists should be included in the multidisciplinary team for the investigation of fatal abuse of older people [72]. Indeed, in some of the included literature cases, financial and mental health problems of the perpetrator

were recognized as risk factor for abuse [72]. Although the identification of mistreatment remains challenging in the forensic setting, the forensic pathologists is an integral part of the EAFRTS, which can, by examining deaths caused by or related to the abuse, improve the service and professional systems that respond to victims and prevent similar deaths in the future [69].

Neglected victims in our study frequently displayed conditions of cachexia and this might have contributed to exacerbate their already precarious state of health (most victims also showed signs of natural disease) or might have led them to death, as seen in cases of death due to starvation/dehydration. Certainly, neglect of vulnerable or older adults is one of the many types of questionable deaths and physical findings in said cases consisted of dehydration, malnutrition, physical decay, poor hygiene, untreated decubitus ulcers and neglect of medical conditions [73]. Decubitus ulcers and onset of systemic infections were frequently noted in the present review, respectively in 45.7 % and 22 % of cases. Accordingly, sepsis was the most frequent cause of death, and this is likely connected to undiagnosed, not promptly or poorly treated infections and ulcers. On the other hand, sepsis is a natural death and highlights how mistreatment could be undiagnosed by medical examiner and forensic pathologists, when no dedicated training is established [67,70]. More rarely, bodies were colonized by insects or animals, denoting an extreme social isolation and lack of care. Nevertheless, this confirms that inferences on abuse/neglect of older people frequently have to be drawn from the decedents' environment, highlighting the need for an accurate death scene investigation [67].

Furthermore, as there is no gold standard for neglect diagnosis, forensic investigation should include the circumstantial data because the neglected person may simply look like a frail older person and the findings may be masked by the physiological aging [74]. Recently, a two-criterion screening has been suggested to identify cases of suspected abuse or neglect in deceased older people, allowing an appropriate, efficient, and targeted use of medico-legal resources [67].

Self-neglect was also included in the present study and, in all cases, it has been found to coexist with other geriatric syndromes and multiple comorbidities, including dementia and depression, coronary artery disease, diabetes mellitus, frailty and malnutrition, as well as being an independent risk factor for death.

As shown in cases of homicides across literature aggregated data, neglect is rarely found when signs of physical abuse are detected. Gunshot wounds, stab/cut injuries and blunt force injuries prevailed in the homicidal and physical abuse cases reported in Table A of the Supplementary material [21–23,25–27,30–36,38,39,62–64]. Physical abuse with objectified signs prevails also among victims who refer to the emergency room [19], suggesting that in these cases the medical attention might be more urgently sought. The cited review of Mercier [68], indeed, underlined that victims of verified cases of physical abuse present more frequently to the ED than non-abused people, as confirmed in a recent retrospective case-control study, which identified also an increased likelihood of hospitalization in older adults experiencing mistreatment [75].

Although more easily identified, signs of physical abuse are also difficult to distinguish from age-related phenomena and their absence does not exclude lethal internal injuries [76]. Even cases in which the physical signs strongly suggest physical abuse require a thorough autopsy examination, as demonstrated by a case report in which multiple contusion and a neck trauma with retropharyngeal hematoma in first hypothesis attributable to strangulation and blunt force trauma was caused by a left vertebral artery laceration [77]. All the members of the care team, especially in the ED, can contribute to suspect or recognize a form of abuse of older people [78], but currently physician training on this ability is scarce. Physician training program involving patient cases and active hands-on learning with real or standardized patients appears to increase knowledge and perceived ability to appropriately manage and report cases of elder abuse [79].

In the literature forensic cases and literature aggregated data here analyzed, it is worth noting that some studies were excluded from the review because not reporting data from external examination or autopsy. Depending on the national legislation, the prosecutor or the forensic pathologist might not see the need to order an autopsy, or might fail to suspect an abuse, leading to an underestimation of the phenomenon [58].

Even more alarming is the rate of additional analyses, which took place in approximately one-fifth of literature forensic cases. Toxicological analysis took place more frequently in cases of homicides, likely due to the suspect of a drug-facilitated crime. In a recent study [50] is pointed out the importance of blood quantitative analysis for many substances, especially benzodiazepines, in older people, also for helping in the distinction between a homicide and a drug facilitated crime.

However, the toxicological analysis should be encouraged also to check for the compliance to the home therapy given the multiple comorbidities of older people requiring several medications.

Moreover, being sepsis commonly fatal in neglect, microbiological analyses performed post-mortem might support the identification of the cause of death together with autoptic and circumstantial data.

4.1. Limitations and strengths

Several limitations of this study should be considered. First of all, only cases of fatal abuse of older people, submitted to at least a post-mortem examination, were included and differences in the characteristics of abuse might exist in comparison with other data sources. Some cases might not have been included in our cohort because no autopsy was performed or due to lack of information. Also, the focus on the forensic setting might have affected the possibility of retrieving additional information, e.g. risk factors, education, employment status etc. However, the post-mortem setting is also a *raison d'etre* for the present study, since forensic pathologists play a key role in identifying abuse of older people, especially in criminal cases, and should be provided additional research and data on forensic markers of mistreatment [72], considering lack of review focused specifically on the post-mortem setting. The here-in faced difficulties in obtaining information are not restricted to the forensic setting but are a hallmark of the study of abuse. Moreover, victims especially of neglect might not be able or may not want to search for assistance, and this form of abuse could remain a submerged phenomenon if postmortem cases go missing too. Given the fragmentation of data regarding the abuse of older people, it is only by a comprehensive evaluation of multiple settings, including not only the clinical or the clinical forensic, but also the post-mortem one, that the otherwise non-diagnosed cases can emerge.

Second, we are aware that the definition of abuse of older people by the WHO only includes cases developed within a relationship of trust, while others (e.g. American Medical Association) do not pose a diagnosis on the basis of perpetrators. The present study aimed to be as inclusive as possible and, considering that the number of cases occurring outside a relationship of trust were very low in number, the potential bias deriving from this inclusion criteria appears to be minimal for forensic literature cases. A precise age cut-off for victims was also not established, and self-neglect was included, in order to consider all "vulnerable persons" and this appears as a strength of the study.

Third, predefined categories were applied to some of the information extracted from articles. This was done with the aim of creating uniformity across studies and to facilitate the comparison of data.

The limitations of the present study also allow to confirm the challenges in obtaining complete data on the phenomenon of abuse of older people when considering the forensic setting.

5. Conclusions

This comprehensive review of the literature allows to shed some light on the submerged and underestimated phenomenon of abuse of older people. The fragmentation of our data could be interpreted as a result of

the gaps of knowledge in the forensic aspects of abuse of older people, especially in identifying risk factors in the post-mortem setting, and highlights the need for more comprehensive research. In order to generate more and better data, expanded research in the forensic field requires standardized methods and the raise of professional awareness about abuse of older people.

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary material

Supplementary material to this article can be found online at https://doi.org/10.1016/j.legalmed.2024.102398.

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