TITLE

Unexplained absence resulting in deaths of nursing home residents in Australia

- a 13 year retrospective study

Running head: Unexplained absences and deaths in nursing home residents

Key words: Elopement, Wandering, Absconding, Residential Aged Care, Injury prevention, Mortality

Key points:

- Deaths of nursing home residents following an unexplained absence occur, and strategies to mitigate the risks are required
- Management strategies should target nursing home residents with history of unexplained absences, recent entry and dementia
- Most residents with unexplained absences are noticed absent during morning shift, travel less than 1 kilometre and by foot
- Nursing home residents are found deceased within a relatively short time, highlighting the necessity to launch searches quickly

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ABSTRACT

OBJECTIVES: To examine deaths of Australian nursing home (NH) residents following an unexplained absence.

METHODS: Population based cross-sectional study was conducted using coronial data from the National Coronial Information System. Participants are residents of accredited NHs if death followed an unexplained absence and was reported to the Coroner between 1-July 2000 and 30-June 2013. Individual, organisational, environmental and unexplained absence event factors were extracted from coronial records. Data were analysed using descriptive statistics.

RESULTS: Of 21,672 NH deaths, 24 (0.1%) followed an unexplained absence. This comprised seventeen unintentional external (injury-related) causes; and seven natural cause deaths. Drowning was the most frequent external-cause of death (59%, n=10). Deaths occurred more frequently in males (83.3%, n=20), and in the age group 85-94 years (37.5%, n=9). The majority of NH residents, for whom data were available (n=15), had a diagnosis of dementia (86.7%, n=13). Most residents were found in waterways (41.7%, n=10). Median distance travelled was 0.5 kilometres [KMs] (IQR: 0.25–2.4KM), with almost 70% of residents found within 1.0KM of their NH. Most residents left the NH

by foot (88.2%, n=15). Half of the residents were found within six hours of time last seen (Median: 6-hours, 40-minutes; IQR: 6.0–11.45 hours).

CONCLUSION: Unexplained absences in elderly NH residents are a relatively common event. This study provides valuable information for aged care providers, governments, and search and rescue teams, and should contribute to debates about balancing issues of safety with independence.

INTRODUCTION

Unexplained absence (Definition Flowchart 1), commonly described as ‘wandering’, ‘elopement’ or ‘absconding’¹ is a challenging management issue in the care of older people residing in nursing homes [NHs].^{2–4} An unexplained absence may be goal-directed, such as going to visit family⁵ or purposeless and unguided due to underlying cognitive impairment, such as memory and recall deficits, disorientation, poor visuospatial ability, and expressive language deficits.^{4–6} The occurrence of unexplained absences significantly increases in persons with dementia [PWD].^{2,7}

Unexplained absences are a relatively common event, with some 24% to 40% of older adults in care facilities having an unexplained absence during their stay.^{5,8} With the NH population projected to grow rapidly,⁹ and the number of PWD increasing,¹⁰ the incidence of unexplained absences is likely to rise.

There is a paucity of current empirical research,¹ and what exists is narrowly focussed on investigating interventions to reduce unexplained absence events^{11,12} and identifying person's most at-risk.^{4,13} These studies report unexplained absences as a high-risk activity associated with injury and death.^{3,4,11,13,14}

Staff have a heightened concern for safety of the NH population given the residents care needs, multiple comorbidities, impaired physical and mental functional status; all of which may influence the person's chance of survival outside of the NH facility.¹⁵ Few studies have examined the individual, organisational, environmental and unexplained absence event factors specifically in the NH population.^{1,7,16,17} If the true burden and profile of the event are unknown then management strategies may be inappropriate and ineffective. There are potential adverse consequences on the lives of older people in NHs who may become over-protected due to care providers' perceived risk of these events.¹⁸ Further, opportunities to improve search and rescue efforts will be missed.

There is considerable personal and financial burden to treat injury and to manage unexplained absences, including the need to conduct search and rescue operations.^{16,17,19,20} Strategies, such as locking of doors,^{14,21} restraint use,¹¹ and pharmaceutical management,²² are common interventions for the management of unexplained absence. These strategies essentially remove access to physical structures (e.g. roads), environmental hazards (e.g. hot weather), and dangerous terrain (e.g. rocks/rivers) that may cause injury.

Managing risks by limiting freedom reduces personal autonomy.²³ An older person's independence to leave the facility and participate in outdoor activities is important to their life satisfaction; and movement is a stress relief mechanism, satisfying emotional needs.^{21, 24}

The aim of this study is to examine unexplained absences resulting in natural and unintentional external (injury-related) causes of death of Australian NH residents. There are important injury-prevention implications in examining the coronial data for deaths resulting from unexplained absences. Understanding the true burden and etiology of the event will allow researchers to identify potential strategies for improvement.

METHODS

Study Design

Population-based cross-sectional study of residents' deaths due to unexplained absence from a NH.

Study Population and Setting

Residents dwelling in Australian accredited (accredited by the Australian Aged Care Quality Agency for compliance and quality²⁵) NHs (Flowchart 1).

Data Source

Data were obtained from the National Coronal Information System (NCIS), an electronic data storage and retrieval system of deaths reported to Australian Coroners since July

2000 (2001 for Queensland). The NCIS contains coded and free text variables, and four full text documents including: the narrative of circumstances of death from the police report; the autopsy report; forensic toxicology report and the Coroners' findings.²⁶

Case Identification

To identify NH residents whose death followed an unexplained absence, a two-step search strategy was developed. The first step, a comprehensive search of the NCIS to identify deaths of NH residents, comprised of multiple related sub-steps (1a-1c), including:

Step 1a: A search of NCIS using the following terms: *"Home for the Elderly/Retirement Village"*, or *"Nursing Home"*, or *"Hospice, Palliative or Respite Care"*, or *"Residential Care Facility"*.

Step 1b: Individuals 40 years and older and whose incident location was classified as something other than those defined in Step 1a, were extracted from NCIS. Two research officers reviewed the coroners' findings and determined whether any new case should be included by consensus. This step identified any additional NH residents that may have been missed in Step 1a.

Step 1c: Addresses from all deaths identified in Step 1a and 1b were matched with a list of accredited NHs to determine if the deceased was a NH resident. Cases with non-matched addresses were searched for keywords in three full text documents (narrative

of circumstances from the police report, autopsy report and coronial finding) including *“nursing home”, “respite”, and “residential age* care”*.

The second step comprised of identifying deaths that followed an unexplained absence in the NH resident population identified in step-one. This included a search of NCIS using the keywords: *“wander”, “abscond”, “elope”, and “eloping”*; as well as a manual search of the full text documents available on NCIS. This search was conducted by two researchers from the Victorian Institute of Forensic Medicine, Health Law and Ageing Research Unit.

Inclusion and Exclusion Criteria

Cases were included if: (1) the person was a permanent or temporary (i.e. respite) resident of a NH who died from natural or unintentional external-causes (Definition Flowchart 1); (2) the death occurred between 1-July 2000 and 30-June 2013 following an unexplained absence event; and (3) the coroners’ investigation into the death was completed by 31-December 2014.

Cases were excluded if: (1) there was insufficient information to ascertain the cause of death; (2) it could not be determined if the person was a NH resident; or (3) the death was attributed to suicide, as these deaths differ from natural and unintentional external-cause deaths.¹⁷

Data Extraction

The following information was extracted: (1) individual and organisational factors describing the deceased's socio-demographic and NH characteristics (Table 1); (2) unexplained absence event factors (Table 2). Finally, environmental factors, in particular weather data, for day/year/location of each death was sourced from the Australian Government Bureau of Meteorology [BoM],²⁷ and classified into a heat index (from 'very hot' to 'cold': Supplementary Table 1) according to the BoM Heat Index classification (refer to BoM for comprehensive Apparent Temperature/Heat Index Classification²⁸).

Two researchers independently reviewed and extracted the data available in the NCIS and any discordance was resolved by discussion to achieve consensus. Data were entered into Microsoft Excel, cleaned, and then transferred to the Statistical Package for Social Sciences (SPSS) Version 23 for analysis.

Data Analysis

Numerical data were summarised using descriptive statistics. Missing data were analysed using pairwise deletion.

Ethics Approval

Ethics approval was granted by the Victorian Institute of Forensic Medicine Research Advisory Committee (RAC 011/13) on 14 April 2015 and the Department of Justice Human Research Ethics Committee for access to the NCIS (CF/13/8187) on 12 May 2015.

RESULTS

Individual Characteristics

Of the 21,672 natural and unintentional external causes of death of NH residents reported to Australian coroners,²⁹ 24 (0.1%) followed an unexplained absence. Among these 24 deaths, 70.8% (n=17) resulted from unintentional external causes; and 29.2% (n=7) resulted from natural causes.

Of the 17 residents who died from external causes, drowning was the most common cause of death (59%, n=10); followed by fall-related (17%, n=3); and hit by vehicle and weather-related (12%, n=2, respectively) causes of death. Of the seven residents who died from natural causes cardiovascular causes, such as coronary artery atherosclerosis, was the most common cause (85.7%, n=6).

Deaths following an unexplained absence occurred more frequently in males (83.3%, n=20), and in the age group 85-94 years (range 57-100 years) (37.5%, n=9). Females (median [*M*] 87 years, IQR 80.5-88.3 years) were marginally older than men (*M* 83 years, IQR 78.5-87.3 years).

Presence or absence of dementia data were available for 15 NH residents, of which 13 (86.7%) had a diagnosis of dementia. Prior history of unexplained absence information was available for seven residents, of which 85.7% (n=6) had prior history of unexplained absences (Table 1).

Of the six residents with a history of unexplained absences, five had a diagnosis of dementia. For the five residents who had a history of wandering within the NH, all had a diagnosis of dementia.

Nursing Home Characteristics

Overall, 91.7% (n=22) of deaths occurred among permanent NH residents, and 8.3% (n=2) were residents receiving respite. For the ten residents for whom data were available 60% had a length of stay of 12 weeks or less; with just one resident having a length of stay greater than one year (Table 1).

Data on the presence or absence of restrictive strategies, such as level of supervision provided, locked doors and security alarms was not reported on NCIS.

Unexplained Absence Event Characteristics

Time of Day of Unexplained Absence

Data on time of day the resident was noticed to be absent from the NH was available for 11 cases, with the majority (63.7%, n=7) noticed absent between 6:00am and 12:00pm.

One resident left in the afternoon and three residents at night. On examination of nursing shifts, of the residents for whom data were available (n=12), half were noticed to be absent from the NH during morning shift hours (7am – 3pm); three during night shift hours (10pm – 7am); and three during afternoon shift hours (3pm – 10pm).

Mode and Distance Travelled

Most residents' left the NH by foot (88.2%, n=15). The median distance travelled was just over 0.5 kilometres [KMs] (IQR 251 – 2,353 meters), with almost 70% found within one KM of the NH (Diagram 1, Box 1B). Only 16.6% (n=2) of residents travelled more than 2KMs by foot (Diagram 1, Box 1D).

The median distance travelled for NH residents with dementia was 522 meters, whereas for NH residents who did not have a diagnosis of dementia noted in autopsy and/or coroner's findings, the median distance travelled was 807 meters.

Time and Cause of Death

For the 12 residents for whom time data were available, the median time in which residents were found from time last seen was 6-hours and 40-minutes (IQR 6.0 – 11.45 hours), with 50% found within six hours of time last seen (Diagram 2, Box 2A). Two residents travelled over three kilometres and were found within three days; and one resident travelled less than 100 meters although was not found for seven days, due to thick scrub.

For the eight residents with complete data on distance, place found and hours missing, it took longer to find residents who travelled further and were found in green vegetation compared to residents who travelled relatively shorter distances and found in waterways Table 3.

Overall, it took shorter time to find residents whose death was from unintentional external causes (M : 6.5 hours) compared to those with a natural cause death (M : 72 hours) (Diagram 2, Box 2B). However, this is likely to be skewed due to the small number of natural cause deaths examined ($n=3$).

Environmental Characteristics

The majority of NH residents died during summer months and in 'warm' temperatures (37.5%, n=9; respectively). Fewer residents died in winter months and 'cold' temperatures (16.7%, n=4 and 8.3%, n=2; respectively) (Supplementary Table 1).

One resident died during the night from hypothermia when the outside temperatures were 'cold' (4.4 Degrees Celsius [$^{\circ}$ C]). Conversely, another resident died during daytime hours from hyperthermia the recoded temperature was 'warm' 34.6 $^{\circ}$ C.

DISCUSSION

This is the first population-based study examining deaths of NH residents following an unexplained absence. Earlier studies have combined populations residing in the community and NH.^{1, 19, 30} These groups are not comparable as they differ in their opportunity to leave their dwelling and overall health and cognitive status.^{19, 31}

We found 0.04% (n=7) natural and 0.52% (n=17) external cause deaths of NH residents reported to the coroner over a 13-year study period were attributed to unexplained absences. There are no other published studies to directly compare these findings however, the relatively small number of deaths in our study is comparable with White and Montgomery.³⁰ The authors examined missing person's records over a four-year period in one United Kingdom policing region and reported 0.7% (2/281) were found deceased. In contrast, our results are discordant with the study by Rowe et al.² which analysed newspaper reports of PWD missing in the community in the United States over four years, reporting 33% (n=87/325) missing persons were found deceased. Differences

may reflect international variation by study population characteristics and size, age-distribution; as well as environmental factors such as climate and terrain.¹⁷

The small number of deaths in our study suggests unexplained absences may not be the 'high-risk' activity commonly reported.^{3, 4, 11, 13, 14} Regardless, deaths do occur and management strategies to mitigate the risks are required. Our findings, and those of earlier publications,^{32, 33} suggest that the most effective strategies will be those that are targeted toward NH residents with prior history of unexplained absences, a recent entry or short length of NH stay, and PWD. Interventions, such as early assessment of residents on entry will support care planning of unexplained absences.¹⁵ Design of the physical space in NHs may reduce unexplained absence events, particularly in PWD.³⁴⁻³⁷ Environmental modifications, such as light filled rooms, wandering paths, and provision of space and natural settings significantly reduces the temptation of PWD to leave the facility.^{34, 35}

We found drowning was the most common cause of death (59%, n=10), indicating NH residents are more likely to succumb to the environment rather than infrastructure. Earlier studies, mostly conducted in the United States, also cited environmental factors, in particular prolonged exposure, as the most common cause of death.¹ These findings are not surprising, developed countries such as Australia and United States have well established road infrastructure and enforcement to protect drivers and pedestrians.³⁸ Weather conditions and terrain, on the other hand, cannot be modified. The relatively

short time in which residents were found deceased (6 hours, 40 minutes) highlights the necessity to launch search and rescue operations quickly to reduce time to find, and the influence of the environment and terrain in the vulnerable NH population.¹⁷

The findings from our study suggest that NH services should consider their approach to staffing and practice during morning nursing shift hours. Morning shift hours are recognised to be a busy time in which carer attention is diverted to multiple tasks such as showering, dressing and medication administration.³⁹ Lapse in supervision when carer attention is diverted is a major cause of missing incidents in community-dwelling older PWD.^{2, 40}

Our findings that individuals with unexplained absences travel by foot and, do not travel far is concordant with previous studies.^{1, 7, 31, 32, 41} This information provides valuable insight for search and rescue teams. Searching in areas that are within close range of place last seen is likely to be more successful than expanding the search boundaries beyond one-kilometre. Ideally, our findings needs to be combined with other contextual factors, such as density of green vegetation and proximity to water, which will influence how far a person may travel.^{7, 17}

The strengths of this study include the examination of over 21,000 cases of NH deaths reported to the Coroner over 13-years. A unique strength is the examination of individual, organisational, environmental and event information. This information supports aged care providers, law and policy development, and search and rescue teams

to better understand and to develop suitable assessment and intervention protocols, for unexplained absences.

We cannot exclude the possibility that the small number of deaths in our study may be due to an under-reporting bias. Such as the death was not reported to the coroner because it was expected and attributed to underlying health conditions. We were also not able to calculate incidence of unexplained absences and risk of mortality as a national registry of these events does not exist. Similar to earlier published studies,^{1, 31, 42} missing data limited the opportunity for further analysis and to test for associations and significance.

Conclusion

More research is required to better understand unexplained absences and this must consider how data is collected by coroners; and NH providers of people who have a prior history of taking unexplained absences. Further, whilst technology can have an important role in the promotion of safety and independence, new studies are needed to enhance this understanding. In particular, how technology can be used to support residents to go outside independently while at the same time NH care staff are able monitor the resident's location.²¹ ⁴⁵ Finding out why people with dementia are seeking to leave is another important area for further work to anticipate and prevent injury and death. Equally needed is a debate on whether 'wandering', a commonly used term to describe unexplained absences,³ ¹¹ ¹⁹ ³¹ is an appropriate term or

description for persons with and without dementia. Interventions that do not see walking or attempts to leave as purposeless activity provide a different way of thinking about the issue. An approach that recognises the importance of knowing the resident's needs (personal biography, preferences and priorities, orientation to place, and avoidance of terms such as 'wandering') may be as important as staff hypervigilance at different times of the day. Future research must also consider detailed resident-level characteristics, as well as the whole system of work, such as policies, management, staff-mix and ratios. Examining these may improve the development of person-centered assessment practices to evaluate individual-level risk and to distinguish objective risk from perceived risk.³⁰

Declaration of Interest

Conflicts of interest: none.

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Table 1 Demographic and organisational characteristics

Case characteristics		<i>n</i> (24)	%*
Sex	Female	4	16.7%
	Male	20	83.3%
Age (years)		84 (<i>M</i>)	78.5-88 (IQR)
Age Group	<65	1	4.2%
	65-74	5	20.8%
	75-84	7	29.2%
	85-94	9	37.5%
	95+	2	8.3%
Year Death Occurred	2000 - 2003	8	33.3%
	2004 - 2006	8	33.3%
	2007 - 2009	5	20.8%
	2010 - 2013	3	12.5%
Cognitive impairment [¶]	Dementia	13	86.7%
	Forgetfulness	1	6.7%
	Acute Brain Syndrome	1	6.7%
History of Unexplained Absence ^{¶¶}	Yes	6	85.7%
	No	1	14.3%
History of wandering within the Nursing Home ^{**}	Yes	5	83.3%

	No	1	16.7%
Type of residence	Nursing Home Resident	22	91.7%
	Respite Resident	2	8.3%
Length of stay in NH ††	≤ 12 weeks	6	60.0%
	>12 weeks to 24 weeks	2	20.0%
	>24 weeks to 1 year	1	10.0%
	> 1 year	1	10.0%
NH Size † ††	Small (1 – 20 places)	1	4.5%
	Medium (21 – 60 places)	8	36.4%
	Large (61+ places)	13	59.1%
NH Ownership ‡ §§	Religious	3	13.0%
	Government	3	13.0%
	Private	17	73.9%
AIHW Population Classification §	Capital City M1	1	4.2%
	Urban population M2 > 100,000	14	58.3%
	Urban population R1 25,000-99,999	7	29.2%
	Urban centre population R2 10,000-24,999	2	8.3%

Ledger: (*) Unless otherwise stated; (M) Median; (IQR) Interquartile range; (†) Categories for size of NH sourced from AACQA⁴⁴; (‡) NH ownership data sourced from AACQA⁴⁴; (§) Area classification sourced from AIHW 2017; (¶) The number of cases for the variable was n=15; (¶¶) The number of cases for the variable was n=7; (**) The number of cases for the variable was n=6; (††) The number of cases for the variable was n=10; (†††) The number of cases for the variable was n=22; (§§) The number of cases for the variable was n=23

Table 2 Search and rescue characteristics

Event characteristics		n (24)	%
Mode of travel*	On Foot	15	88.2%
	Electronic Wheelchair / Scooter	1	5.9%
	Drove	1	5.9%
Persons conducting the search†	Police	12	50.0%
	SES	6	25.0%
	NH Staff	6	25.0%
	Family of deceased	2	8.3%
	Other¶	4	16.7%
	Not Applicable**	2	8.3%
Number of search & rescue teams involved‡	1	4	26.7%
	2	4	26.7%
	3	3	20.0%
	4	-	-
	≥5	2	13.3%

Person who discovered the body§	Not Applicable**	2	13.3%
	Police	3	17.6%
	SES	2	11.8%
	RACS Staff	-	-
	Family of deceased	1	5.9%
Location of incident	Member of public	11	64.7%
	Green vegetation	4	16.7%
	Streets and railways	9	37.5%
	Waterways	10	41.7%
Place found in"	Previous residence	1	4.2%
	Public place outdoors	21	95.5%
	Former home	1	4.5%

Ledger: (*) The number of cases for the variable was n=17;

(†) Total > 24 as more than 1 search & rescue team may conduct a search;

(‡) The number of cases for the variable was n=15;

(§) The number of cases for the variable was n=17;

(||) The number of cases for the variable was n=22;

(¶) Other includes: park rangers, local search & rescue teams, volunteers, fire service;

(SES): State Emergency Services; (NH) Nursing home (**) Found before search began

Table 3 Cause of death and place found, distance travelled and time to discovery

Cause of death	Place found	Distance from NH (meters)	Total time missing* (hour†)
Hyperthermia	Roads and railways	798	6:50
Natural	Green vegetation	46	7 days
Natural	Green vegetation	3,800	3 days

Natural	Previous residence	843	2:05
Drowning	Green vegetation	1,961	17:36
Drowning	Waterways	184	14:00
Drowning	Waterways	194	6:00
Drowning	Waterways	611	11:27

Ledger: (*) From time resident was last seen to time resident was found;
 (†) unless otherwise stated

Flowchart 1 Case selection

Ledger: 'Unexplained absence' describes an event where a NH resident (a person living in a facility which provides 24-hour functional support and care) leaves the facility without informing caregivers, and/or the whereabouts of the person is unknown.¹

'External-cause deaths' are deaths that cause damage to the body caused by (acute) exchanges with environmental energy that are beyond the body's resilience.⁴³

Diagram 1 Distance travelled

Diagram 2 Time to discovery

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