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RESEARCH PAPER

Preventable deaths involving falls in England and Wales, 2013–22: a systematic case series of coroners' reports

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Abstract

Background: Falls in older people are common, leading to significant harm including death. Coroners have a duty to report cases where action should be taken to prevent future deaths, but dissemination of their findings remains poor.
Objective: To identify preventable fall-related deaths, classify coroner concerns and explore organisational responses.
Design: A retrospective systematic case series of coroners' Prevention of Future Deaths (PFD) reports, from July 2013 (inception) to November 2022.
Setting: England and Wales.
Methods: Reproducible data collection methods were used to web-scrape and read PFD reports. Demographic information, coroner concerns and responses from organisations were extracted and descriptive statistics used to synthesise data.
Results: Five hundred and twenty-seven PFDs (12.5% of PFDs) involved a fall that contributed to death. These deaths predominantly affected older people (median 82 years) in the community (72%), with subsequent death in hospital (70.8%). A high proportion of cases experienced fractures (51.6%), major bleeding (35.9%) or head injury (38.7%). Coroners frequently raised concerns regarding falls risks assessments (20.9%), failures in communication (20.3%) and documentation issues (17.5%). Only 56.7% of PFDs received a response from organisations to whom they were addressed. Organisations tended to produce new protocols (58.5%), improve training (44.6%) and commence audits (34.3%) in response to PFDs.
Conclusions: One in eight preventable deaths in England and Wales involved a fall. Addressing concerns raised by coroners should improve falls prevention and care following falls especially for older adults, but the poor response rate may indicate that lessons are not being learned. Wider dissemination of PFD findings may help reduce preventable fall-related deaths in the future.

Keywords: falls, safety, coroners, older people

Key Points

- One in eight coroners' preventable death reports is related to falls.
- Falls most commonly happen in the community, and deaths in hospital.
- Only one in two reports receives a response, thus it is unclear whether lessons are being learnt.
- Coroners raise a wide range of concerns regarding preventable deaths involving falls.

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Introduction

Falls are the second leading cause of unintentional injury deaths worldwide [1]. In 2020, there were 6,410 deaths reported from accidental falls in England and Wales, with 5,850 of these representing persons ≥65 years old [2]. Falls can lead to traumatic injury, such as hip fracture [3] or head injury, which may lead directly to mortality. Additionally, falls can act as the initiating factor in a chain of events that lead to death, such as immobility after a fall precipitating a fatal pneumonia [4].

Preventing significant morbidity and mortality related to falls remains a challenge both in inpatient, care home and other community settings. Inpatient falls are the most reported patient safety incident reported in England and Wales [5], whereas falls in the community led to 223,101 emergency hospital admissions in people aged ≥ 65 during 2021–22 [6]. Consequently, preventing falls both in hospitals and the community has been highlighted at a national level in the NHS Patient Safety Strategy 2019 [7], the NHS Long Term Plan 2019 [8] and as a strategic research need in 2022/23 [9]. Not all falls are preventable; however, it is important to understand what factors preceding and following a fall are modifiable to prevent serious harm.

Since 1984, coroners have had a duty to report and communicate a death where the coroner believes that action should be taken to prevent future deaths [10]. These reports, named Prevention of Future Deaths (PFD), are mandated under Paragraph 7 of Schedule 5, Coroners and Justice Act 2009 and Regulations 28 and 29 of The Coroners (Investigations) Regulations 2013 [11, 12]. They are now cited as an official source of data for the NHS Patient Safety Strategy; however, the concerns they contain remain poorly explored and disseminated.

A detailed analysis of PFDs implicating falls could highlight factors surrounding falls leading specifically to preventable death. This has the potential to aid clinical staff managing patients at risk of falling and patients who have fallen, inform wider public health policy and guide fall-related research. The aim of our study was to conduct a systematic case series of PFDs to identify and characterise deaths involving falls, synthesise coroner concerns and explore the responses of individuals or organisations to whom PFDs were addressed.

Methods

A systematic case series was designed, and the study protocol was preregistered on an open repository [13].

Data collection, screening and eligibility

Data were acquired from the Courts and Tribunals Judiciary website [14] on 16 November 2022. An openly available web scraping code [15] designed by the study authors (F.D.) was used to automatically download all PFD pdf documents from the Judiciary website and search for pre-determined keywords. The keywords chosen were 'fall', 'falls', 'falling', 'fallen', 'fell' and the positive control word 'coroner' (to identify documents that could not be automatically screened for the keywords). The code downloaded 4,305 documents, of which 4,205 were case reports and the remainder mislabelled response documents. Two thousand and ten (48%) of the documents were readable by the code and eligible for primary inclusion and were screened by at least one author (K.S. and F.D.; Figure S1). Two thousand two hundred and ninety-five remaining documents were independently screened by at least two study authors (K.S., C.P., J.J., D.L., H.F. and M.H.). Cases were included if a fall was believed to have caused or contributed to death. Cases were excluded if the fall was precipitated by violence (e.g. a push by another care home resident), or if suicidal intent was suspected by coroners. Any ambiguities regarding inclusion of cases were discussed with and resolved by the senior investigator (F.D.).

Data extraction

Case demographics, cause of death and morbidity, fall risk factors highlighted by national falls prevention authorities [3, 5], coroner concerns and responses from individuals/organisations receiving PFDs were manually extracted by authors (K.S., C.P.), and reviewed by F.D.

Data analysis

The number of included fall-related PFDs, their rates as a proportion of all PFDs and Office for Nation Statistics (ONS) mortality data were calculated over time. Medians and interquartile ranges (IQRs) were calculated for continuous variables (e.g. age) and frequencies were reported for categorical variables (e.g. sex, location of fall, location of death and coroner area of jurisdiction).

We calculated the years of life lost [16] for each case (where age was reported) by extracting their remaining life expectancy from the ONS cohort life tables [17].

Two investigators (C.P. and K.S.) assigned the International Statistical Classification of Disease and Related Health Problems 11th Revision (ICD-11) [18] numeric codes for the causes of death to each PFD.

To examine geographical variation, we graphed both the absolute counts and rates of fall-related PFDs per all PFDs in each coroner area mapped to the standard regions of England and Wales.

To evaluate reporting of fall-related risk factors reported in PFDs, information on risk factors detailed in the National Audit of Inpatient Falls (NAIF) [3] and Office for Health Improvement and Disparities (OHID) [5] was collated reported as a percentage of total cases. The NAIF has identified the following risk factors for falls: visual impairment, orthostatic hypotension, delirium, mobility problems and incontinence. Similarly, the OHID identifies muscle weakness, poor balance, visual impairment, polypharmacy and environmental hazards as falls risk factors. For the purposes of this study, we have also extracted dementia and frailty as risk factors.

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To collate and evaluate concerns raised by coroners, we classified and identified repeated themes using directed content analysis [19]. This allowed us to highlight cases involving previously recognised concerns, and to explore concepts, drawing similarities and disparities from the data. Subgroup analyses were undertaken according to the location of fall.

To calculate response rates to PFDs, we used the 56-day legal requirement [11], to classify responses as 'on time', 'late' or 'unspecified' (where a date was not present). We calculated the average response rate and frequency for individuals and organisations. Responses from organisations in receipt of fall-related PFDs were analysed and classified by type of change initiated.

Software

We used Datawrapper [20] to produce bar charts, pie charts and the choropleth map. We used SankeyMatic [21] to produce the Sankey diagram of fall location and death location. We used R (version 4.1.1) to create the openly available code [15] to download and screen PFD pdf documents.

Results

Case characteristics

There were 527 fall-related PFDs and deaths between July 2013 and 16 November 2022 in England and Wales (12.5% of all PFDs). The rate of fall-related PFDs has persisted above 10% from 2013–22 (Figure S2 and Table S1). A median of 1.03% (IQR: 0.97–1.17) of all fall-related deaths in England and Wales, as per NHS Digital Statistics, was written into PFDs each year.

The median age at death was 82 years old (IQR: 70–89 years; $n = 340$; Figure 1), and 4,652.8 years of life were lost overall, with a median of 7.9 years per person (IQR: 4.6–17; $n = 340$). Only 16 (3%) individuals were <30 years old at the time of death. In all, 53.7% of those who died were male.

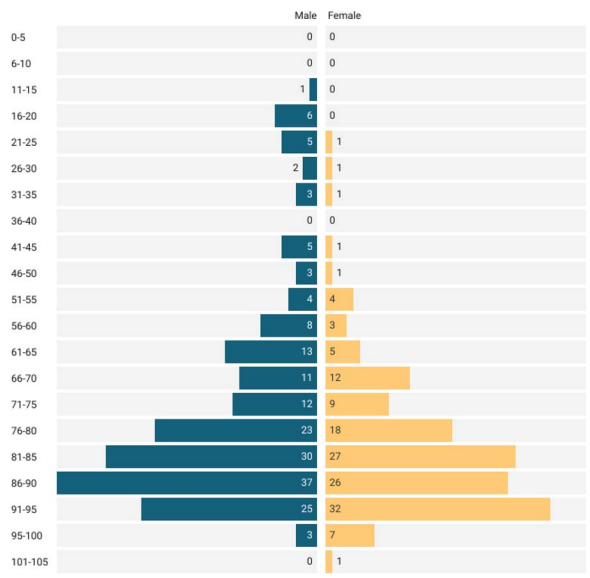


Figure 1. Age distribution of included fall-related PFD cases, by sex.

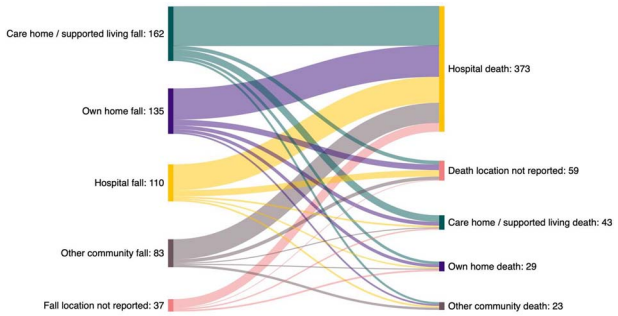


Figure 2. Sankey diagram comparing the location of initial fall and location of eventual death (n).

Overall, 21.1% of falls and 70.8% of deaths occurred in hospitals. Seventy per cent of falls occurred in community settings; 30.6% occurred in care home/supported living settings, 25.8% in patients' own homes and 15.6% in other community settings (Figure 2 and Table S2).

The 527 PFDs were written across 80 coroner jurisdictions (Table S3). Coroners in Northwest England wrote the most (26.6%, $n = 140/527$) fall-related PFDs (Figure 3A and Table S4), followed by South-East England (14.4%, $n = 76/527$) and Wales (10.1%, $n = 53/527$). However, the highest number of fall-related PFDs as a proportion of the total PFDs from that region came from Wales (20.5%), North-East England (19.9%) and North-West England (16.5%; Figure 3B and Table S4).

On the Judiciary website, 56.4% ($n = 297$) of fall-related PFDs were classified under the 'Hospital Deaths' report type (Table S5). The next most common classifications were 'Care Home Health-related deaths' (23.7%; $n = 125$) and 'Emergency Services-related deaths' (12.3%; $n = 65$).

Risk factors and causes of death

The most common risk factor identified was delirium/dementia (20.3%, $n = 107$), followed by mobility problems (19.0%, $n = 100$) and environmental hazards (15.4%, $n = 81$; Table S6). In all, 8.35% ($n = 44$) of PFDs identified the individual as being frail. Out of the 111 falls that occurred in an inpatient environment, 68.7% did not describe any NAIF risk factors (Table S7). Following their fall, 51.6% of cases experienced a fracture, 35.9% had a major bleed and 38.7% sustained in a head injury (Table S8).

After categorisation by ICD-11 code, 34.0% of deaths were because of infection-related causes, 25.8% because of head injuries/neurovascular sequelae and 11.5% because of cardiovascular causes (Table S9). The most common specific causes of death were pneumonia (28.7%), traumatic subdural haematoma (17.8%) and pulmonary thromboembolism (4.6%). Overall, 11.4% of PFDs did not specify an explicit cause of death.

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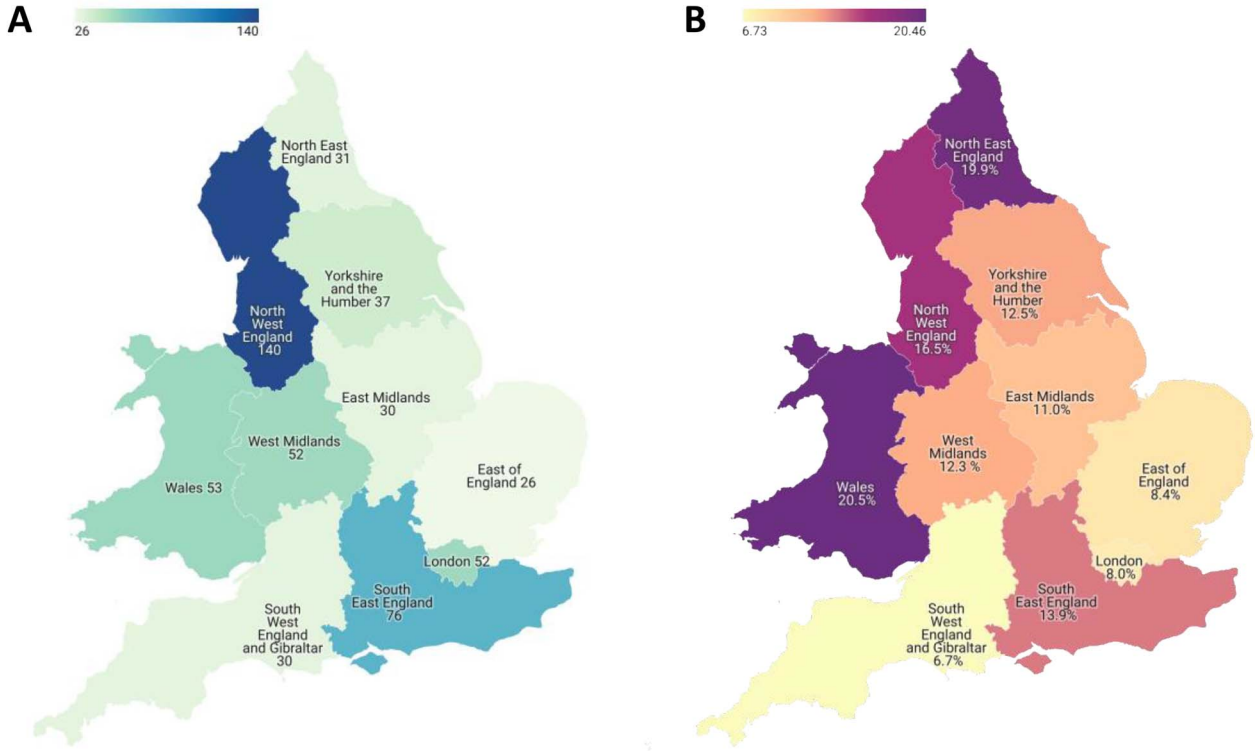


Figure 3. (A) Raw number of fall-related PFDs published per region, 2013–22. (B) Number of fall-related PFDs published per region expressed as a percentage of all PFDs published by that region.

Concerns raised by coroners

Coroners expressed 1,219 individual concerns in the 527 fall-related PFDs. Using content analysis, these concerns were categorised into 23 distinct themes within four higher-order chronological groups. These four groups were: before the fall, response time to the fall, medical care following the fall and general concerns (Figure 4 and Table S10). Overall, 67.9% of concerns originated from falls in community settings, and 24.7% from falls in hospital (Table S11).

In all, 25.8% of all concerns were related to events before the fall. Overall, 20.9% of PFDs expressed concern surrounding inadequate falls risk assessments or protocols relating to falls risk, whereas 17.3% of PFDs expressed concern over high-risk environments (Table S10). In the subgroup analysis by location of fall, concerns regarding falls risk assessments were raised in around a third of hospital (38.7%) and care home (32.3%) cases (Figure 4 and Table S10). Concerns around high-risk environments were especially raised in care homes (17.4%) and other community settings (52.4%; Figure 4 and Table S10).

Nine per cent of all concerns were related to the response time following the fall, most commonly poor response time of emergency services (6.6% of PFDs; Table S10). In all, 49.3% of concerns expressed regarding poor immediate response time were in cases where falls occurred in care settings, and 30.1% in cases where falls happened in own homes (Figure 4 and Table S10).

Overall, 37.8% of all concerns were related to events in the medical care following the fall, most commonly related to failures in communication or handover (20.3%; Table S10). In all, 29.8% of all concerns were general concerns encompassing any time point around the fall. The most common general concern was regarding issues with documentation, which was reported in 17.5% of PFDs (Table S10).

Responses by organisations to fall-related PFDs

Coroners sent 730 PFDs to 35 categories of organisation (Table S12) most commonly NHS organisations (49.5%). Overall, only 56.7% of reports had received a response at the time of data extraction, with just 37.7% of reports receiving a response within the 56 statutory days (Table S12).

In total, 69.8% of responses acknowledged the issues raised by coroners and initiated new changes to address their concerns (Table S13). This included 74.9 and 84.8% of responses from NHS organisations and care organisations, but only 45.6 and 48% responses from government and professional bodies, respectively. In all, 8.7% of responses did not acknowledge or agree with coroner concerns, including 22.2% of responses from 'other' organisations (Figure 5A and Table S13).

Changes initiated by organisations to address coroner concerns were analysed and categorised into nine themes (Figure 5B and Table S14). The most common actions

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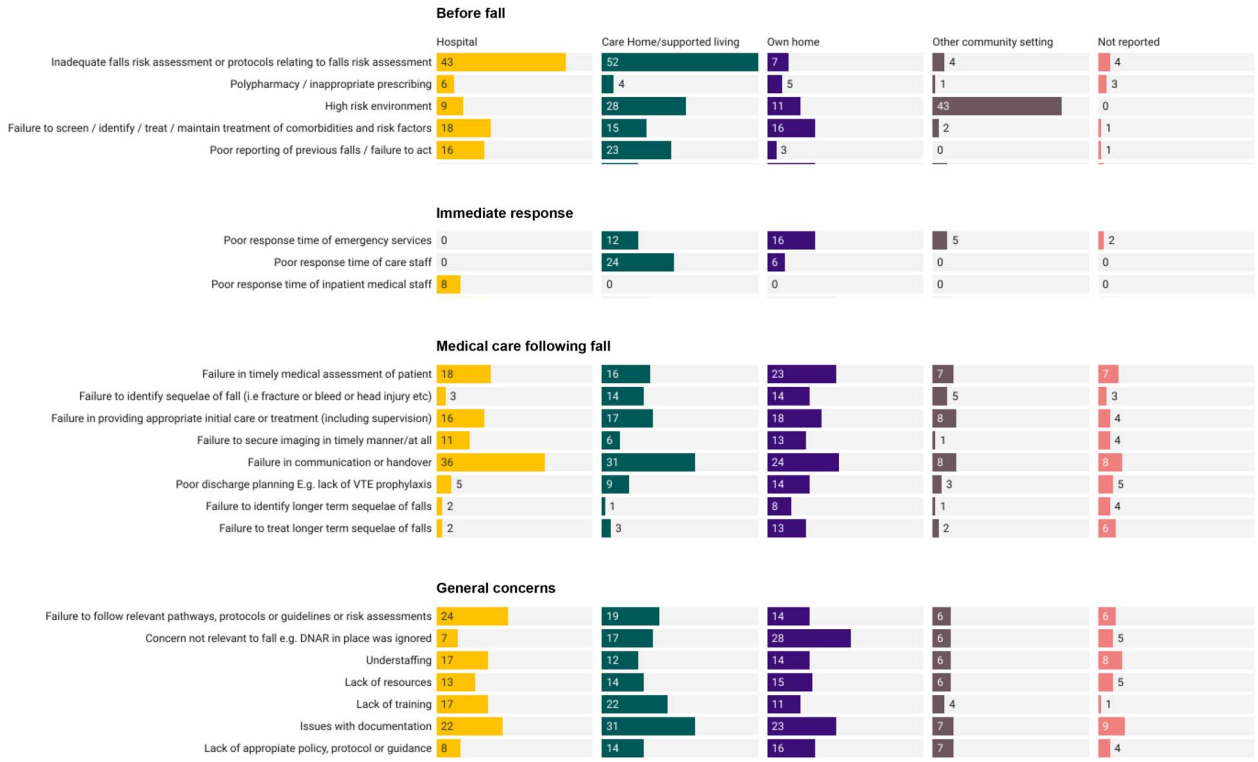


Figure 4. Coroner concern grouped by chronology of concern related to fall, and fall location.

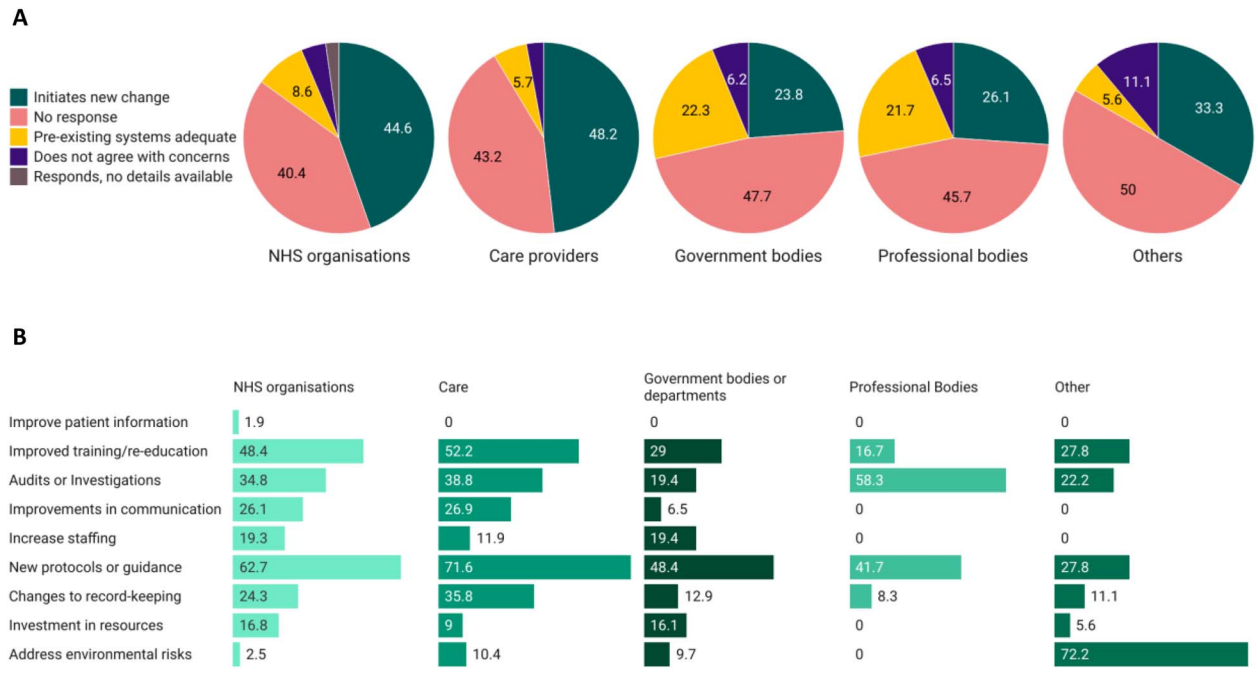


Figure 5. (A) Initial higher-order response classification by organisation type. (B) Classification of changes initiated by organisation (as a percentage) when made in response to coroner concerns.

include implementation of new protocols or guidance (58.5% of all responses), improved training or re-education (44.6%) and initiation of audits or investigations (34.3%). Notably, 72.2% of responses detailing changes initiated by 'other' organisations addressed environmental falls risk.

Discussion

Summary of findings

Between July 2013 and November 2022, there were 527 fall-related deaths where coroners determined that action should

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be taken to prevent future deaths. These cases predominantly occurred in older adults, who commonly fell in the community before dying in hospital. Around half of cases explicitly had at least one risk factor known to increase the risk of falls, and a high proportion of cases sustained a significant injury post-fall, including fractures, bleeds and head injuries.

Coroners expressed a wide range of concerns spanning risk assessments before falls to issues with communication, documentation and care following the fall. These concerns were sent to hundreds of organisations, predominantly the NHS, care providers and government bodies, but around half of reports have yet to receive a response. Organisations that responded commonly initiated audits to investigate events further, implemented new protocols related to falls or care and sought to improve education and training.

Comparison with the existing literature

Several studies have investigated coroners' concerns in PFDs [22–27], yet none have focussed on fall-related deaths. In a study investigating anticoagulant-using cardiovascular disease-related PFDs [23], concerns related to inadequate use of protocols were raised in 36.0% of cases, a concern similarly prevalent in our own fall-related cases. Similarly, coroners raised concerns around communication, seen in a fifth of our cases, in 26.0% of medicines-related PFDs [22].

These studies have similarly found poor response rates to PFDs, a concern highlighted in a 2021 report by the House of Commons Justice Select Committee [28], and quantified in a recent quality analysis of all PFDs [29]. To our knowledge, only one previous report has studied organisational responses to coroners concerns, in a limited number of medication-related deaths. [30]. This study found that improving systems, performing audits and implementing new policies were common responses, in line with our own fall-related findings. In all, 16.4% of responses outlined no action or stated that current policies were sufficient, slightly lower than the proportion amongst fall-related PFDs (28.3%). In contrast to the United Kingdom's (UK) PFD system, the National Coronial Information System (NCIS) of Australia and New Zealand contains information on every death reported by a coroner (not just 'preventable' ones), and has contributed to 206 publications with the aim of improving public health in these countries [31]. An analysis of fall-related deaths using NCIS data in Victoria, Australia, found that those affected were generally older adults, in line with our own data [32]. This study reported high rates of pre-existing comorbid conditions (86.8%) and psychoactive drug use (19%) amongst fall-related deaths, which is in contrast to lower rates of explicit risk factors reported in our data, likely because of poorer reporting of these in PFDs compared with the NCIS.

Compared with the NAIF [33], which examines inpatient falls in England and Wales where a fracture occurs, reporting of risk factors is far lower amongst PFDs. For example, mobility issues were cited in 92% of NAIF cases, but only 16.2% of PFD cases. This is again likely to represent under-reporting of risk factors by coroners rather than an actual absence of risk factors amongst cases, despite identification of risk factors being an important aspect of fall prevention. Our included cases showed high rates of fractures post-fall, which is in line with global data from the Global Burden of Disease Study 2017, which showed that fractures are the most common injury post-fall worldwide [34].

Strengths and limitations

Our study forms part of the growing research that analyses samples and subgroups of PFDs [22–27], a data source that is used by the NHS Patient Safety Strategy [7] and begins to address several strategic research needs [9]. We use reproducible data collection methods to draw information from a large sample size of preventable death cases from both inpatient and community settings. We extracted information allowing comparison with national falls audits and describe organisational responses as well as concerns. There are some important limitations associated with using information from PFDs. First, because of a lack of a consistent PFD reporting system, there is established inter-regional and inter-coroner variability in PFD publishing [29], the latter being especially pertinent when considering the relative subjectivity of coroner concerns. Second, PFDs do not routinely include certain demographic data, such as ethnicity, gender or socioeconomic status, and age reporting is inconsistent. Although we included deaths deemed to be preventable where a fall contributed to the death, in a few cases some preventable factors identified may have related to other fall-independent aspects of the patients' healthcare. Finally, in instances where organisations have made changes to address coroners' concerns, it is impossible to verify whether this change has improved fall-related outcomes.

Implications for practice

One in five people in the UK will be ≥65 years old by 2030 [35], a population in which 30% of people are falling at least once a year [36]. Therefore, increased attention to falls prevention and falls management is urgently required to improve outcomes for older patients. Indeed, supporting people to age well and improved support to those living in care homes has been highlighted by The NHS Long Term Plan 2019 as a key priority [8]. The 2022 World Guidelines for Falls Prevention and Management for Older Adults [37] advocates strongly for a multifactorial approach to falls prevention in both inpatient and community settings including care homes, and our findings provide support for the widespread implementation of these guidelines. Coroners' concerns and changes initiated by organisations in response to these concerns may help direct quality improvement efforts to reduce harm from falls.

Our study found that the majority of falls leading to preventable death happened in the community. The large NAIF audit exists to track the quality of prevention and care of inpatients sustaining a fall and fracture, but similar

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national audits do not exist for falls in the community. Our findings support an ongoing requirement for high quality, cost-effective and easily implementable falls risk assessment and prevention strategies for community health practitioners [38]. NICE supports the use of multifactorial interventions in the community [36], and a meta-analysis of 41 trials has shown that these may be successful in reducing the rate of falls [39]. There is concern, however, that the burden of prevention may fall to general practitioners, who may face multiple barriers to implementing the guidance outlined by NICE [40]. New risk prediction models based on large data sets may help identify patients who are most at risk and may benefit from early intervention [41].

Implementation of new protocols or guidance was the most common action taken by organisations in receipt of fall-related PFDs, but successful implementation of these changes is similarly important. Research demonstrates that success in reducing rates of falls in care homes is driven by effective staff-training to increase awareness of falls risk, local staff champions advocating an all-staff approach and fostering attitudes that falls can be prevented [42]. A systematic review of falls prevention interventions in hospital inpatients found that patient and staff education in particular yielded significant reductions in falls rates [43]; however, previous guideline reviews have shown a relative paucity of education recommendations [44]. A separate review highlighted leadership support, engagement of all staff in falls prevention and attitude change as further important aspects of prevention [45].

Not all falls are preventable; however, morbidity can be significantly reduced by targeting coroner concerns regarding the post-fall period. Poor sharing of information, including verbal communication between staff and documentation, regarding patient care is a known cause of patient harm [46]. Further investment in communication channels in addition to staff training, including technology for documentation, is required to minimise these harms.

In addition to the intrinsic health-based risk factors individuals may have as highlighted by NICE, our study showed a high-risk environment was cited by coroners in 17.3% of cases, especially within community settings. A prospective study highlighted the most common environmental factors in nursing homes that were significantly associated with occurrence of falls as inadequate or inappropriate handrails, unsafe ground and insufficient lighting [47]. Ensuring safe healthcare environments remains a key potential area for quality improvement for healthcare providers both in hospitals and care homes, especially for vulnerable individuals at risk of falls.

Conclusions

Fall-related PFDs provide valuable lessons in informing falls prevention and management in clinical practice. As number of people ≥ 65 years old and at risk of falls in the population increases, implementation of their findings will improve patient safety and reduce morbidity and mortality from falls.

Supplementary Data: Supplementary data mentioned in the text are available to subscribers in *Age and Ageing* online.

Declaration of Conflicts of Interest: K.S., C.P., J.J., D.L., H.F., M.H. and F.D. declare no conflicts of interest. G.R. is the director of a limited company that is independently contracted to work as an epidemiologist and teach at the University of Oxford. G.R. received scholarships (2017–20) from the NHS National Institute of Health Research (NIHR) School for Primary Care Research (SPCR), the Naji Foundation and the Rotary Foundation to study for a DPhil at the University of Oxford.

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Data Availability: Protocols and study materials used for data synthesis are openly available on the Open Science Framework [13]. Demographic information from all PFD cases is openly available from the Preventable Deaths Tracker [48]. The code used to download and screen PFD pdf documents is openly available [15].

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