

# Hip fracture registries: utility, description, and comparison

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## Abstract

**Summary** Hip fractures (HF) are prevalent and involve high morbidity and mortality so improving their management is important. HF registries are a good way to improve knowledge about this condition and its quality of care, while at the same time reducing clinical variability, optimizing efficiency, improving outcomes, and reducing costs.

**Introduction** Hip fractures (HF) are a prevalent fragility fracture secondary to osteoporosis that involves high morbidity and mortality. They are low-impact fractures, resulting from a fall from a standing or sitting height. Despite numerous Clinical Practice Guidelines that establish uniform recommendations for their care, great variability persists regarding clinical and healthcare outcomes. Fracture registries can help detect deficits and establish measures to improve care. The objective of this work is to analyze the contents that a HF registry

should have and to compare the characteristics of some national HF registries.

**Methods** A literature search was conducted on several national hip fracture registries, and those that contain relevant information on the variables and their outcomes were selected.

**Results** The selected HF registries were compared using the parameters they measure as well as the outcomes in the different countries. The variables collected in the majority of the databases and those that give useful information are as follows: sociodemographic variables (age, sex, place of residence), clinical variables (function before and after HF, anesthesia risk as measured by the ASA score, type of fracture, type of surgery and anesthesia, and in-hospital and 1-month mortality), and healthcare variables (pre-operative and overall stay, presence of collaboration with orthogeriatrics or with any clinician in addition to the surgeon, secondary prevention of new fractures by assessing the fall risk, and need for osteoporosis treatment).  
**Conclusion** The recording of HF cases in different countries improves knowledge about handling this condition and its quality of care, while at the same time reducing clinical variability, optimizing efficiency, improving outcomes, and reducing costs. The debate on the variables that should be recorded is timely, such as organizing how to collect each measurement, and even trying to unify the national and international registries or using a current proposal such as the one from the Fragility Fracture Network.

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## Introduction

Hip fractures (HF) are a highly prevalent condition. An incidence of 620,000 cases per year was estimated in the European Union in 2010 and more than 210,000 cases per

year in the USA between 2008 and 2011 [1, 2]. In terms of economic consequences, the annual cost of treatment for the acute and subacute phase in the European Union was estimated to approach €20 billion in 2010, while in the USA, the cost of the acute phase is \$3.3 billion [1, 2]. The costs are expected to grow 25% between 2010 and 2025 [2]. The care given to patients admitted for a fragility fracture (resulting from a fall from a standing or sitting height) varies widely, as do the clinical management and outcomes (mortality, complications, mean stay, time to surgery, access to rehabilitation) [3].

Drafting Clinical Practice Guidelines (CPG) was the first step for improving the quality of care for the elderly with fragility hip fractures. They are a valid decision-making tool that also decrease variability and increase efficiency [4–8].

However, knowing what to do is not enough: it is necessary to monitor, analyze, and audit some of the parameters related to managing this condition. After defining quality standards, either local or national, the audit will measure adherence to the guidelines and will detect what part should be modified to improve the clinical outcome. To achieve these objectives, a hip fracture registry is needed [9].

Multicenter registries include patient information from several hospitals at the regional, national, or international level. They are a potential tool to monitor conditions and record outcomes with the end goal of improving care and thus reducing morbidity and mortality, while also contributing to patient safety, identifying best practices, and reducing healthcare costs. The British National Hip Fracture Database (NHFDB) can serve as an example to demonstrate the utility of recording data and the stimulus it provides to improve some parameters [10]. Since its implementation in 2007, it has been observed how, in the following years, a decrease in the time to surgery, an increase in the number of patients assessed by Geriatrics and discharged with treatment for osteoporosis, and more fall risk assessments after the fracture have been achieved. These outcomes still had a margin for improvement with the implementation in 2010 of the Best Practice Tariff (a system through which the hospital receives compensation if quality standards are met) [11, 12].

Neuburger compared the data from 471,590 HF patients collected between 2003 and 2011, before and after the implementation of the NHFDB, and found a progressive increase in the number of hospitals participating in the data collection, the number of patients who received early surgical intervention (from 54.5 to 71.3%), and a lower 30-day mortality (from 10.9 to 8.5%) [13].

From this data, it can be concluded that some of the advantages of hip fracture registries are as follows:

1. Knowledge of the healthcare reality of this condition. This is of interest both locally, by revealing the magnitude of the condition in each center, as well as generally, which can serve to adjust resources.
2. Assessment or audit of the parameters, of both the condition (pre-surgical waiting time, number of patients

undergoing intervention, etc.) as well as outcomes (number of patients who die, number of patients walking at discharge, etc.). The comparison with the standard enables deficits to be detected and corrective measures to be suggested.

3. “Benchmarking” introduced into the comparison between centers, which enables best practices to be imitated, a necessary instrument for continual improvement in healthcare quality.
4. Data availability for research studies, especially intervention studies, which require a large number of participants to demonstrate benefits. Registries enable multicenter studies with a large number of cases [14, 15]. Furthermore, by including all the cases, it eliminates the selection bias that can be present in clinical trials and other types of studies.

The objective of this work is to analyze the contents a HF registry should have and to compare the characteristics of the most important national HF registries.

## Methods

A review of the available literature on HF registries was conducted by searching on PubMed using the following keywords: “national database,” “hip fracture,” and “elderly.” The national registries that published their operations and described the variables they contain were selected. With the information obtained, the essential variables that should be included in HF registries were chosen, that is, those related with the CPG recommendations that provide the most benefit and have the greatest scientific evidence. The outcomes from the different registries coming from annual reports or published articles were also compared.

## Results

### Variables that hip fracture registries should contain

Some of the variables that a registry should contain can be automatically collected from each hospital’s computer system, as in the case of demographic data (age, sex), the hospital stay, pre-operative stay, type of fracture, and type of surgical intervention. However, the management databases are usually lacking lots of important information, such as the clinical and functional characteristics of patients, meaning that doctors and nurses must participate in the data collection.

The registries should be designed with criteria for optimization, avoiding information that is not useful and only adds to the time burden that makes it difficult to complete.

There is at least one expert consensus that establishes a list of useful parameters in studies on orthogeriatric interventions in the elderly with hip fractures [16], which largely coincides with the CPG recommendations. Some of the variables are well categorized (e.g., using assessment scales) and are easy to collect, but others are difficult to measure, as in the case of medical complications. There is no unanimous definition and recording each possible complication is difficult; therefore, the outcomes can vary according to the collection method, even in the same sample [17].

Some already established registries, such as the NHFD, have simplified many of the variables, collecting the following essential parameters: admission to the ward in fewer or more than 4 h, surgery in fewer or more than 36 h, whether or not pressure ulcers are developed, whether or not the patient was assessed by an Orthogeriatrician before surgery, whether or not there was multidisciplinary care between Traumatology, Geriatrics, and Rehabilitation, whether or not cognitive assessment was performed, whether or not osteoporosis treatment was started before discharge, and whether or not a fall risk assessment was performed. As a case mix for comparisons between all hospitals, they use only two parameters: 30-day mortality and the percentage of patients who return home within 30 days of discharge. These are the variables that are collected using the Best Practice Tariff in the UK [18].

### Description of the national and international hip fracture registries

The HF registries selected for this publication are described below. Table 1 shows the variables collected and some of their outcomes.

#### *Scottish Intercollegiate Guidelines Network (SIGN)*

It is possible that the SIGN guidelines are the source of the different HF registries that have since arisen. In 1997, the first Scottish guidelines on hip fractures were produced. In 2002, a new set of guidelines were drafted and, together with the Scottish Hip Fracture Audit (SHFA), it was decided to jointly make recommendations and audit the improvement in care, making Scotland the first country to simultaneously implement the guidelines and the national database. In 2007, the group reviewed the emerging evidence about secondary prevention and in 2009, the latest guidelines, “Management of hip fracture in older people: A national clinical guideline,” were published [19].

The SHFA collected data from all patients over 50 who were admitted because of hip fracture in 22 Scottish hospitals. The variables collected are related to the condition and the outcomes, reported during the hospital stay and at 120 days

(these were collected by telephone or by mail). The results contributed by this work were published by Holt in 2008 [20].

#### *National Hip Fracture Database (NHFD)*

In 2007, the Blue Book by the British Orthopedic Association (BOA) was produced jointly with the British Geriatrics Society (BGS) and other Anesthesia, Osteoporosis, Nursing, and Endocrinology scientific associations. The book discusses the care of elderly patients with hip fractures from the time of the fall through secondary prevention and served as the basis for the NHFD impetus. This is the largest and fastest-growing hip fracture database in the world to date. The report published in 2014 [12] includes data from 182 hospitals in England, Wales, and Northern Ireland. It has had 250,000 cases since 2007 and has 5000 cases each month. The NHFD initiative is not limited to collecting data; it includes clinical teams that participate with the hospitals with continuous feedback on outcomes and meeting quality standards. They provide telephone calls, online information, and local multidisciplinary meetings to promote good clinical practice. Since the BTP was implemented in April 2010, it has significantly increased the number of participating hospitals, the number of cases included, and the numbers of centers meeting the quality standards.

The published annual reports enable the findings from each hospital to be compared with the others and the on-going improvements from the audited standards to be checked. Furthermore, professionals who participate in the database are surveyed so they can give their opinion about the future of the registry [21]. Results corresponding to 2015 were recently published [22].

#### *Irish Hip Fracture Database (IHFD)*

The IHFD is the Irish national database, an initiative from the Irish Gerontological Society (IGS) and the Irish Institute of Trauma and Orthopedics (IITOS) [23]. The objective of this registry is to use the data to ensure changes in the organization of the process to guarantee better surgical, medical, and rehabilitation care standards, as well as to prevent new fractures. Sixteen trauma units participated in the 2013 report.

#### *Kaiser Permanente Hip Fracture Registry*

In the USA, no single national database has been developed to date. This registry [24] uses the data from Kaiser Permanente (KP), which is the largest integrated health system in the USA. It has developed a registry with the intention of monitoring the patients who received surgery for HF, with patient, surgery, morbidity, and mortality information, to improve the quality of care.

**Table 1** Variables and outcomes from several national hip fracture registries

	Scotland [20]	UK [12, 22](NHFD)	Ireland [23]	USA [24]	Norway [25, 26]	Australia/New Zealand [27]	FFN [33]
No. of cases	15,461	64,864 <sup>b</sup>	1950	12,562	13,251	3519	—
No. of Hospitals	22	177 <sup>b</sup>	12	33	55	25	5
Date collected	1998–2005	2013/2015	2013	2009–2011	2005–2007	2015	2014
Women (%)	80	71.6 <sup>b</sup>	71.3	68.6	72	70/65	71–75
Mean age (years) or % > 80 years	—	68.5% > 80 <sup>b</sup>	59% > 80	82	79	82	60% > 80
Previous residence (%)							
Home	64	75.6	79.2	—	—	71/75	75–85
Nursing home	26	18.5	7.1	—	—	—	—
Acute care hospital	—	4.2	13	—	—	—	—
Destination at discharge (%)							
Home	77 <sup>a</sup>	48	31.8	—	—	—	—
Rehabilitation	10 <sup>a</sup>	18.9	—	—	—	—	50
Nursing home	8 <sup>a</sup>	10.8	35.5	—	—	—	—
Acute care hospital	—	1.1	17.4	—	—	—	—
Walking ability (%)							
Without aids	68	58.3	73.9	—	—	44/49	50
1 aid or without aids	—	—	—	—	—	—	—
Cognition (%)							
Screening test performed	—	94.9 <sup>b</sup>	9.1	—	—	97/64	0–67
Diagnosis of cognitive impairment	—	37.5 <sup>b</sup>	31.6	—	38	40/28	—
ASA > II (%)	73	68.4 <sup>b</sup>	48.6	65.9	42.4	—	70
Type of fracture (%)							
Intracapsular	52	40.6 <sup>b</sup>	40.4	43	—	—	—
Extracapsular	—	—	—	—	—	55	27.51
Type of anesthesia (%)							
General	—	55.1 <sup>b</sup>	14.8	—	—	70/56	100–11
Regional	—	44.9 <sup>b</sup>	75.4	—	—	—	22–87
Time to surgery	—	71.7% < 36 h 25.8% > 48 h	71% < 48 h <sup>c</sup>	—	—	80% < 48 h	29–49% < 36 h 21–68% > 36 h
Mean stay (days)	—	Acute 15.3 Subacute 4.5 19.3 <sup>b</sup>	21	4	—	—	—
Geriatric intervention	—	50.5%	—	1%	—	95/76	0–100%: > 62%
Perioperative Medical Assessment	—	87.5% <sup>b</sup>	—	—	—	—	—
Pressure ulcers (%)	—	2.9	3.7	2.9	—	3.2/1.7	<5
In-hospital mortality (%)	4 <sup>d</sup>	—	—	—	—	—	0–6
Received bone health assessment (%)	—	97.2 <sup>b</sup>	—	—	—	—	—
Osteoporosis treatment (%)	—	—	—	—	—	—	—

**Table 1** (continued)

	Scotland [20]	UK [12, 22](NHFD)	Ireland [23]	USA [24]	Norway [25, 26]	Australia/New Zealand [27]	FFN [33]
Start	56.1	31.9	14/35				
Continuation	10.7	12.6	8/15				
Fall risk assessment (%)	97 <sup>b</sup>	62.4	76/46				
Reintervention within 30 days (%)	1.1 <sup>b</sup>	1.8	18				
Mortality (%)							
30 days	8	7.1 <sup>b</sup>	6.2				
90 days	—	—	12.3				
120 days	21	—	—				

ASA American Society of Anesthesiologists

<sup>a</sup> Home within 120 days of discharge

<sup>b</sup> NHFD 2016

<sup>c</sup> Work hours from Monday to Sunday from 8:00 a.m. to 5:59 p.m

<sup>d</sup> Ellanti (Journal of Osteop. 2014)

### Norwegian Database (NOREPOS)

The purpose of NOREPOS [25, 26] is to understand the circumstances explaining why Norway has one of the highest incidence rates of HF, geographic causes of variability, and outcomes of different treatments. NOREPOS is a collaborative project about osteoporosis and fractures that combines data from four large epidemiological studies from different regions of Norway. Many variables are measured, some different from those in other registries, to answer its epidemiological objective. For example, they collect data on height, weight, wrist circumference, heart rate, blood pressure, 50 questions on sociodemographic aspects, health behaviors, and laboratory test: lipid, glucose, and vitamin D levels. They have the largest bone mineral density (BMD) database in the world (56,000 forearm BMD and 28,000 hip BMD), along with laboratory results from a large number of patients (180,000) and a hip and wrist fracture registry.

### Australian and New Zealand Hip Fracture Report (ANZHFR)

A web-based electronic data collection system, the ANZHFR, was developed in Australia and New Zealand for a continuous audit of hip fracture care. The ANZHFR has been developed to provide feedback to participating hospitals regarding the ANZ Guidelines for Hip Fracture Care (6). Access to a demonstration database is available only for hospitals in Australia or New Zealand. Monthly ANZHFR newsletters are sent updating people on the Registry's progress and the 2016 Report was recently published [27].

### Other databases

In Finland, the PERFECT Hip Fracture Database contains the HFs from 1999 to 2007. The data were taken from the hospital discharge registry (Finnish Hospital Discharge Register) to measure the quality of HF treatment and to analyze the regional differences, developing some indicators. Significant regional differences and data that vary from that of other countries was found, especially the hospital stay, which is around 40 days [28].

In Korea, the national healthcare system has a database containing diseases and drugs prescribed to the entire population. A study by Kang uses this data to estimate the annual incidence of HF and 1-year mortality after the fracture. As in other series, it found an association between 1-year mortality and age, being male, and higher comorbidity (measured using the Charlson Index). However, the unusual finding is the higher mortality among patients with a lower socioeconomic situation, those who live in cities other than the capital (Seoul), and those seen in tertiary hospitals [29]. As it is not a HF-specific registry, more details about its management are

unknown, but it does provide epidemiological data that can help manage healthcare policies.

In the USA, there are other national databases that include a large number of patients. The Nationwide Inpatient Sample (NIS) has retrospective data from patients admitted using the ICD-9 codes for diagnosis and comorbidities. Another database, the National Surgical Quality Improvement Program (NSQIP) by the American College of Surgeons, is prospective and the data are obtained directly from the medical records by trained surgeons, with periodic audits to ensure quality. From 2005 to 2010, more than 258 hospitals participated in collecting information with demographic data, pre-operative, comorbidity, laboratory testing, perioperative variables, and 30-day morbidity and mortality outcomes. They are not HF-specific registries, but they are a source of several research studies due to the large amount of patients and available data [17, 30].

While there is no Canadian Hip Fracture Registry [31], there is activity in several Canadian provinces to develop registries, including British Columbia [31].

#### *Fragility Fracture Network (FFN)*

The FFN [32] is an international organization that recommends options to achieve maximum functional recovery and quality of life in people who have suffered an osteoporotic fracture, as well as secondary prevention by globally optimizing the multidisciplinary management of this health problem. Its tools include creating a network that includes the highest number of countries possible and setting Consensus Guidelines, establishing quality standards, and systematically measuring how they are applied [32].

At its core, it is an international group comprised mainly of representatives from other registries who, in 2013, proposed a concise minimum common dataset (the FFN Minimum Common Dataset—MCD) that would cover the key elements of case mix, care, and outcomes. They also designed a registry that is compatible with the previously existing databases.

The pilot phase of the FFN provided data from five European Trauma units in Spain, Slovenia, Germany, Malta, and England which are already available online [33].

#### **Comparison of outcomes**

The most important results from the various countries' registries are shown in Table 1, where the wide variability in the care, and therefore the outcomes, is reflected.

The outcomes from the common variables from the fracture registries have been discussed, but each registry has some differences. The Kaiser Permanente database [24] collects comorbidities, the surgeon's level of experience, and the volume of fractures at each hospital. Admission to the Trauma ward in

fewer than 4 h is only collected in the British and Irish registries [12, 23] with better outcomes in the first (48.9 versus 20.6%). The Norwegian registry [25], in addition to the large amount of epidemiological, sociodemographic, laboratory test, and densitometry data, can cross-match the data with cohorts of patients who are hospitalized or die after the fracture.

#### *Sociodemographic characteristics*

It is seen that, in all cases, the mean age exceeds 70 years, although it can depend on the inclusion criteria. The prevalence of women—between 70 and 80%—is usual for this condition. Between 65 and 75% come from their own home, and a smaller proportion from nursing homes or another medical center. The differences regarding destination at discharge are larger, with the percentage of patients who are referred to rehabilitation fluctuating from 19 to 50%. This variability will depend on the different healthcare systems and especially on the availability of geriatric rehabilitation units, which, despite having a high degree of evidence demonstrating their utility [34–36], are not an accessible resource in all centers [37]. Moreover, there is also no consensus on the characteristics of the geriatric rehabilitation units that have multiple endpoints (nursing homes, rehabilitation centers, functional recovery units) and different ways of working that make them difficult to compare.

The hospital stay is also correlated with the types of care and availability of resources, and with the way it is recorded, with a wide degree of variability observed, from 4 days in the USA. [24] to 19 days in the UK [12] (where they distinguish between 15.3 days of acute phase and 4.5 of post-acute phase).

#### *Pre-operative stay*

The recommendation for early surgery has mostly been met in England [12] with 71.7% of patients receiving an intervention in the first 36 h, where reducing the time to surgery is being achieved thanks to the implementation of the Best Practice Tariff, and the continuous auditing system. Interventions to improve this data point, such as increasing orthopedic surgeon availability, achieve better outcomes [38].

#### *Clinical status—baseline function*

The function status prior to the fracture is usually walking independence in between 50 and 73% of cases, with a prevalence for cognitive impairment in around 33–40%. Between 42 and 73% have an elevated surgical risk measured using the ASA score (above 2). It is lower in the Norwegian registry [25], likely due to the inclusion of younger patients.

## Anesthesia

The anesthesia technique is another parameter that varies widely in the different registries, and the superiority, in terms of clinical outcomes, of regional anesthesia versus general anesthesia continues to be controversial. Regional anesthesia predominates in Ireland [23] and it is divided between regional, general, and mixed anesthesia in the NHFD registry [11].

The USA, publication reviewed for this work [24] does not provide data about the type of anesthesia. Another American study, the National Surgical Quality Improvement Program by the American College of Surgeons (ACS-NSQIP), which analyzed 9842 hip fracture patients coming from more than 370 hospitals, from 2010 to 2012 found that 73.7% of patients had surgery under general anesthesia and 26.3% under regional anesthesia [39]. In this publication, general anesthesia is associated with longer surgery time, with more thromboembolic complications and a higher need for transfusions. Nevertheless, it is correlated with fewer urinary tract infections and shorter post-operative stay, and like other works [40] did not find any differences in terms of readmissions or 30-day mortality.

As for the UK, no data on the type of anesthesia technique were included until version 6, in 2011. The FFN data [33] once again reflect the wide variability, fluctuating with extremes of 100% general anesthesia in one center to 87% regional anesthesia in another hospital.

## Orthogeriatric collaboration

Taking into account the recommendations about the clinical approach summarized in the article by Bardales [4] and other more recent articles [5–8], it is worth pointing out the great importance of geriatric intervention throughout the process, providing a recognized benefit with a high level of evidence [5–8]; therefore, this intervention should be implemented any time an elderly patient is admitted with a fragility fracture. It is thus a variable that should be recorded in all databases, which would enable us to continue demonstrating the benefit of orthogeriatric collaboration. The outcomes in the registries reviewed are highly variable, with Australia/New Zealand and the UK presenting the best data (interventions in 87–95% of cases) [12, 27]. In the FFN registry [33], three hospitals had Geriatrician intervention in 99% of cases, two others exceeded 60%, and one did not have any. There is no national registry in Spain, but there are several publications on orthogeriatric collaboration, which in some regions such as Castilla-Leon reaches 93% of public hospitals [41].

## In-hospital complications

Recording in-hospital complications is complex because it can multiply the variables to an infinite number and because of the

difficulty in defining them. The complication that is usually recorded in nearly all series is the presence of pressure ulcers, which reflects quality of care and is in the area of 1.7 to 5%. They are monitored in the Kaiser Permanente registry (pneumonia, myocardial infarction, thromboembolic disease, dislocations, wound infection), all with an incidence under 1.4% except for pneumonia, which was the most common complication with an incidence of 11.4%. Some registries systematically assess cognitive status [22, 23, 27, 33], which can facilitate detecting delirium or the risk of developing it, a very prevalent complication and a warning sign for numerous clinical decompensations. Including this variable in hip fracture registries should be considered.

## Mortality

In-hospital mortality data are under 6%, and 1-month mortality is between 6.2% in the American registry and 7.1% in the British registry [22, 24].

## Surgical complications

The percentage of reinterventions at 30 days is around 1% because revisions are recorded (defined as surgery where a component is substituted for some reason). It is highest in the case of Norway [25], likely because they have recorded all types of reinterventions.

## Prevention of new fractures

Secondary prevention of any fragility fracture by assessing the fall risk and treating osteoporosis is currently considered a standard quality of treatment in HFs. In the UK, since the implementation of the BPT, whether or not secondary prevention of future fractures is performed has been recorded in terms of osteoporosis prevention (initiating treatment in between 32 and 57%) and assessing the risk of new falls, which is done in most patients during admission [18]. The incidence of a second hip fracture or any other fragility fracture within a year of the hip fracture reaches 16%, which justifies the need to evaluate and perform secondary prevention [42]. Therefore, the National Bone Health Alliance Working Group has published an expert consensus where an individual who experiences a low-trauma hip fracture can be diagnosed with osteoporosis, with or without a BMD test [43].

## Discussion

There are several hip fracture registries coming from the numerous experiences of in-hospital orthogeriatric collaboration. Based on this review, it can be concluded that the best way to record activity would be one that enables sharing the situation

**Table 2** Proposed variables to be collected in the hip fracture database

Hospital acute phase	
Hospital/location	
Gender	No. of men/women (%)
Age	Years
Previous residence	Community/nursing home
Residence at discharge	Community/nursing home/rehabilitation center/hospital/death
Previous function	Autonomous walking outside, alone or with a cane/outside with more technical support/alone at home/does not walk
Function at discharge	Autonomous walking outside, alone or with a cane/outside with more technical support/alone at home/does not walk
ASA	I–II–III–IV
Type of fracture	Intracapsular/pertrochanteric/subtrochanteric
Surgical treatment	Yes/no Partial prosthesis/total prosthesis/cannulated screws/intramedullary rod
Anesthesia technique	Regional/general/mixed
Date and time of admission	
Date and time of surgery	
Authorization to bear weight	Yes/no
Date weight borne	
Date of discharge	
Orthogeriatric collaboration	Orthogeriatrics unit Geriatrics consultant Physician consultant Only orthopedic surgeon
Pressure ulcers	Yes/no
In-hospital mortality	
Date of death	Yes/no
Prior pharmacological treatment	Calcium/vitamin D/antiosteoporotic/anti-platelet drug/anticoagulant
<i>N</i> (%)	
Pharmacological treatment at discharge	Calcium/vitamin D/antiosteoporotic/anti-platelet drug/anticoagulant
<i>N</i> (%)	
Falls risk assessment	Yes/no
Outpatient follow-up (30–60 days)	
Appointment date	
Specialist performing follow-up	Orthopedic surgeon/geriatrician/rehabilitation
Residence	Community/nursing home/rehabilitation unit/hospital/death
Function status	Autonomous walking outside, alone or with a cane/outside with more technical support/alone at home/does not walk
Mortality	Yes/no
Date of death	
Readmission	
Reintervention	
Osteoporosis treatment	Calcium/vitamin D/biphosphonates/denosumab/teriparatide/others
Follow-up by geriatrician	

ASA American Society of Anesthesiologists

of each center, which would voluntarily participate, to be understood and compared with others from several regions, with the intention of being at least nationally and even

internationally representative. In this way, in addition to each center learning about its own situation, the registry enables national and international comparisons so each center can



compare itself against and learn from the best, thus reducing clinical variability.

The registry would meet the following requirements:

- A simple registry that does not require much effort to complete, to guarantee its continuation. It must be in accordance with routine practice.
- Continual collection over time, including all cases, not a selection.
- Independent from the model of care, i.e., whether there is orthogeriatric collaboration or not.
- Include a series of variables similar to those collected in other databases, which enables the outcomes to be compared.
- Most databases consider the acute phase of the condition to end after 30 days.

Taking these premises into account, a model registry with the most important variables that provide the necessary information for evaluating hip fracture patients and their treatment is proposed in Table 2. Furthermore, they allow for comparisons with other registries, because the majority of the parameters are present in the reviewed databases.

The initial sponsor or sponsors should probably be national or regional scientific societies, or working groups related to the topic, as having institutional support would be best. They should also be followed by an intention by the healthcare administrations to implement the necessary measures to correct the deficits found. Creating a national registry can help to improve planning and management of healthcare resources and to detect the needs and demands of an aging population.

## Conclusion

As a general conclusion, the authors of this review consider a registry of HF cases to be a very important database goal initiated in different countries and in international organizations, which leads to better precision in understanding the management of this condition and improvements in the care of the HF patients by reducing clinical variability, optimizing efficiency, improving outcomes, and reducing costs.

Different hospitals and working groups in several countries are in a position to start a HF registry similar to those that already exist or to participate in one of international scope.

It is essential for an international registry to have a simplified number of essential measures to encourage use by hospitals in multiple countries, which enable the outcomes to be compared between the different countries. National HF Registries can therefore exist with more extensive variables and data points as each national healthcare administrations desires.

The debate on what variables to include, registry structure, and whether European registries should be unified in using an already active proposal, such as the FFN registry, is both fitting and timely.

## Compliance with ethical standards

**Conflict of interest** None.

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