(12.7%) had died, and 99 (33.3%) had had at least one rehospitalization. Of participants with delirium onset within 72 hours, all-cause death and rehospitalization rates were not significantly more frequent, and the composite end-point (n = 28, 71.8%) was significantly more frequent than in other participants (n = 102, 28.2%) ($P < .001$). Delirium occurrence within 72 hours (odds ratio (OR) = 1.43, 95% confidence interval (CI) = 1.13–1.67), functional dependence (OR = 1.37, 95% CI = 1.05–1.71), greater Cumulative Illness Rating Scale severity (OR = 1.18, 95% CI = 1.08–1.89), low hematocrit (OR = 0.79, 95% CI = 0.53–0.98) and serum albumin levels (OR = 0.69, 95% CI = 0.38–0.97) were significantly associated with greater incidence of the composite end-point.

These results provide evidence that individuals who experience delirium within 72 hours after ward admission have a greater risk of death and rehospitalization; the association between delirium occurrence and the composite end-point remained significant after multivariate adjustment. In keeping with previous studies that have reported greater postdischarge mortality and worse clinical outcomes in individuals who develop delirium during a hospital stay,[7–10] these findings add to the current evidence demonstrating that ED length of stay, by increasing the risk of delirium onset, might contribute to postdischarge death and rehospitalizations. Therefore, whether interventions designed to shorten the length of ED stay (or to make it more comfortable) may reduce the incidence of delirium in older vulnerable adults and result in a better overall prognosis, including lower mortality and rehospitalization rates, should be evaluated.

Mario Bo, MD, PhD
Struttura Complessa a Direzione Universitaria Geriatria e Malattie Metaboliche dell'Osso, Città della Salute e della Scienza-Molinette, Torino, Italy

Martina Bonetto, MD
Struttura Complessa Geriatria e Cure Intermedie, Azienda Sanitaria Ospedaliera Santa Croce e Carle di Cuneo, Cuneo, Italy

Giuliana Bottignole, MD
Paola Porrino, MD
Eleonora Coppo, MD
Michela Tibaldi, MD
Giacomo Ceci, MD
Struttura Complessa a Direzione Universitaria Geriatria e Malattie Metaboliche dell'Osso, Città della Salute e della Scienza-Molinette, Torino, Italy

Silvio Raspo, MD
Giorgetta Cappa, MD
Struttura Complessa Geriatria e Cure Intermedie, Azienda Sanitaria Ospedaliera Santa Croce e Carle di Cuneo, Cuneo, Italy

Giuseppe Bellelli, MD
Dipartimento di Scienze della Salute, Università Milano-Bicocca, Milan, Italy
Acute Geriatric Unit, San Gerardo Hospital, Monza, Italy

ACKNOWLEDGMENTS

The ethics committees approved the research protocol, and written consent was obtained from all participants.

Conflict of Interest: The editor in chief has reviewed the conflict of interest checklist provided by the authors and has determined that the authors have no financial or any other kind of personal conflicts with this paper.

Author Contributions: Mario Bo: expert geriatrician, writing the manuscript. Martina Bonetto: study design. Bottignole, Porrino, Coppo, Tibaldi, Ceci: data collection. Raspo: statistical analysis. Cappa: expert geriatrician. Bellelli: reviewer.

Sponsor's Role: None.

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EFFECT OF FRAIL PHENOTYPE ON BONE MASS AND VERTEBRAL COMPRESSION FRACTURE IN INDIVIDUALS UNDERGOING DIALYSIS

To the Editor: Frailty denotes a decline in ability to manage physiological stressors with aging. Presence of frailty predicts the risk of clinically significant fractures, and frail individuals frequently have osteoporosis.[1] Frailty and osteoporosis putatively share a common ground, including coexisting physical inactivity, muscle wasting, weight loss, and nutritional insufficiency.[2]

Frailty is also highly prevalent in individuals with end-stage renal disease (ESRD);[3] its presence and severity are associated with poor outcomes.[4] In addition, individuals with ESRD are at greater risk of hip fracture because of osteoporosis or the abnormal bony architecture resulting from chronic kidney disease–mineral and bone disorder

(MBD; renal osteodystrophy).[5] It is unclear whether the established association between frailty, osteoporosis, and fracture also exists in individuals with ESRD, in whom silent vertebral compression fractures (VCFs) are underrecognized.[6] The purpose of this pilot study was to investigate the relationship between frailty, bone mass, and VCFs in individuals with ESRD.

METHODS

Forty-three individuals with ESRD were prospectively enrolled after providing informed consent (approved by National Taiwan University Hospital ethical review board, 201505154RINB). All participants completed a self-report frailty instrument (simple FRAIL scale (SFS), score range 0–5, with higher scores indicating greater frailty) with validated efficacy in individuals with ESRD[7] and underwent blood tests for serum calcium, phosphate, alkaline phosphatase, and intact parathormone. Certified radiologists obtained and interpreted a thoracolumbar spinal roentgenogram to determine VCF status (location and segments). Thirty-seven (86%) underwent dual-energy X-ray absorptiometry (DXA; Hologic, Waltham, MA) for evaluation of bone mass (bone mineral content (BMC)/density (BMD), T/Z-scores). DXA and VCF results were stratified according to presence of frailty and analyzed accordingly.

RESULTS

Of this cohort, 14% were frail (SFS ≥3) and 51% were prefrail (SFS 1–2). Thirteen (30%) had VCFs, and six (14%) had three or more VCF segments. No significant differences were observed between individuals with ESRD with and without frailty in age, sex, body mass index, or comorbidities. Frail individuals undergoing dialysis had significantly lower BMC at the third lumbar vertebra (L3) and femoral neck (FN); lower BMD and T-scores at L3, L4, and FN; and lower Z-scores at L4 and FN than those who were not frail and no significant differences in the biochemical parameters of MBD (Table 1). The severity of frailty (SFS scores) was negatively correlated with L3 ($P = .04$), L4 ($P = .04$), and FN BMD ($P < .001$). Frail individuals undergoing dialysis were more likely to have VCF (67% vs 24%, $P = .04$) and had more VCF segments (0.38 vs 1.33, $P = .02$) than those who were not frail. After adjusting for demographic characteristics and comorbidities, regression analyses showed that frailty was negatively associated with FN BMD ($\beta = -4$, $t = -3.17$, $P = .004$); higher SFS scores were also associated with higher risk of VCF (odds ratio (OR) = 1.8 per point; $P = .01$). Analyses including prefrail individuals yielded similar results.

Table 1. Biochemical and Dual Energy X-Ray Absorptiometry Results in Frail and Nonfrail Individuals with End-Stage Renal Disease

	Nonfrail	Frail	
Index	Mean ± Standard Deviation		*P*-Value
Serum biochemical findings			
Calcium, mg/dL	8.9 ± 0.8	8.9 ± 0.8	.95
Phosphate, mg/dL	5.4 ± 1.5	4.8 ± 1.5	.27
Calcium-phosphate product	48.5 ± 14.1	42.8 ± 13	.25
Alkaline phosphatase, IU/L	72.4 ± 28.9	84.4 ± 23.3	.23
Intact parathyroid hormone, pg/mL	365.8 ± 48.5	351.2 ± 80.6	.89
Bone mineral content, g/cm			
L1	12.9 ± 3.4	11.5 ± 5	.42
L2	13.5 ± 3.7	10.9 ± 3	.12
L3	15.9 ± 4.7	12.5 ± 2.8	.04
L4	16 ± 4.7	13.2 ± 4.5	.23
Femoral neck	3.2 ± 0.8	2.2 ± 0.6	.01
Bone mineral density, g/cm^2			
L1	0.9 ± 0.16	0.78 ± 0.17	.11
L2	0.9 ± 0.16	0.79 ± 0.15	.11
L3	0.97 ± 0.19	0.81 ± 0.13	.03
L4	0.92 ± 0.18	0.73 ± 0.09	.03
Femoral neck	0.63 ± 0.11	0.43 ± 0.1	.002
T-score			
L1	−0.66 ± 1.3	−1.68 ± 1.48	.12
L2	−0.77 ± 1.34	−1.7 ± 1.31	.13
L3	−0.64 ± 1.56	−1.97 ± 1.1	.03
L4	−0.95 ± 1.48	−2.6 ± 0.76	.02
Femoral neck	−1.68 ± 0.95	−3.47 ± 0.85	.002
Z-score			
L1	0.55 ± 0.83	0.22 ± 1.3	.46
L2	0.61 ± 0.89	0.38 ± 1.28	.61
L3	0.68 ± 1.07	0.3 ± 1	.42
L4	0.63 ± 1.19	−0.16 ± 0.51	.03
Femoral neck	−0.04 ± 0.9	−1.37 ± 0.92	.002

DISCUSSION

In line with the hypothesis, frailty in individuals with ESRD, similar to the general population, is significantly associated with lower lumbar spine and FN bone mass and decreases with greater severity of frailty. In addition to lower bone mass, these individuals had a greater likelihood of VCF and more VCF segments, which was significantly correlated with severity of frailty.

It was recently reported that self-reported frailty is significantly associated with falls and fractures in individuals undergoing incident dialysis.[8] That study focused exclusively on clinically significant episodes using administrative coding and risked missing silent events such as VCFs. Despite this difference, the greater risk (OR = 1.6) in that study is close to that of the current study (OR = 1.8), lending support to the current findings.

DXA results can underestimate the risk of fracture in individuals with ESRD, which is partially related to failure to incorporate the influences of MBD (bone remodeling and microarchitectural deterioration).[9] Measuring of novel bone turnover markers, such as procollagen type-1 N-terminal pro-peptide, has been recommended to enhance the utility of DXA, but such advanced assays are rarely available. Assessment of frailty, especially using self-report instruments, might serve as a useful surrogate to assist in predicting the risk of VCF in individuals with ESRD, because these questionnaires are easy to administer and do not require laboratory tests. As demonstrated above, self-reported frailty and its severity have independent associations with lumbar spine and FN bone mass, and more

importantly, frailty is a significant predictor of VCF in these individuals. Incorporating frailty and its severity into fracture risk prediction might therefore aid in clinical decision-making for individuals with ESRD.

Chia-Ter Chao, MD
Department of Medicine, Jinshan Branch, National Taiwan University Hospital, New Taipei City, Taiwan
Graduate Institute of Toxicology, Taipei, Taiwan
Department of Internal Medicine, College of Medicine, National Taiwan University Hospital, Taipei, Taiwan

Chih-Kang Chiang, MD, PhD
Graduate Institute of Toxicology, College of Medicine, National Taiwan University, Taipei, Taiwan
Department of Integrative Diagnostics and Therapeutics, National Taiwan University Hospital, Taipei, Taiwan

Jenq-Wen Huang, MD, PhD
Department of Internal Medicine, College of Medicine, National Taiwan University Hospital, Taipei, Taiwan

Ding-Cheng Chan, MD, PhD
Department of Geriatrics and Gerontology, National Taiwan University Hospital, Taipei, Taiwan
Superintendent, National Taiwan University Hospital, Chu-tung Branch, Hsin-Chu County, Taiwan

for the COhort of GEriatric Nephrology in National Taiwan University Hospital (COGENT) study group

ACKNOWLEDGMENTS

We are grateful for the assistance in data collection from the staffs at National Taiwan University Hospital Jinshan Branch.

Author Contributions: All authors had full access to the data of this study and accept responsibility for data integrity and accuracy. Chao: study design, enrollment of participants, data collection, analysis and interpretation, drafting the manuscript. Chan, Chiang, Huang: study design, data collection and analysis, drafting the manuscript.

Sponsor's Role: None.

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FACTORS ASSOCIATED WITH POTENTIALLY INAPPROPRIATE MEDICATION USE IN ELDERLY KOREANS IN AN OUTPATIENT SETTING: A POPULATION-BASED STUDY

To the Editor: Older adults (≥65) commonly receive multiple medications, which is reported to be closely associated with potentially inappropriate medication (PIM) use.[1] Older adults without primary care physicians are vulnerable to PIM use because they are more likely to receive uncoordinated care.[2] Because most Koreans do not have primary care physicians yet healthcare services are easily accessible in terms of cost and geographic proximity, PIM use is of special concern in Korea.[3] Few studies have examined the prevalence of PIM use in Korea using nationally representative data. This study sought to determine the prevalence of PIMs and the factors associated with PIM use using nationally representative data.

METHODS

The Korean National Health Insurance 2011 pharmaceutical prescription electronic claims data, which cover 97% of the population and 99% of the insurance claim, were used for the analysis.[4] Koreans aged 65 and older who received at least one prescription in 2011 were included in the analysis. The main outcome of the study was the annual prevalence of at the use of least one PIM among elderly per visit. PIMs were defined based on the 2012 version of the American Geriatrics Society updated Beers Criteria;[5] drugs that are considered inappropriate regardless of diagnosis or condition were defined as PIMs. Dosages that exceed the recommended daily dose were also considered PIMs. Differences between prescriptions of PIMs and non-PIMs were compared using the chi-square test. The association between PIM use and individuals characteristics was quantified using odds ratios (ORs) using logistic regression. All statistical analyses were conducted using SAS version 9.1 (SAS Institute, Inc., Cary, NC).

RESULTS

Koreans aged 65 and older (N = 5,565,677) made 113,686,588 visits in 2011, and PIMs were identified in 70.3% of the study population (n = 3,914,543) (data not shown), or 24.2% of the prescriptions received (n = 28,736,836). The prevalence of PIMs per visit was