

# Odkrivanje in zdravljenje osteoporoze pri bolnikih z osteoporoznim zlomom kolka

## Diagnosis and treatment of osteoporosis in patients with osteoporotic hip fracture

**Avtor / Author**

**Ustanova / Institute**

**Mateja Krajnc<sup>1,2</sup>, Vojislav Ivetić<sup>2,3</sup>**

<sup>1</sup>ZD dr. Adolfa Drolca Maribor, Maribor, Slovenija; <sup>2</sup>Univerza v Mariboru, Medicinska fakulteta, Katedra za družinsko medicino, Maribor, Slovenija; <sup>3</sup>SAVA MED, d.o.o., Spodnji Duplek, Slovenija;

<sup>1</sup>Dr. Adolf Drolc Health Centre Maribor, Maribor, Slovenia; <sup>2</sup>University of Maribor, Faculty of Medicine, Department of Family Medicine, Maribor, Slovenia; <sup>3</sup>SAVA MED, d.o.o., Spodnji Duplek, Slovenia;

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**Correspondence**

doc. dr. Vojislav Ivetić, dr. med.

SAVA MED d.o.o.

Cesta k Dravi 8,

SI-2241 Spodnji Duplek, Slovenija

Telefon +386 51336036

Fax +386 26202492

E-pošta: vojislav.ivetic@um.si

**Izvleček**

**Namen:** Namen raziskave je bil ugotoviti delež neodkrite in nezdravljene osteoporoze pred zlomom kolka, ugotoviti ali imajo bolniki iz referenčnih ambulant odkrito in zdravljeno osteoporozo v večjem deležu kot bolniki iz ne-referenčnih ambulant ter ugotoviti delež uvedene terapije osteoporoze ob odpustu iz bolnišnice.

**Metode:** Opravljena je bila retrospektivna kvantitativna raziskava na kirurškem oddelku Splošne bolnišnice dr. Jožeta Potrča Ptuj za opazovano obdobje od 1.1.2015 do 31.12.2016 z analizo podatkov odpustnih pisem.

**Rezultati:** V analizo je bilo vključenih 145 bolnikov, med njimi je bilo 26 moških (17,9 %) in 119 žensk (82,1 %), povprečna starost bolnika je znašala 82,7 (±6,8) let. Ob odpustu je bilo pokretnih 70,4 % (81 od 115) bolnikov, ki so bili v 28,3 % (41 od 145) primerov odpuščeni v domače okolje. Z raziskavo smo ugotovili, da je delež neodkrite in nezdravljene osteoporoze pred zlomom

**Abstract**

**Purpose:** The aim of the study was to determine the prevalence of undiagnosed and untreated osteoporosis cases prior to hip fracture, to determine if there are more patients with diagnosed and treated osteoporosis from model family medicine practices compared to standard family medicine practice patients, and to determine the proportion of patients initiating osteoporosis therapy after discharge from hospital.

**Methods:** We conducted a retrospective, qualitative study at the Department of Surgery, General Hospital of Dr. Jožeta Potrč Ptuj, Slovenia, using patient records from the period of January 1, 2015 to December 31, 2016, including data analysis of patient discharge letters.

**Results:** The analysis used data from 145 patients, 26 men (17.9%) and 119 women (82.1%). The mean age was 82.7 (±6.8) years. At discharge, 70.4% (81 out of 115) of patients were mobile and 28.3% (41 out of 145) of these were discharged and allowed to return home.

kolka 94,5 % (137 od 145) in da je delež uvedbe terapije za osteoporozo ob odpustu iz bolnišnice 7,1 % (10 od 140), delež priporočil za uvedbo terapije za osteoporozo ob odpustu pa 15,0 % (21 od 140). Med bolniki iz referenčnih 5,5 % (5 od 91) in ne-referenčnih ambulant 8,1% (3 od 37) ni pomembne razlike v deležu zdravljene osteoporoze pred hospitalizacijo zaradi zloma kolka ( $p>0,05$ ).

**Zaključek:** Z raziskavo smo ugotovili, da je delež neodkrite osteoporoze zelo velik in da ostaja obravnava osteoporoznih zlomov kolka kljub priporočilom in smernicam velik izziv za multidisciplinaren pristop na vseh nivojih zdravstvene oskrbe.

The study showed that osteoporosis prior to hip fracture was undiagnosed and untreated in 94.5% (137 out of 145) of cases. Osteoporosis therapy was initiated at discharge in only 7.1% (10 out of 140) of patients, and recommendations to initiate osteoporosis therapy at discharge were provided in 15.0% (21 out of 140). There was no significant difference between model family medicine practice patients (5 out of 91; 5.5%) and patients from standard family medicine practices (8.1%; 3 out of 37) in the proportion of patients treated for osteoporosis prior to hospitalization due to hip fracture ( $p>0.05$ ).

**Conclusion:** The study concluded that the prevalence proportion of undiagnosed osteoporosis is quite high and that, despite all recommendations and guidelines, management of osteoporotic hip fractures still remains a major challenge at all levels of healthcare.

## INTRODUCTION

Osteoporosis is a progressive systemic skeletal disease characterized by reduced bone mass and micro-architectural deterioration of bone tissue (1). Osteoporotic fractures are very common, considerably decrease the patient's quality of life and increase mortality (2). Osteoporosis treatment is aimed at preventing osteoporotic hip fractures (2, 3). A previous fragility fracture increases the patient's risk of another osteoporotic fracture by up to five times (4). Of all fractures reported worldwide, the studies show that osteoporotic fractures account for 34.8%, with women comprising 85% of all cases (4). In 2010, approximately 22 million women and 5.5 million men aged 50–84 years had osteoporosis in Europe (5). The level of undiagnosed osteoporosis remains extremely high in the developed countries, and treatment is not initiated early enough (5, 6).

Screening of patients at high risk for osteoporotic fracture is performed at family medicine practices during preventive cardiovascular examinations. These are performed in line with the management protocol for patients with osteoporosis and using an upgraded model of primary care where the standard family practice team (family physician and a nurse) is expanded by a registered nurse (model family medicine practices) (7, 8, 9). Using a computer-driven FRAX ("Fracture Risk Assessment Tool") model we can calculate the absolute risk in all postmenopausal women and men aged 50 and older of experiencing one of the four most common osteoporotic fractures (vertebra, hip, wrist or humerus) over the next 10 years (8, 10, 11).

Osteoporotic vertebral and hip fractures are two most important complications of osteoporosis which considerably increase the risk of new fractures.

Hence, any of these conditions are sufficient for the diagnosis of severe osteoporosis and initiation of treatment regardless of the DXA (“Dual-energy X-ray absorptiometry”) result and the FRAX risk calculation (1, 12). All hip fractures are treated surgically and therefore require first-line inpatient treatment (12). More than 50% of hip fracture patients are unable to live independently and as many as 33% of these patients die in the first year following the fracture (13). The 5-year risk of a secondary hip fracture is estimated to range between 13% and 43%. Initiation of therapy after osteoporotic fracture has been shown to benefit patients (14).

Osteoporosis therapy should be initiated during hospitalization to improve patient compliance and reduce mortality (15). Inclusion of a primary care physician and patient education also improve compliance (16). In clinical practice, most patients still do not receive any osteoporosis medication after hip fracture (17, 18). This is mainly due to the following: ambiguity as to who was supposed to perform osteoporosis treatment (endocrinologist, rheumatologist, traumatologist or family physician), insufficient knowledge (by both physicians as well as patients) about the evidence as to the post-hip fracture osteoporosis treatment type and success, fear of adverse effects, and cost of therapy (19).

Although osteoporosis and its associated fractures is one of the most pressing social and economic issues, its management is still far from adequate in the Republic of Slovenia.

The aim of the study was to determine the prevalence of undiagnosed and untreated osteoporosis prior to hip fracture, to determine if there are more patients with diagnosed and treated osteoporosis from model family medicine practice compared to standard family medicine practice patients, and to determine the proportion of patients undergoing osteoporosis therapy after hospital discharge.

## **MATERIALS AND METHODS**

### **Study Type**

A retrospective, quantitative study was performed in which we analysed discharge letters from the MEDIS

Hospital Information System of the General Hospital of Dr. Jože Potrč Ptuj, Slovenia, for the period from 1 January 2015 to 31 December 2016.

### **Subjects**

The sample consisted of hospitalized and operated patients with hip fracture (ICD-10 diagnostic codes: S72.00, S72.04, S72.05, S72.10, S72.11, S72.2, S72.40 and S72.9) from the General Hospital Ptuj with a history of a fall from standing height.

To be included in the study, the patients had to meet all four eligibility criteria: (1) age >65 years, (2) a fracture of the neck of femur (treated surgically as partial/total hip arthroplasty or osteosynthesis), (3) a history of a fall from standing height, and (4) data on therapy that was in progress prior to hip fracture.

The exclusion criteria were: (1) suspected secondary osteoporosis (ongoing glucocorticoid therapy, rheumatic disease, chronic kidney disease, alcohol dependence syndrome) or (2) confirmed high-energy trauma (road traffic collision, fall from >2m).

### **Collection of data**

Data was provided by the General Hospital Ptuj's analytics office following our request for records on all patients treated at the Department of Surgery for hip fracture in the observation period under the ICD-10 code S72.XX. Based on the review of 287 discharge letters and eligibility criteria we obtained a sample of 145 patients whose data was further analysed in this study. For eligible patients, additional data was obtained from the MEDIS system about their family physician of choice (FPOC). Their environment type was determined based on their residential postal code. The NIJZ (National Institute of Public Health) provided a list of model family practices (20) operating since the start of our project, namely from April 2011 to February 2017, which included the names and surnames of family physicians working at a model family practice, data on their employer, and date of their inclusion in the project. With the help of this data we were able to establish if the FPOC had a model family practice. An FPOC code was provided for each patient. We collected these for 128 out of 145 (88.3 %) patients, whereby we recorded 42 different codes.

To establish if the patient received any prescribed osteoporosis therapy before hip fracture, we analysed data on their medical history obtained at hospital admission. A review of discharge letters was conducted to establish the patient's condition at discharge and to determine if they were prescribed therapy at discharge or received recommendations for osteoporosis therapy initiation.

**Statistical Analysis**

Data entry and analysis were performed using IBM SPSS 22.0. Basic patient characteristics were shown categorized according to standard descriptive methods. Proportions and differences were tested using nonparametric tests, such as the chi-square test. The statistical significance level was set at 5% ( $p \leq 0.05$ ). Due to the observed frequencies of less than five, we further performed the Fisher's exact test, which also failed to confirm statistically significant differences. The study was approved by the National Medical Ethics Committee on 18 July 2017 (No. 0120-342/2017/4).

**RESULTS**

The analysis included 145 patients; 26 men (17.9%) and 119 women (82.1%). The mean age of patients in the reference year of 2016 was 82.7 ( $\pm 6.8$ ) years (Table 1).

Data shows that the majority of patients who received osteoporotic hip fracture treatment in the observation period at the General Hospital Ptuj live in rural environments; they represented nearly three fourths of all study subjects (107 out of 145; 73.8%). (Table 2).

The results show that the majority of patients (91 out of 128; 71.1%) had selected a FPOC who also works at a model family medicine practice (Table 2).

The majority of patients (137 out of 145; 94.5%) did not receive any osteoporosis therapy prior to hospital admission. The remaining 8 out of 145 (5.5%) patients were receiving osteoporosis therapy for their osteoporotic hip fracture at hospital admission.

Only 1 out of 145 enrolled patients had been receiving triple therapy (bisphosphonate/denosumab,

**Table 1.** Patient age (years)

|                    | Age in 2016 |
|--------------------|-------------|
| Mean               | 82.74       |
| Standard deviation | 6.812       |
| Modus              | 85          |
| Median             | 83.00       |
| Minimum            | 65          |
| Maximum            | 100         |
| N                  | 145         |

**Table 2.** Patient's residence environment type, model family medicine practice of the FPOC, pre-admission osteoporosis therapy, triple therapy (bisphosphonate/denosumab, cholecalciferol, calcium) prior to admission

|                                    |       | Number (N) | Proportion (%) |
|------------------------------------|-------|------------|----------------|
| Environment type                   | urban | 38         | 26.2           |
|                                    | rural | 107        | 73.8           |
|                                    | total | 145        | 100            |
| Model family medicine practice     | yes   | 91         | 71.1           |
|                                    | no    | 37         | 28.9           |
|                                    | total | 128        | 100            |
| Pre-admission osteoporosis therapy | yes   | 8          | 5.5            |
|                                    | no    | 137        | 94.5           |
|                                    | total | 145        | 100            |
| Triple therapy prior to admission  | yes   | 1          | 0.7            |
|                                    | no    | 144        | 99.3           |
|                                    | total | 145        | 100            |

**Table 3.***Pre-admission medication, medication at discharge*

| Pre-admission medication       | Number (N) | Proportion (%) |
|--------------------------------|------------|----------------|
| calcium                        | 2          | 1.4            |
| cholecalciferol                | 7          | 4.8            |
| bisphosphonate/<br>denosumab   | 4          | 2.8            |
| other (calcitriol)             | 1          | 0.7            |
| no medication                  | 131        | 90.3           |
| total                          | 145        | 100            |
| <b>Medication at discharge</b> |            |                |
| calcium                        | 8          | 5.7            |
| cholecalciferol                | 13         | 9.3            |
| bisphosphonate/<br>denosumab   | 1          | 0.7            |
| other                          | -          | -              |
| no medication                  | 118        | 84.3           |
| total                          | 140*       | 100            |

\*five patients deceased during the hospitalisation

**Table 4. Discharge type**

|                |  | Number (N) | Proportion (%) |
|----------------|--|------------|----------------|
|                | home care  | 41         | 28.3           |
|                | health resort  | 8          | 5.5            |
|                | prolonged hospital treatment                             | 41         | 28.3           |
| Discharge type | nursing home   | 14         | 9.7            |
|                | Department of Internal Medicine at General Hospital Ptuj | 3          | 2.1            |
|                | non-acute hospital treatment                             | 33         | 22.8           |
|                | death  | 5          | 3.4            |
|                | total  | 145        | 100            |

cholecalciferol, calcium) prior to hospital admission, which is 0.7% of all patients (Table 2). Additionally, the analysis also showed that two out of 145 (1.4%) patients had already been taking calcium for their osteoporotic hip fracture prior to hospital admission. Cholecalciferol had been used by 7 out of 145 (4.8%) patients, bisphosphonate/denosumab by 4 out of 145 (2.8%) patients, and only 1 (0.7%) patient had been taking other medication (calcitriol) (Table 3).

The obtained data revealed that most patients were either discharged to home care or had a prolonged hospital stay (41 out of 145; 28.3% in both cases) (Table 4).

A comprehensive adequate medical status at discharge was defined in 115 out of 145 (79.3%) subjects; we were unable to determine the status of other patients at discharge based on discharge letter analysis only. The majority of our patients (81 out of 115; 70.4%) were mobile at discharge (Table 5).

We were able to obtain data on osteoporosis therapy initiation during hospitalization for 140 out of 145 (96.6%) patients. The majority, namely 130 out of 140 (92.9%) of these patients did not receive any osteoporosis therapy during hospitalization (Table 5). Triple therapy was not recorded for any patient (Table 5). We found that 8 out of 140 (5.7%) patients were taking calcium at the time of discharge; 13 out of 140 (9.3%) patients were taking cholecalciferol, and 1 out of 140 (0.7%) patients was taking bisphosphonate/denosumab. Apart from these three medications, there are no reports of any other medications used.

The collected data showed that 21 out of 140 (15.0%) patients also received recommendations for osteoporosis therapy initiation (Table 5). Among these, 3 patients had a prescription issued in accordance with authorizations which is 14.3% (N=21). We also found that, despite recommendations, 18 out of 21 (85.7%; N=21) patients did not obtain a prescription (Table 5).

The results also revealed that there was a smaller proportion of patients from model family medicine practices who received osteoporosis treatment prior to hospitalization (5 out of 91; 5.5%) compared to patients from standard family medicine practices (3 out of 37; 8.1%), but this difference was not statistically significant ( $p > 0.05$ ) (Table 6). This finding led to a



conclusion that there is no statistically significant difference between model family medicine practice patients and patients from standard family medicine practices in the proportion of patients receiving osteoporosis treatment prior to hospitalization due to hip fracture (Table 6).

## DISCUSSION

We found that the proportion of patients with undiagnosed and untreated osteoporosis prior to hospital admission for osteoporotic hip fracture is 94.5% (137 out of 146 patients) (Table 2). The results show that osteoporosis therapy was initiated at discharge in only 7.1% of patients (10 out of 140), and recommendations to initiate osteoporosis therapy at discharge were provided in 15.0% of cases (21 out of 140), meaning that osteoporosis remains undiagnosed and untreated in the majority of cases after hospitalization and remains untreated even after surgical treatment of osteoporotic hip fracture. We found that, considering patients whose osteoporosis remains undiagnosed and untreated, there is no statistically significant difference between model family practice compared to standard family practices (chi-square test:  $\chi^2=0.307$ ,  $df=1$ ,  $p=0.580$ ) (Table 6).

Foreign literature suggests that it would be reasonable to formulate recommendations not only for osteoporosis detection and treatment, but also for the management of patients after osteoporotic hip fracture in the context of secondary prevention (21, 22). Fokner et al. in their research from 2003, found that primary prevention (building sufficient peak bone mass at younger age) in Slovenia, was shown to be inadequate as well (28). Slovenia has adopted recommendations for hip fracture treatment, osteoporosis treatment after hip fracture and medical rehabilitation of elderly patients with hip fracture (23). After surgical treatment, patients often do not recover to the level that would allow them to live the same quality life as they did before the injury (24). After surgical treatment is completed, patients in Slovenia can be referred for rehabilitation treatment at a tertiary institution (the University

**Table 5.** Patient status at discharge, osteoporosis therapy initiated during hospitalization, triple therapy at discharge, recommendations for osteoporosis therapy at discharge, prescription issued in accordance with authorizations

|   |          | Number (N) | Proportion (%) |
|---|----------|------------|----------------|
| Patient status at discharge                           | mobile   | 81         | 70.4           |
|   | immobile | 34         | 29.6           |
|   | total    | 115        | 100            |
| Osteoporosis therapy initiated during hospitalization | yes      | 10         | 7.1            |
|   | no       | 130        | 92.9           |
|   | total    | 140        | 100            |
| Triple therapy at discharge                           | yes      | -          | -              |
|   | no       | 140        | 100            |
|   | total    | 140        | 100            |
| Recommendations for osteoporosis therapy at discharge | yes      | 21         | 15.0           |
|   | no       | 119        | 85.0           |
|   | total    | 140        | 100            |
| Prescription issued in acc. with authorizations       | yes      | 3          | 14.3           |
|   | no       | 18         | 85.7           |
|   | total    | 21         | 100            |

**Table 6.** Chi-square test by family medicine practice type (model or standard)

|   |       | Practice type |            |             |
|---|-------|---------------|------------|-------------|
|   |       | model         | standard   | total       |
| Prescription issued in acc. with authorizations | yes   | 5 (5.5%)      | 3 (8.1%)   | 8 (6.3%)    |
|   | no    | 86 (94.5%)    | 34 (91.9%) | 120 (93.8%) |
|   | total | 91 (100%)     | 37 (100%)  | 128 (100%)  |

chi-square test:  $\chi^2=0.307$ ,  $df=1$ ,  $p=0.580$

Rehabilitation Institute Soča), natural health resort (secondary level), nursing hospital or the Prolonged Hospitalization Department, or alternatively, they can be transferred to a nursing home or discharged to the home environment (25). Patient referral depends on the patient's medical condition, their comorbidities and the information about their functional independence prior to the fracture (23). Our findings further show that after hospitalization most patients were discharged to home care, or that they had a prolonged hospital stay (Table 4). This increases the total cost of hospitalization for hip fracture, which was observed by Ferik in 2002 (27). Osteoporotic fractures directly affect mortality and, most of all, the quality of life (3). Approximately 25% of patients become wholly dependent on others after a hip fracture, as was also observed in our study (Table 4), and approximately 50% of them never regain their pre-injury activity level (4, 12, 24). Initiation of osteoporosis therapy after hip fracture should also be considered due to the risk of additional fractures (23, 24).

A study performed between 2003 and 2005 on a much larger sample at 318 hospitals in the USA, which included 51,346 patients with osteoporotic hip fracture, showed a very low rate of in-hospital initiation of osteoporosis therapy (18). Only 6.6% of patients received a combination of calcium and vitamin D, 7.3% of patients received antiresorptive drugs, and only 2% of patients were prescribed triple therapy after discharge (18), which is comparable to our results (Table 3). Foreign studies also showed that in-hospital treatment represents an ideal opportunity to initiate osteoporosis therapy in patients who had not received it before (15, 16, 17, 18). Slovenia issued guidelines for the management of hip fracture patients in 2012. These guidelines recommend that therapy be initiated in a hospital environment as follows: initiation of therapy with vitamin D to replenish stocks, the initiation of therapy with calcium - if serum calcium levels are not elevated and finally recommendation to family physician to treat osteoporosis with bisphosphonate or denosumab after 14 days to 1 month after discharge from hospital (after sufficient replenishment of Vitamin D and calcium) (23).

A study conducted at the University Clinical Centre Maribor from 1 January 2015 to 31 December 2016 included an analysis of patients with osteoporotic hip fracture aged >65 years and treated at the Department of Traumatology (12). Besides the basic demographics, the study also collected data on the patients' ages and the proportion of patients who had a recorded diagnosis of osteoporosis or received instructions on osteoporosis therapy, as well as data on the number of patients with prior typical osteoporotic fracture (12). The study included 561 patients older than 65 who experienced a typical osteoporotic hip fracture (a fall from a standing height) (12). A total of 418 (74.50%) women and 143 (25.49%) men were treated in the study (14). The mean age of patients was 82.3 ( $\pm 7.0$ ) years (12). These demographics are similar to the ones in our study (Tables 1, 2). The proportion of patients with undiagnosed osteoporosis prior to hip fracture was 92.7%, which is also similar to our findings (94.5%) (12). This related relevant study revealed that only 15 out of 561 (2.67%) patients received instructions or osteoporosis therapy at discharge which is also comparable to our results showing that osteoporosis therapy was initiated at discharge in 7.1% of cases and that recommendations to initiate osteoporosis therapy at discharge were provided in 15.0% (12). A study performed in the USA in 2005 showed that patient education and inclusion of a primary care physician improve the rate of osteoporosis treatment (16). Patients who received a 15-minute education and instructions from their FPOC also received therapy in 42% compared to the control arm where osteoporosis therapy was initiated in 19% (16). In Slovenia, the necessary additional education could be provided at the primary level by a suitably trained graduate nurse.

Another Slovenian study performed at the University Clinical Centre Ljubljana on secondary prevention of osteoporotic fractures introduced measures aimed at improving the management of such patients (26). These measures included an admission checklist introduced for patients with hip fractures, and their FPOCs received instructions for further treatment of osteoporosis at patient discharge (26). Before this checklist, only 5% of patients were diagnosed with

osteoporosis at discharge, and only 1.1% of patients received instructions for osteoporosis treatment at discharge, which is similar to our findings. After the introduction of the checklist, 50% of patients were discharged with the diagnosis of osteoporosis, and instructions for osteoporosis treatment were provided in 56%. However, we could not find a simplified version of the proposal for measures that would be more appropriate for smaller regional hospitals in Slovenia. Hence, we decided to propose simplified measures to improve secondary preventive management of patients with osteoporotic hip fractures at admission as well as at discharge from hospital treatment. In preparing this proposal, we derived guidelines from the existing literature and strived to summarize and simplify the most relevant content to make it more useful in everyday clinical practice (26).

We suggested that upon admission to hospital for hip fracture treatment, anamnestic diagnosis of osteoporotic hip fracture can be made during the history taking (unrecognized osteoporosis in the elderly, fall from a standing height), that basic laboratory tests can be performed during hospitalization to exclude secondary osteoporosis, and that Vitamin D is added to osteoporosis therapy (Appendix 1). It is necessary that osteoporosis is coded according to the ICD-10 at discharge, and an auto-generated text should be added for the FPOC (Appendix 2).

One of the weaknesses of this study was the sampling method, for it was subjectively conditioned by the investigator's assessment due to unclear medical records. Another weakness was the sample itself, which was defined based on a patient's medical history obtained at admission and relative to the course of hospital treatment. For some patients it was impossible to determine exactly whether the patient actually fell from standing height, concluding based on their medical history that this was a low-energy fall (e.g. falls occurring in the kitchen, bathroom, backyard, church, etc.). We encountered even more problems in obtaining data about patients' therapy prior to hospitalization and chronic diseases, as their medication history was often not recorded at admission. Thus, we had to collect this

data from previous hospitalization records, their anesthesiological treatment records, and sometimes also from records of their further care (mainly from records on prolonged hospitalization). We excluded all patients who did not receive surgical treatment, regardless of whether they experienced osteoporotic hip fracture. Patients for whom we were not able to collect sufficient key data were also excluded from the study. Repeating the same study will probably allow the possibility of choosing a different sample, due to prior clinical knowledge and subjective assessment of the investigator. The sample was obtained from only one regional hospital, which is the main weakness of the study; subsequently, we cannot extrapolate the results to all of Slovenia. Nevertheless, other studies were performed at the two Slovenian clinical centres with similar duration, both of which gave comparable results to ours, and we did not find any other similar study performed at a regional hospital only (14, 16).

## CONCLUSION

The results of our study show that, despite the recommendations from 2012 and guidelines for the diagnosis and treatment of osteoporosis adopted in 2013, management of osteoporotic hip fractures still remains a major challenge at all levels of healthcare. Within the multidisciplinary approach, the family physician is the one playing the role of a coordinator and providing continuous patient management after hip fracture. Inclusion of a graduate nurse in the family medicine team is a major plus, as their professional approach and education can contribute significantly to the treatment of these patients.

According to our findings, more studies are needed to improve the management of patients with osteoporotic hip fractures, and healthcare workers and the general population should also receive more education on this subject.

The proposed measures for smaller regional hospitals are only one of the factors that can contribute to improving management of patients after inpatient treatment. discharge back to their home environment or a nursing home. After discharge



back to their home environment or a nursing home, these patients still require further medical care which can be provided by family medical practices using an integrated and holistic approach.

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APPENDIX: Proposed measures for secondary prevention of osteoporotic hip fractures – a checklist to be completed at admission, reminder for discharge letter

### ADMISSION CHECKLIST FOR HIP FRACTURE PATIENTS (WITH SUSPECTED OSTEOPOROTIC HIP FRACTURE)

#### AT ADMISSION

BASIC LABORATORY TESTS for exclusion of secondary causes of osteoporosis (on a temp. list)

| HISTORY                            | YES | NO |
|------------------------------------|-----|----|
| Fall from a standing height        | X   |    |
| Undiagnosed osteoporosis           | X   |    |
| age >65 years                      | X   |    |
| Hip fracture confirmed on an X-ray | X   |    |

#### INCLUSION OF VITAMIN D (on a temp. list)

|            |
|------------|
| CBC        |
| Ca, P      |
| AF         |
| AST, ALT   |
| creatinine |
| TSH        |

Plivit D 3 sol. 10gtt/day (2,000 IU/day) = 70 gtt/week (14,000 i.e./week)

#### AT DISCHARGE

A letter to the FPOC with included diagnosis of osteoporotic hip fracture (icd-10 code: m80.9)

Dear colleague!

Your patient was treated at our hospital's Department of Surgery for low-energy hip fracture. Since the patient fell from standing height, this type of fracture is in terms of diagnostic criteria for OSTEOPOROSIS, considered as a severe osteoporotic fracture.

At admission, the patient underwent basic laboratory tests to exclude secondary osteoporosis (hemogram, calcium, phosphates, alkaline phosphatase (ALP), creatinine, transaminases, and TSH), and we also initiated primary treatment with vitamin D supplementation (initial therapy to restore sufficiency: 2,000U/day or 14,000U/week - Plivit D3: 10gtt/day or 70 gtt/week).

We recommend that the patient receives primary osteoporosis treatment with medication according to the guidelines (Kocjan T, Preželj J, Pfeifer M, Jensterle-Sever M, Čokolič M, Zavratnik A. Smernice za odkrivanje in zdravljenje osteoporoze. Zdrav Vestn 2013; 82:207-17) and that you comply with the prescribing limitations. The graduate nurse in your team must ensure the patient and their family receive appropriate education about a healthy lifestyle, the importance of a calcium-rich diet and prevention of additional falls.

Osteoporosis and the associated osteoporotic hip fractures are an increasing social and economic issue. With comprehensive patient management we want to improve the quality of life of hip fracture patients, and secondary prevention should decrease incidence of further osteoporotic fractures.

Sincerely, ...

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