

Retrospective chart review to assess costs related to osteoporotic fractures in Slovenia and Serbia

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INTRODUCTION

- Osteoporosis is a skeletal disease characterized by reduced bone mass, which predisposes a person to an increased risk of fracture^[1].
- Common sites for osteoporotic fractures are the femur, spine, and forearm^[2]. Fractures that can be considered as osteoporotic are low-energy trauma fractures caused by a fall from standing or seated positions.
- Osteoporosis is a disease mainly affecting elderly postmenopausal women. About two out of three fractures occur in women. The lifetime risk of sustaining a proximal femur, vertebral, or distal radius fracture for 50-year-old women in Sweden has been estimated at 46%^[3]. The corresponding risk for 50-year-old men has been estimated at 22%^[3].
- In Europe, a total of 2.7 million osteoporotic fractures account for a direct cost of 36 billion Euros annually^[2]. The number of proximal femur fractures in Serbia is approximately 4000 every year^[4, 5]. There were 2267 hip fractures in Slovenia in 2005, which accounted for 11 million Euros in direct hospital costs^[6]. The substantial burden of osteoporotic fractures requires detailed cost data to improve prioritization of resources and disease management. As cost data are largely lacking in Eastern Europe compared to Western Europe, we conducted a study in two countries in the region.

OBJECTIVE

- To evaluate direct medical costs of treatment for osteoporotic fractures in Slovenia and Serbia from public payer and patient perspectives, directly after fracture and during up to 1 year of follow-up.

METHODS

- This was a medical chart review study conducted in order to examine medical resources used to treat the three most common osteoporotic (proximal femur, vertebral, and distal radius) in the first year after the event.
- Local investigators collected data from one center in Slovenia and three centers in Serbia between December 2009 and March 2010 using a web-based electronic data capture system. Access to the system was through an application operable with any web browser. Each investigator had an individual account secured by password and was the only person authorized to view or modify data. Connection between the user and the server was encrypted.
- Inclusion criteria:
 - Female
 - 50 years of age or above with
 - a diagnosis of osteoporosis, or
 - a low-energy fracture from minor causes (appropriate ICD-10 codes W00-W07) including falling from bed, chair, or standing height
 - Or 60 years of age or above with no documented diagnosis of osteoporosis nor documentation of the cause of the fracture
 - Proximal femur, distal radius or vertebral fracture, defined by ICD-9/10 codes or equivalent, that occurred between 1 and 5 years before the start of the study
- Exclusion criteria:
 - Multiple fractures at different sites or multiple fractures sustained at different times
 - Fractures caused by comorbidity (any of the following diseases during the 12 months prior to the fracture event):
 - all types of cancer
 - primary hyperparathyroidism
 - hypogonadism
 - chronic malnutrition
 - malabsorption
 - New osteoporosis-related fracture during the observation period
 - Death during the observation period
- The treatment costs for each fracture type from the public payer and patient perspectives were calculated based on reported usage of resources. Unit costs were provided by local coordinators. The sources of these costs were catalogues of national health funds and market data concerning prices of drugs. Based on the opinions of experts, local procedures from catalogues were matched to proper ICD codes.
- The analysis was divided into two parts:
 - Intervention directly after the fracture: cost of first hospitalization or initial ambulatory visit (if hospitalization was not required) including procedures, examinations, and medications
 - Follow-up for up to 1 year after the event (including costs of hospitalization, outpatient visits, examinations, rehabilitation, medications, and devices)
- Average costs of treatment for each fracture were estimated. Due to skewed distribution of costs, the bootstrapping method was used to obtain confidence intervals.
- Costs of osteoporosis medications, calcium, and vitamin D supplements were not included in the study.
- Costs of treatment in Serbia were converted to Euros according to the currency exchange rate of the National Bank of Serbia at the end of the study (March 2010).

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RESULTS

- The study included 240 patients (150 in Serbia and 90 in Slovenia) 50 years of age or above with low-energy trauma fractures occurring within 1-5 years of study initiation.
- Basic characteristics of patients are presented in Table 1. Cardiovascular system disease was the most common comorbidity in both countries (44% of patients in Serbia and 47% in Slovenia).

Diagnoses

- The most common diagnosis in case of proximal femur fracture in both countries was closed fracture of neck of femur (ICD code: S72.00). The most common vertebral fracture was closed fracture of lumbar vertebra (ICD: S32.00). The vast majority of patients with distal radius fracture in Serbia had closed fracture of lower end of radius (ICD: S52.50), while in Slovenia, closed fracture of lower end of both ulna and radius (ICD: S52.60) was the most common.

Fracture hospitalization

- Figure 1 shows the percentage of patients hospitalized directly after the fracture. The average duration of fracture hospitalization is presented in Table 2.

Costs of treatment of fractures

- In Serbia, costs of intervention directly after the fracture accounted for 81% of total costs of treatment for proximal femur fracture, 26% for vertebral fracture, and 35% for distal radius fracture.
- In Slovenia, costs of intervention directly after the fracture accounted for 86% of total costs of treatment for proximal femur fracture, 87% for vertebral fracture, and 67% for distal radius fracture. Patient costs consisted of costs of BMD measurement only.

Table 1. Patient characteristics

Category	Serbia (N=150)	Slovenia (N=90)
Age	71.13 (SD: 8.09)	66.33 (SD: 7.68)
Proportion of patients over 60 years old	90%	80%
Patients with at least one comorbidity	52%	61%
Patients with diagnosed osteoporosis	32%	43%

Table 2. Average duration of hospitalization

Fracture	Serbia	Slovenia
Proximal femur	41.10 days (SD: 19.51)	15.59 days (SD: 10.08)
Vertebral	14.73 days (SD: 6.80)	6.69 days (SD: 3.94)
Distal radius	8.23 days (SD: 5.93)	5.33 days (SD: 3.79)

Table 3. Costs of treatment of fractures in Euros [€]

Fracture	Perspective	Serbia	Slovenia
Proximal femur	Total costs	2902 [CI _{95%} : 1845; 3565]	4727 [CI _{95%} : 3908; 5617]
	Public payer	2857 [1826; 3358]	4727 [3908; 5617]
Vertebral	Total costs	390 [206; 554]	4319 [3421; 5217]
	Public payer	364 [257; 492]	4317 [3408; 5030]
Distal radius	Total costs	163 [62; 251]	1567 [1251; 2346]
	Public payer	118 [94; 151]	1567 [1251; 2346]
	Patient	45 [34; 82]	0

CI_{95%}: 95% confidence interval

Figure 1. Percentage of patients hospitalized directly after fracture

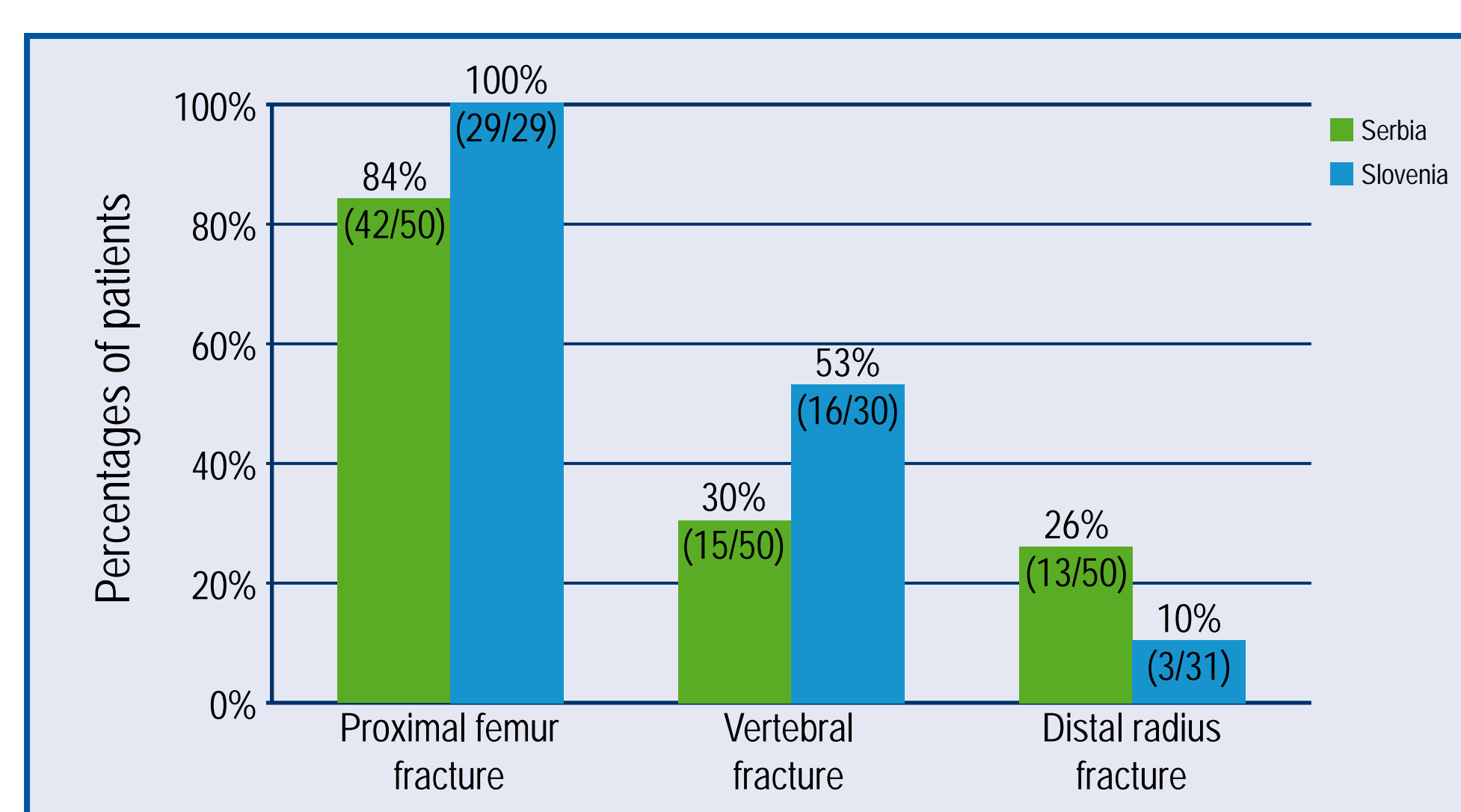


Figure 2. Average cost of treatment in the first year after the fracture

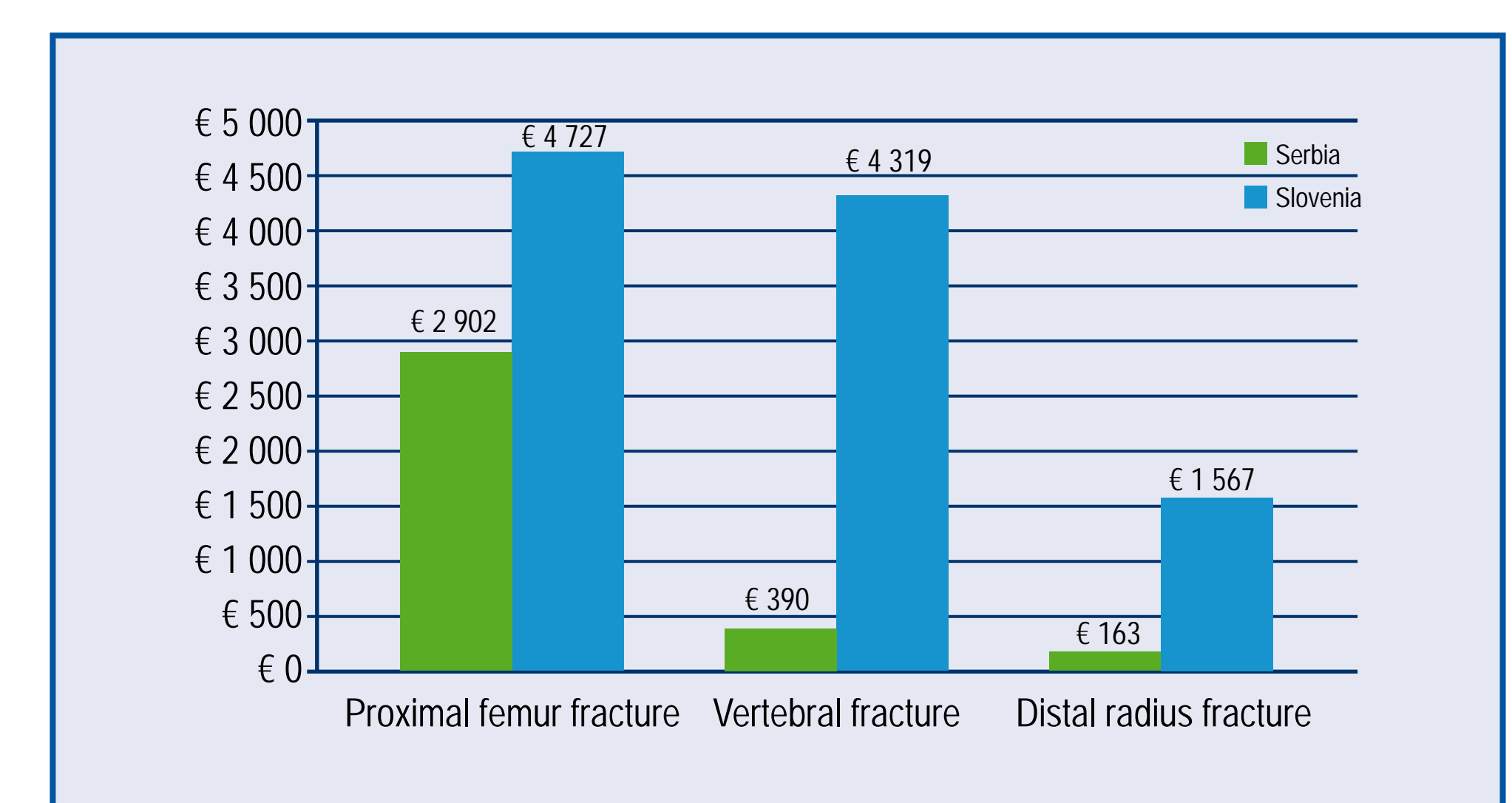


Figure 3. Costs for treatment of fractures in Serbia

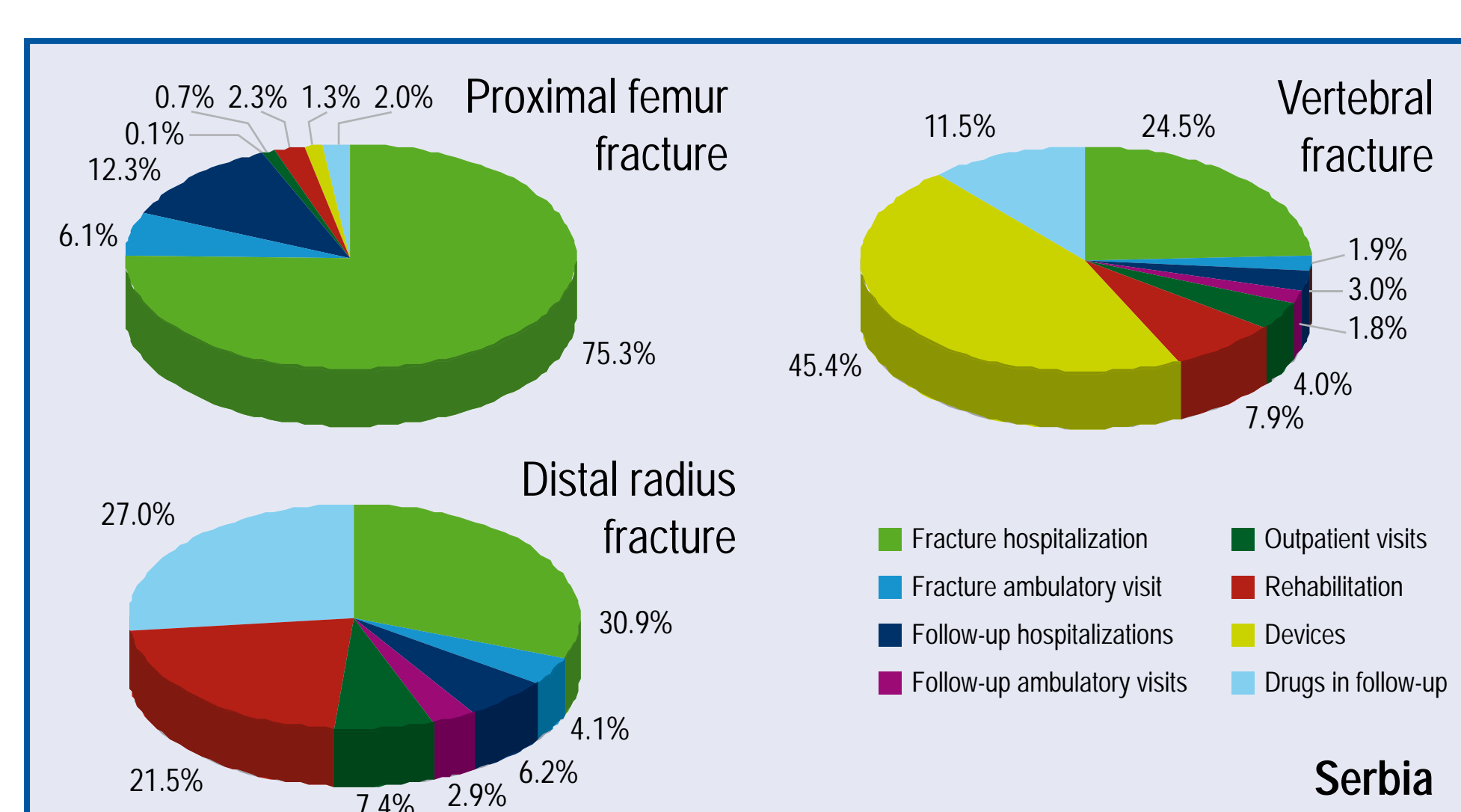
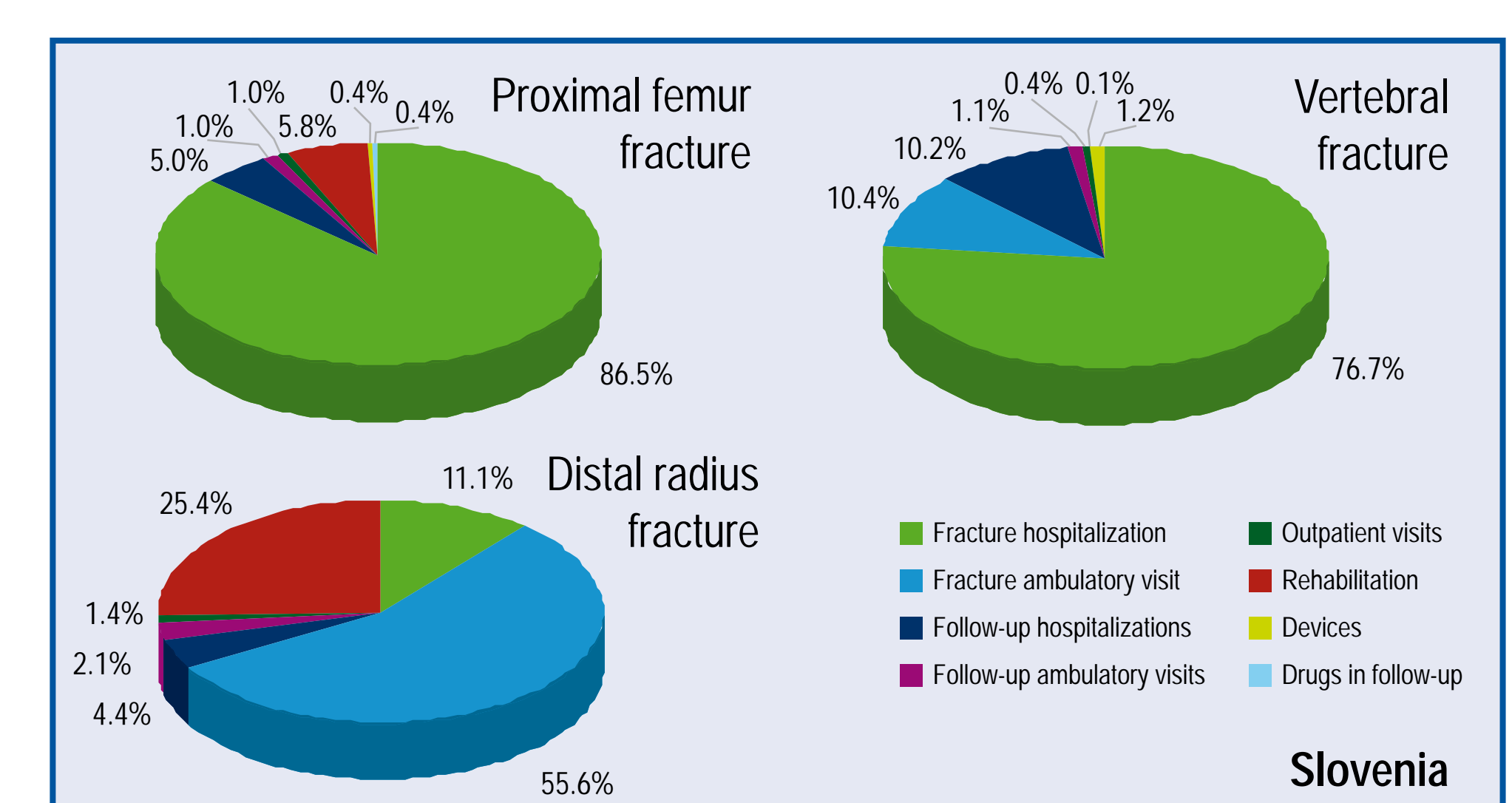


Figure 4. Costs for treatment of fractures in Slovenia



CONCLUSIONS

- Treatment of proximal femur fractures cost more than that of vertebral and distal radius fractures in both countries.
- Treatment costs were considerably higher in Slovenia than in Serbia.
- Costs of intervention directly after the fracture (costs of first hospitalization or initial ambulatory visit and all procedures done) made up the main part of total costs during the first year after fracture in Slovenia.
- In Serbia, costs of treatment during the follow-up period were higher than costs of intervention directly after the fracture for vertebral and distal radius fracture.
- Large disparities between the costs of hospitalization due to reimbursement policies in both countries were the major reason for the observed differences. Moreover, patients in Slovenia received more elaborate and costly procedures (especially in case of vertebral fracture).
- In Slovenia, almost all costs of treatment of fractures were incurred by the public payer, while in Serbia the patients were required to make greater contribution to the cost of their care.
- Our study has shown that the costs of fracture treatment in these two countries are incurred during the year after the event and are not only related to direct intervention. Further studies concerning subsequent years of treatment are necessary to capture overall costs of fractures. Moreover, since fractures related to osteoporosis are associated with an enormous social and economic burden, strong efforts should be made to introduce effective methods of prevention and treatment of osteoporosis.

LIMITATIONS

- Patients who died following a fracture during the observation period were excluded from the analysis. This may have underestimated total costs.
- Since the study did not include contact with patients, it was not possible to keep track of which hospital and non-hospital care facility the patient had visited. The study is likely to have underestimated the costs of fractures, especially from the patient perspective, but it does contain the bulk of the first-year costs of treatment.
- Fracture costs generally increase with age since older patients tend to require more intensive health care.
- Since it was a medical chart review study without any control group, estimated costs of treatment could be associated not only with fractures but also with comorbidities.

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