

Burden of Fracture and Fracture Management Among Individuals With Osteogenesis Imperfecta: Results From a Survey of Adults and Caregivers

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INTRODUCTION

- Osteogenesis imperfecta (OI) is a group of rare systemic connective tissue disorders most commonly caused by pathogenic variants in genes for type I collagen^{1,2}
- The collagen quantity and/or quality may be compromised, ultimately resulting in bone fragility and connective tissue abnormalities¹
- Patients with OI may experience frequent bone fractures and some patients choose to manage fractures at home¹

OBJECTIVES

- Quantify the fracture rates, including fractures managed at home, for adult and pediatric individuals with OI
- Explore factors impacting fracture management among individuals with OI

METHODS

Recruitment

- Adults with OI and caregivers of children with OI were recruited through advocacy groups or clinician referral

Eligibility

- Adult with OI (≥18 years old) or caregiver of a child (<18 years old) with OI
- Live in an approved country:
 - United States, Canada, United Kingdom, Ireland, the Netherlands, Sweden, Norway, Italy, Denmark, and Belgium
- Learned about the survey from an approved source (i.e., clinic/doctor, OI advocacy organization, recruitment flyer, friend/family member)
- Willing and able to complete the survey in English or Spanish

Data Collection

- The OI online survey was completed by adult patients and caregivers through the Momentive platform between December 2021 and July 2023.
- Survey Questions:
 - Demographics & OI diagnosis specifics
 - Current symptoms and conditions
 - Fracture history
 - Surgery & physical function
 - Management & therapies

DISCLOSURES AND ACKNOWLEDGMENTS

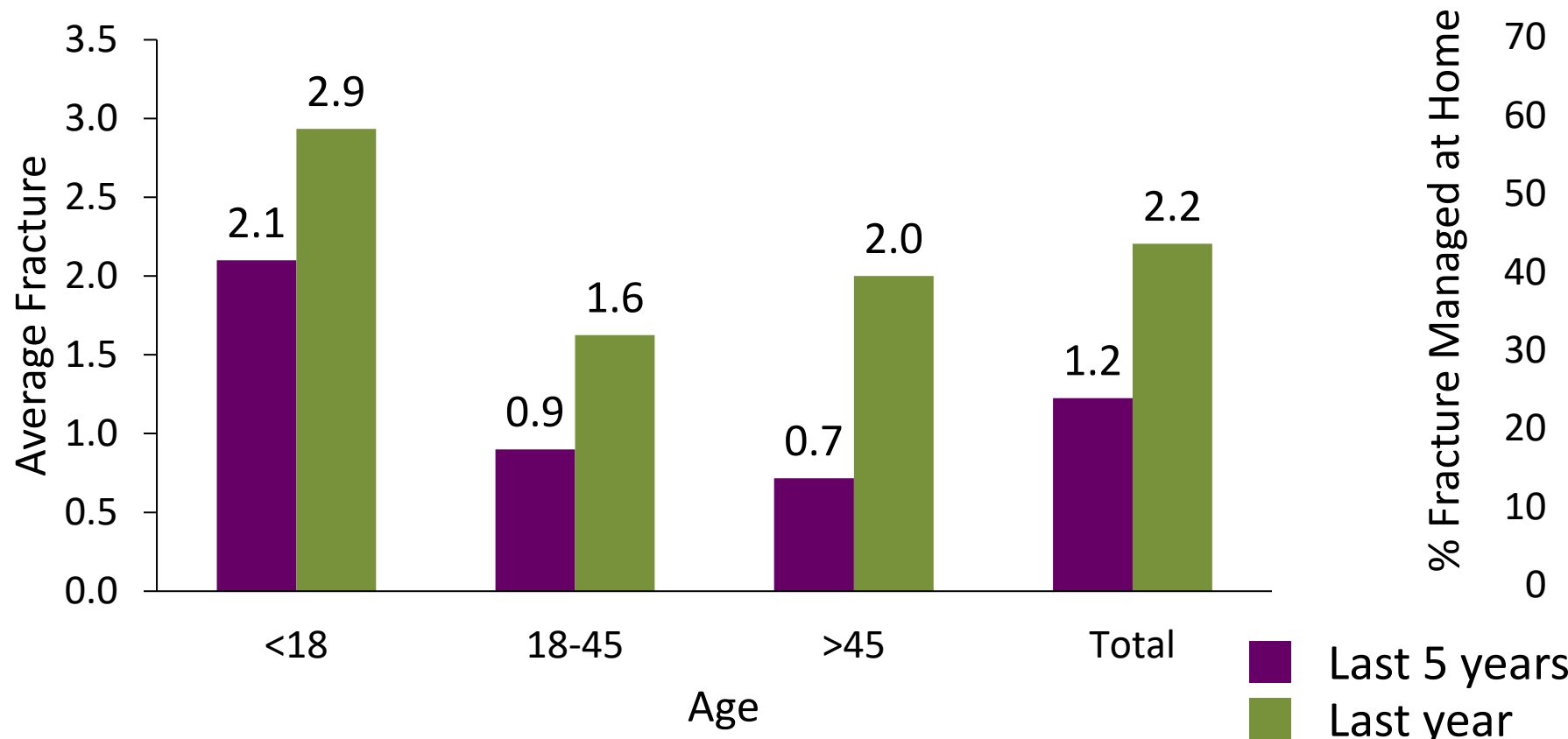
- EY, CS, AE are employees/stockholders of Ultragenyx
- MK has no financial relationships to disclose
- Study sponsored by Ultragenyx
- Medical writing assistance was provided by Jack Pike, PhD of Ultragenyx

RESULTS

- Among patients that reported a fracture in the last 1 or 5 years, the fracture rate in the last year was 2.2 and 43% of the fractures were managed at home (**Figure 2A, B**)
 - Pediatric patients had a higher fracture rate at 2.9 per year in the last year, and a lower % of fractures managed at home (34%) than adults (50%-56%)
- Overall annualized fracture rate was lower over the last 5 years compared to the most recent year (2.2 vs 1.2) (**Figure 2A**), but a higher proportion of fractures were reported as managed at home over the last 5 years versus the last year (54% vs 43%) (**Figure 2B**)

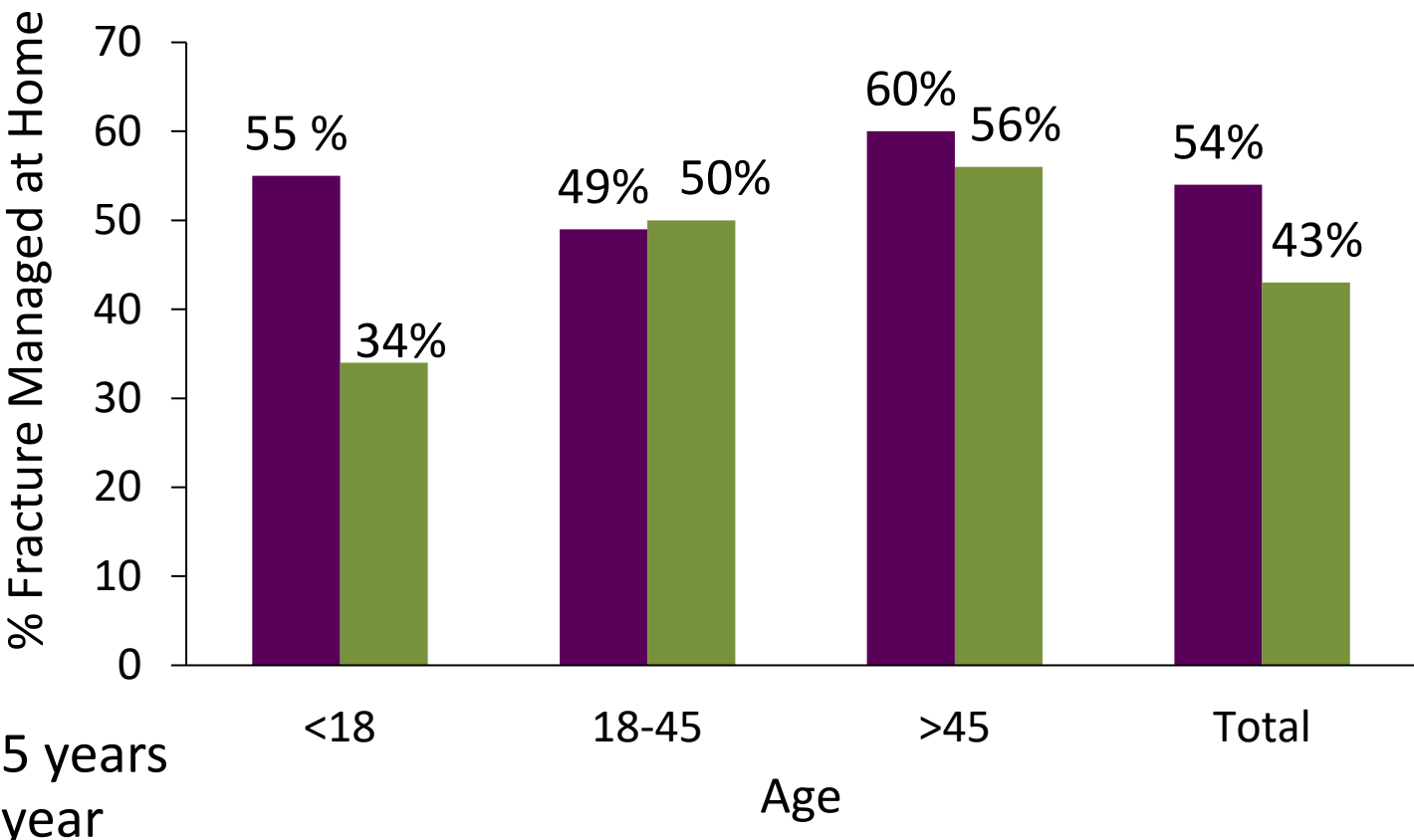
Figure 2: Fracture Rate (A) and Management (B) by Age, in Patients that Experienced a Fracture*

Figure 2A: Annualized Fracture Rate By Age



*in patients who experienced a fracture in the last 1 or 5 years

Figure 2B: Percent Fractures Managed at Home by Age



- In the last year, patients with OI Type I had the lowest overall annualized fracture rate (0.6) compared with Type III (1.8) and Type IV (1.3). The same trend was reported for annualized fracture rate over the last 5 years
- Patients with OI Type III/IV experienced a higher number of fractures and higher % of fractures managed at home compared with patients with type I OI (**Figure 3**)

Figure 3: Fracture Rate (A) and Management (B) by Subtype, in Patients that Experienced a Fracture*

Figure 3A: Annualized Fracture Rate By Subtype

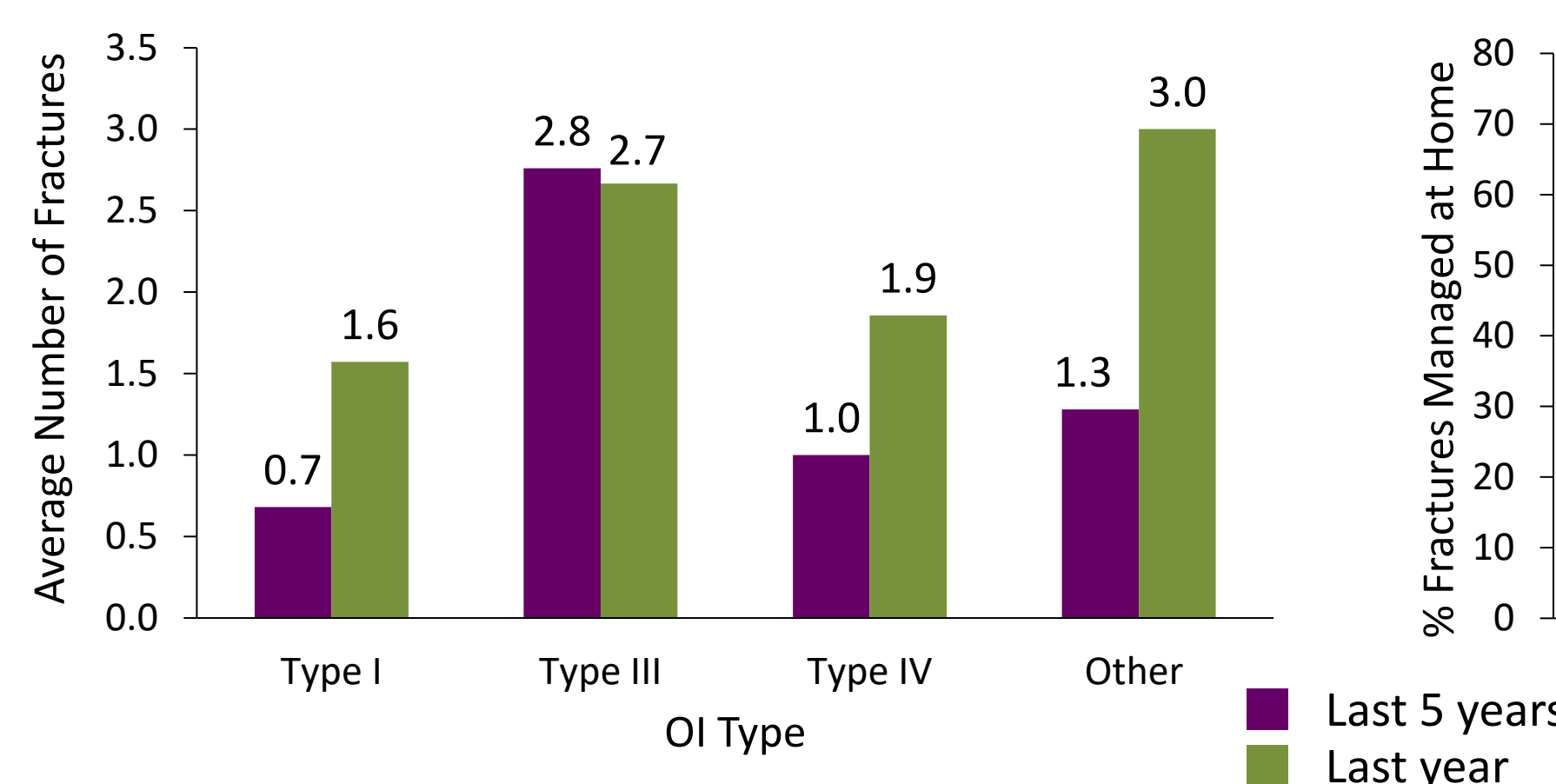
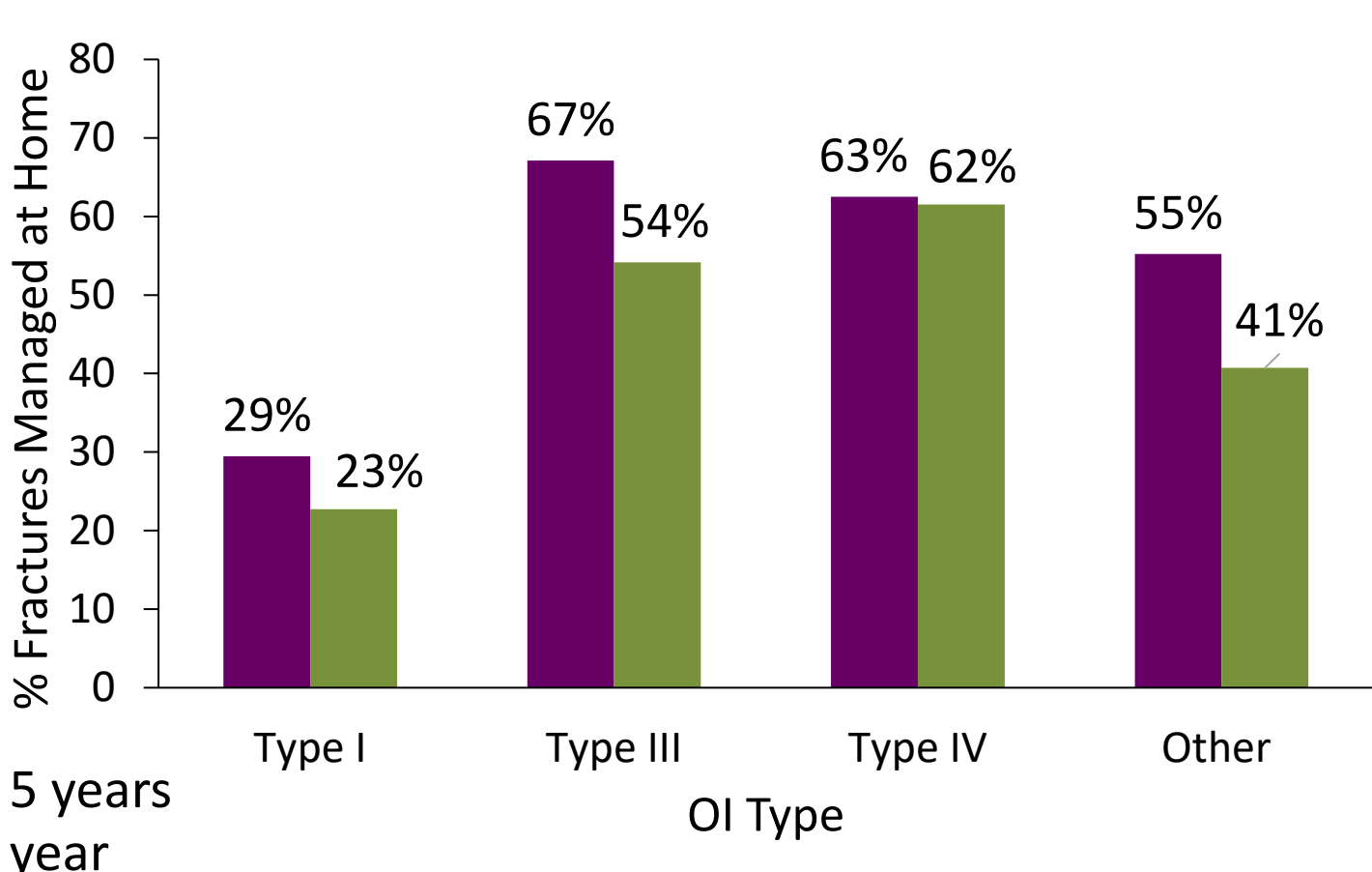


Figure 3B: % Fractures Managed at Home by Subtype



OI Type	Type I	Type III	Type IV	Other	Total Patients Who Reported Fracture, n (%)
Fracture in last 5 years, n (%)	28 (68%)	11 (85%)	8 (80%)	15 (75%)	62 (74%)
Fracture in last year, n (%)	14 (34%)	9 (64%)	7 (70%)	9 (45%)	39 (46%)

*in patients who experienced a fracture in the last 1 or 5 years

- Patients who reported ever using BPs had higher number of fractures compared with patients without any BP use (**Figure 4A**)
- Despite higher fracture rate in patients on BP, the percentage of fractures managed at home was similar in patients treated vs not-treated with BP in the last year (**Figure 4B**)

Figure 4: Fracture Rate (A) and Management (B) by Bisphosphonate (BP) Use in Patients That Experienced a Fracture*

Figure 4A: Annualized Fracture Rate By Subtype

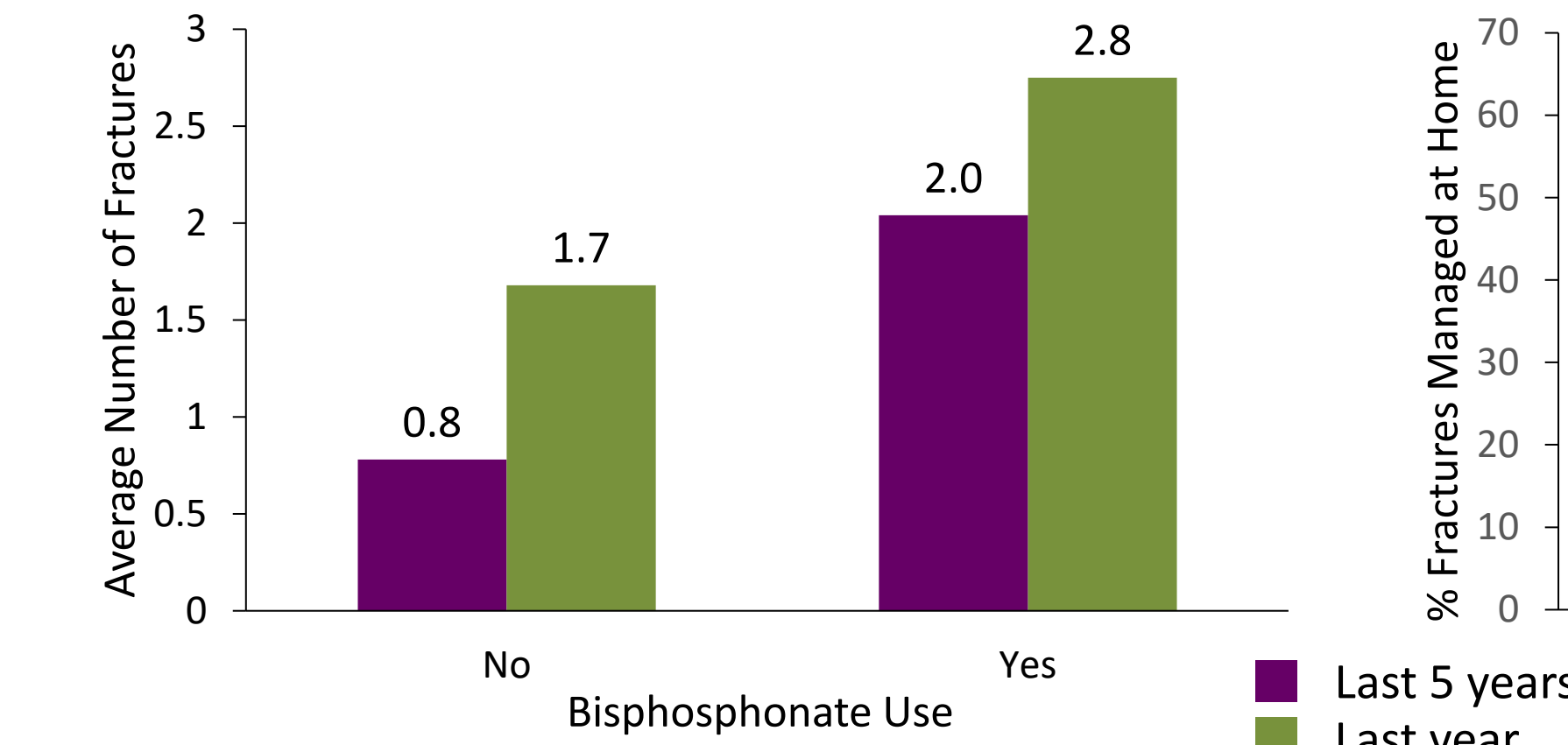
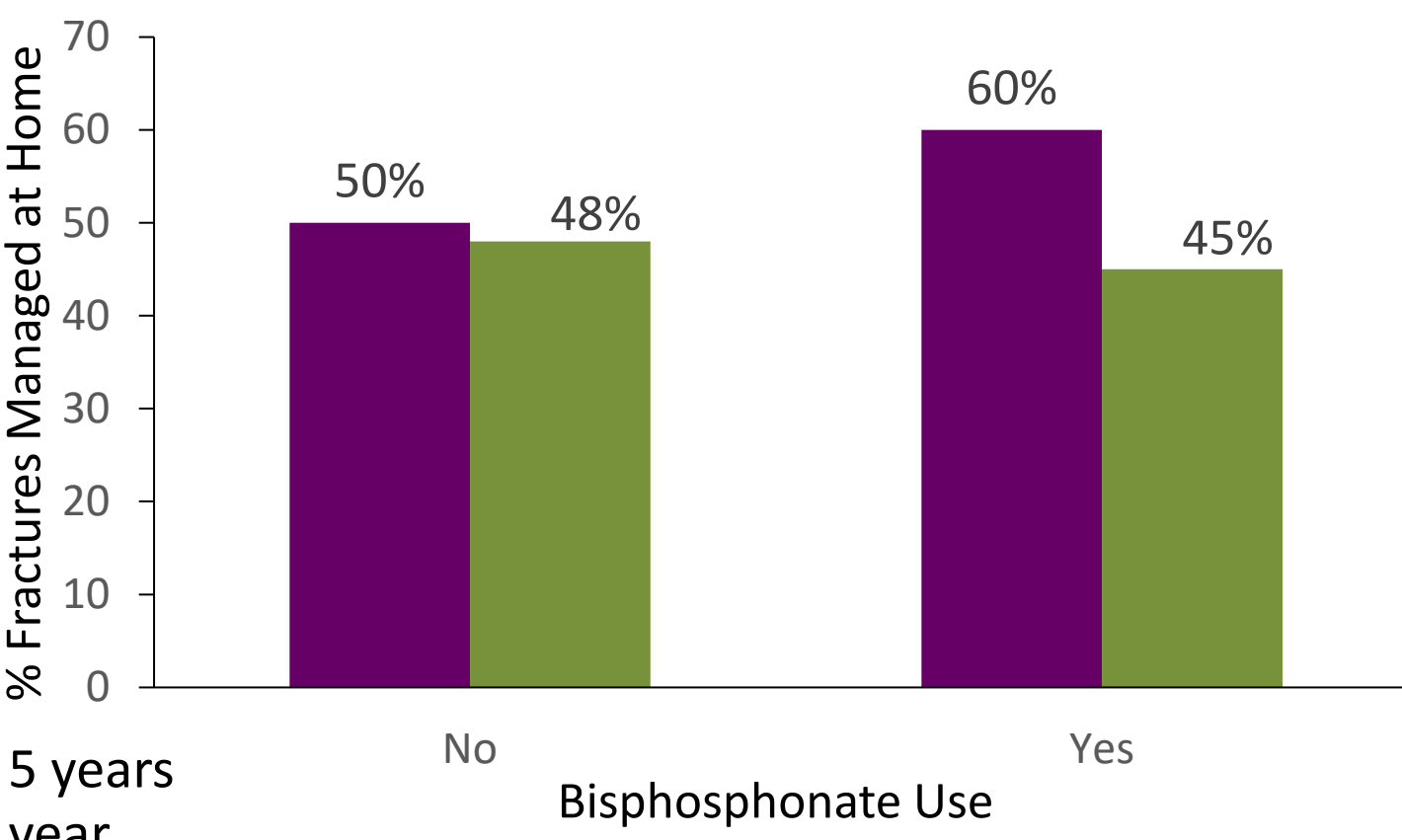


Figure 4B: % Fractures Managed at Home by Subtype

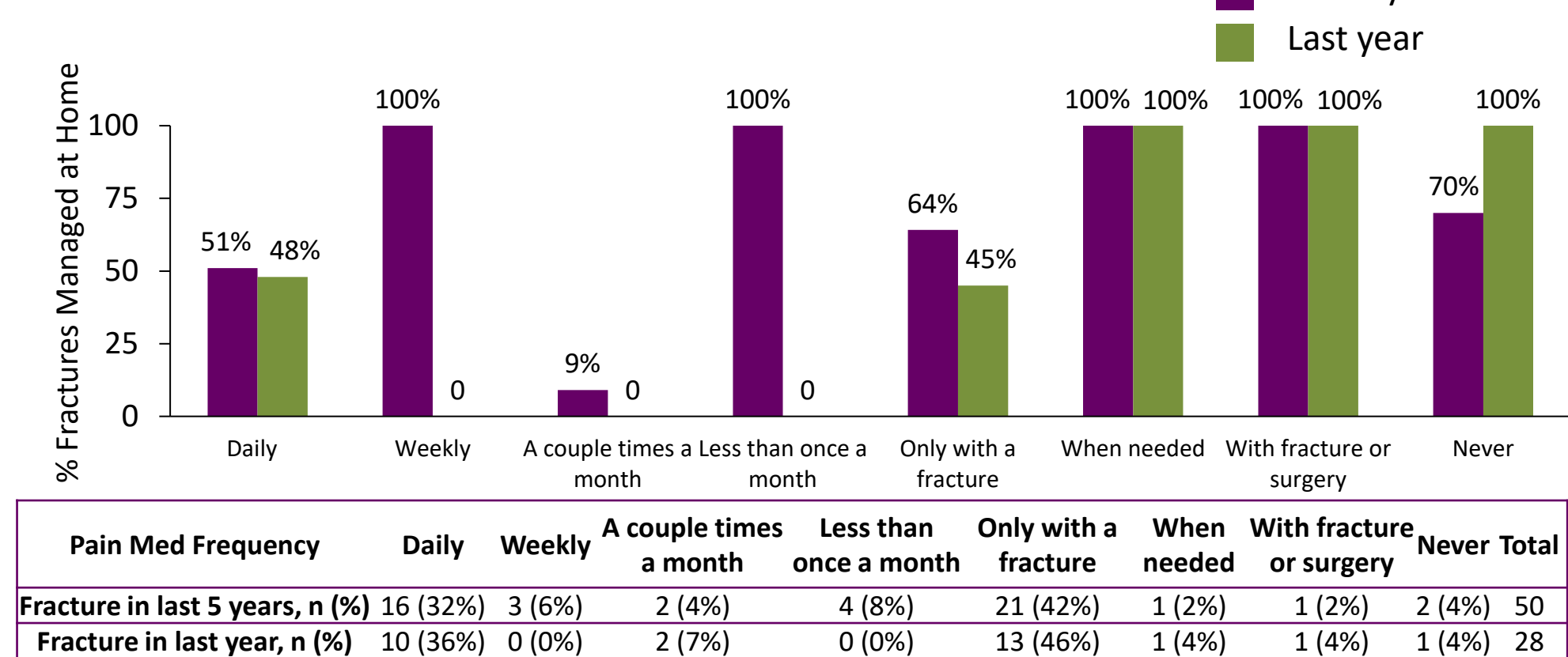


Bisphosphonate Use	No	Yes	Total Patients Who Reported Fracture With Available BP Data
Fracture in last 5 years, n (%)	23 (68%)	37 (77%)	60 (71%)
Fracture in last year, n (%)	14 (41%)	23 (48%)	37 (44%)

*in patients who experienced a fracture in the last 1 or 5 years

- Most patients reported using pain medication daily (32%) or with a fracture (46%).
- No clear trend of home fracture management was seen with frequency of pain medication use (**Figure 5**)

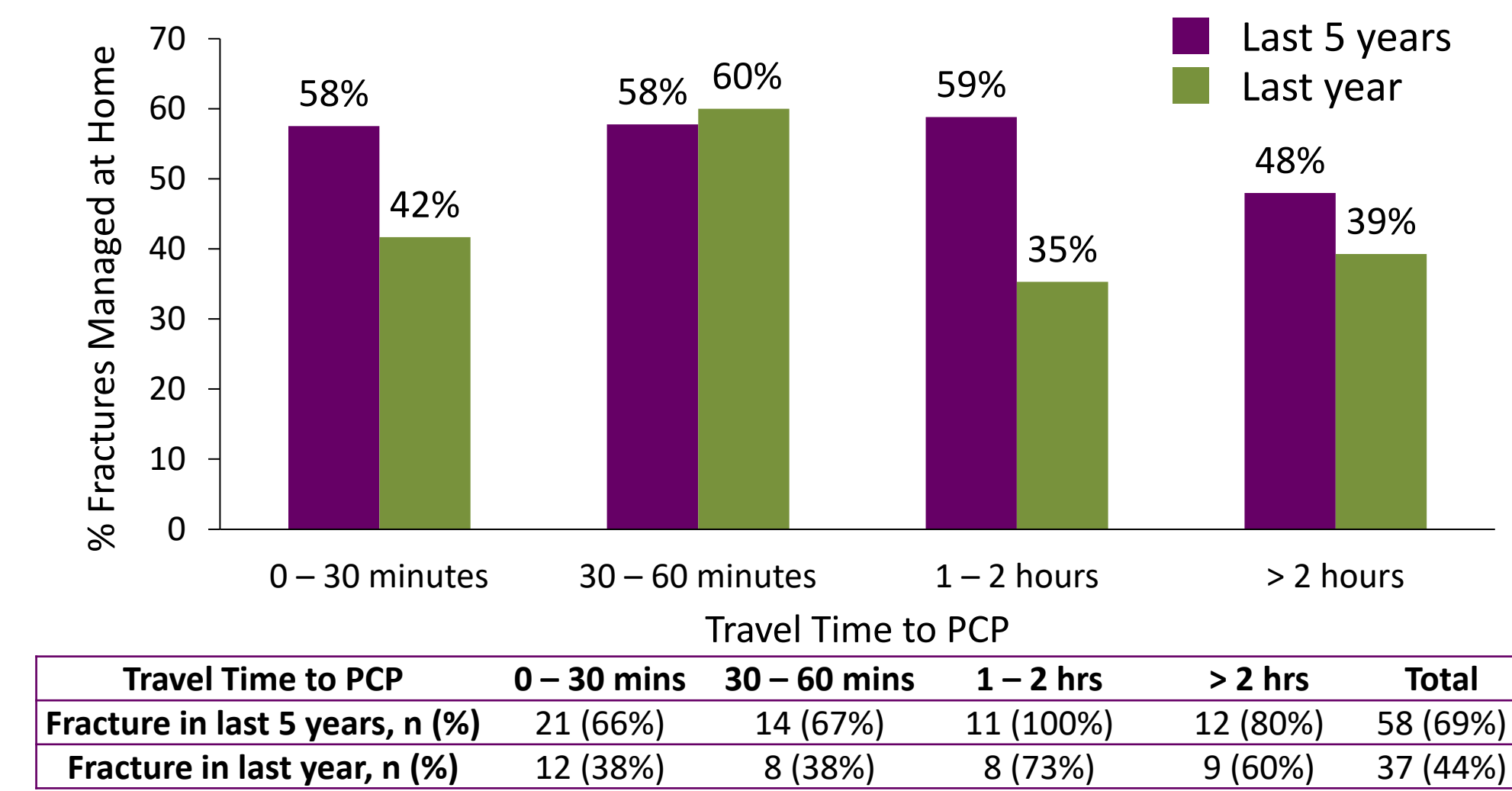
Figure 5: Percentage of Home Fracture Management by Status of Pain Medication Use



*in patients who experienced a fracture in the last 1 or 5 years

- Living farther away from primary care physicians (PCP) did not necessarily translate to an increase in home management of fractures (**Figure 6**)

Figure 6: Travel Time to PCP vs Fractures Managed at Home



*in patients who experienced a fracture in the last 1 or 5 years

LIMITATIONS

- Patients were recruited using convenience sample and may not reflect the entire OI population
- Sample sizes are small, especially within subgroups
- Data are subject to recall bias
- The COVID-19 pandemic may have impacted patients and caregivers' fracture management behaviors

SUMMARY

- The greatest number of reported fractures were in:
 - Pediatric patients
 - OI Type III/IV
 - History of BP use
- Fracture rates in patients aged 18-45 were similar to those >45
- Patients/caregivers reported about half of fractures were managed at home, suggesting that the fractures observed or managed in the healthcare system are underreported and therefore an underestimation of overall fracture rates in OI
- OI Type influences fracture management at home; more fractures in Type III/IV patients were managed at home
- Home fracture management was similar across age groups in the last five years; pediatric patients had fewer fractures managed at home compared with adults in the last year
- Patients with a history of BP use had similar percentage of home fracture management than those without BP

REFERENCES

- Marini JC, et al. *Nat Rev Dis Primers*. 2017; 3(17052).
- Van Dijk FS, et al. *Mol Syndromol*. 2011; 2(1).