Appendix

In this Appendix we provide a mathematical basis for the estimation method of the incidence of hip fracture in this study.

If *x* is the observed number of individuals with the outcome of interest (i.e., hip fracture onset), and *Py* the number of person-years at risk, the incidence rate (IR) is given by

$$\mathrm{IR} = \frac{x}{Py}$$

The number of person-years at risk is obtained as a sum of the patient's time at risk who suffered hip fracture (*Pfy*) and did not (*Pny*).

$$\mathrm{IR} = \frac{x}{Py} = \frac{x}{Pny + Pfy}$$

If a patient did not suffer a hip fracture, the patient's time at risk of these patients (*Pny*) is equal to the patient's survival time during the one-year study period (*Psny*).
If a patient suffered a hip fracture, we assume the patient's time at risk of these patients (*Pfy*) is equal to half of *Psfy* the patient's survival time during the study.

$$\mathrm{IR} = \frac{x}{Py} = \frac{x}{Pny + Pfy} = \frac{x}{Psny + (0.5 \times Psfy)}$$

This assumption is considered reasonable as there are no seasonal trends associated with the incidence of hip fractures [ref.8] or there is a symmetrical seasonal trend in the general Japanese population [http://www.ncbi.nlm.nih.gov/pubmed/16133645], because the average of patient's time at risk is equal to half of the patients' survival time during the study in both of these situations.

In addition, as only a small number of hip fractures were reported, the total patient time at risk estimated using this method did not significantly change when this assumption was changed as below

For male hemodialysis patients,

x = 595,

Psny = 78319.5388 years,

Psfy = 592.75 years,

$$\mathrm{IR} = \frac{x}{Py} = \frac{x}{Pny + Pfy} = \frac{x}{Psny + (0.5 \times Psfy)} = \frac{595}{78319.5388 + (0.5 \times 592.75)} = 7.57 \times 10^{-3}$$

If we assume that all fractured patients were suffered on the last day (i.e., equal to the patient's survival time during the study), the IR was calculated as below

$$\text{IR} = \frac{x}{Psny + (1 \times Psfy)} = \frac{595}{78319.5388 + (1 \times 592.75)} = 7.54 \times 10^{-3}$$

If we assume that all fractured patients were suffered on the first study day (i.e., January 1st), the patient's time at risk of these patients (*Pfy*) is calculated as follow

$$Pfy = (1 \div 365) \times x$$

Thus, the IR was calculated as below

$$\text{IR} = \frac{x}{Psny + ((1 \div 365) \times x)} = \frac{595}{78319.5388 + ((1 \div 365) \times 595)} = 7.60 \times 10^{-3}$$

Same as above, for female hemodialysis patients,

x = 842,

Psny = 47879.5 years,

Psfy = 832.58333 years,

$$\text{IR} = \frac{x}{Psny + (0.5 \times Psfy)} = \frac{842}{47879.5 + (0.5 \times 832.58333)} = 17.43 \times 10^{-3}$$

If we assume that all fractured patients were suffered on the last day (i.e., equal to the patient's survival time during the study), the IR was calculated as below

$$\text{IR} = \frac{x}{Psny + (1 \times Psfy)} = \frac{842}{47879.5 + (1 \times 832.58333)} = 17.29 \times 10^{-3}$$

If we assume that all fractured patients were suffered on the first study day (i.e., January 1st), the patient's time at risk of these patients (*Pfy*) is calculated as follow

$$Pfy = (1 \div 365) \times x$$

Thus, the IR was calculated as below

$$\text{IR} = \frac{x}{Psny + ((1 \div 365) \times x)} = \frac{842}{47879.5 + ((1 \div 365) \times 842)} = 17.58 \times 10^{-3}$$

In conclusion, application of this estimation method did not significantly affect the study results according to our trial calculation. Our assumption is considered reasonable.