

An Economic Model Evaluating the Cost of Nocturia-Related Falls in Older Women in the Community

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Background

Nocturia – the condition of arising from sleep to urinate – is common in older adults.¹ The prevalence of serious nocturia (≥2 episodes per night) in older US women ranges from 33.1% (60-69 years) to 46.2% (70-79 years) to 46.6% (≥80 years).² Nocturia decreases quality of life³ and it is associated with an increased risk of falls in elderly community-dwelling adults.⁴ The economic burden of nonfatal falls is substantial – Medicare expenditures for these falls was estimated to be \$28.9 billion in 2015 with females falling significantly more than males.⁵

Objective

The objective of this analysis was to model the annual cost of nocturia-related falls risk in older women in the community with significant nocturia.

Methods

First, an analysis was conducted to determine the risk of falls in community-dwelling older females not related to nocturia. Next, the incremental risk due to significant nocturia was calculated. Last, the cost of high-acuity falls in that population was estimated to arrive at the annual cost of nocturia-related falls risk.

Results

28.9% of females (≥65 years) experience a fall each year in the US.⁶ The underlying falls risk not related to nocturia was derived for that population (see Model).

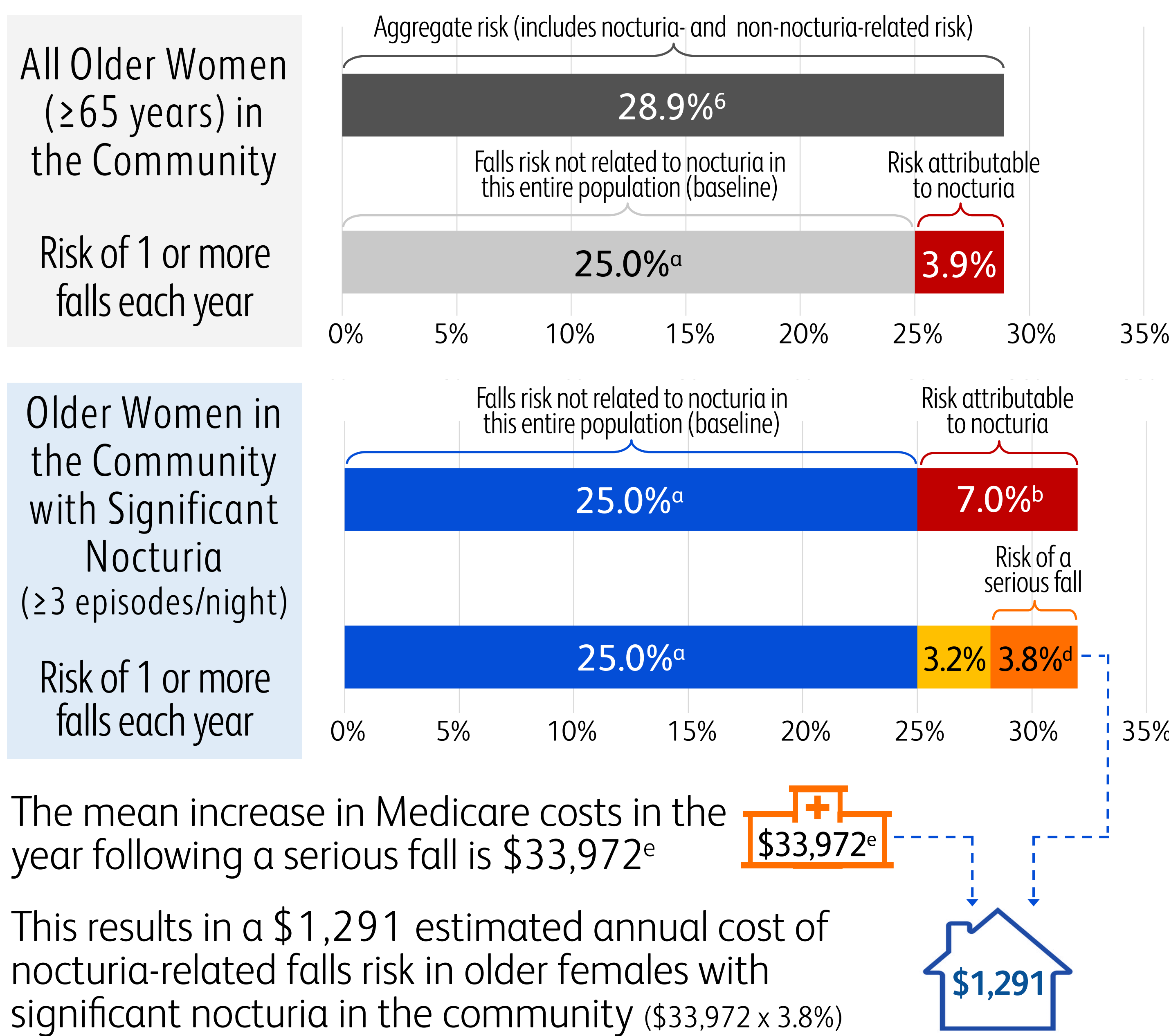
Significant nocturia – defined as ≥3 episodes per night – was found to be associated with a 28% increased risk of falling in community dwelling adults (≥65 years).⁸ The falls risk attributable to that significant nocturia was derived (see Model).

The fraction of falls in older females that result in serious injury was derived (see Model). That value was multiplied by the incremental healthcare costs in the year following a fall to determine that, on average, \$1,291 in additional Medicare expenses will accrue annually in older women in the community who present with significant nocturia (see Model).

Limitations

- It was assumed that all women (those with and without nocturia) have the same baseline risk of a fall – that fraction of falls risk not attributable to nocturia.
- The 28% increased risk of falls⁸ was based on a blend of males and females. Other studies have found a higher fall risk for females across all frequencies of nocturia.¹²
- The prevalence of falls⁶ may be understated as subjects reported experiencing a fall within the year and thus some individuals may have sustained multiple falls in a year.
- The model assumes zero cost for the 46.3% of falls^{d,9} that do not result in an ED visit or a hospitalization.

Model



Key Model Calculations

^aEstimation of falls risk not related to nocturia for all older women

$$\begin{aligned} \text{Aggregate annual risk of a fall} &= \text{Nocturia prevalence} \times \text{increased risk} + \text{No nocturia prevalence} \times \text{increased risk} \\ &\quad \times \text{baseline risk} \quad \times \text{baseline risk} \\ 28.9\%^6 &= (78\%^7 \times 1.2^4 \times \text{baseline}) + (22\%^7 \times 1.0 \times \text{baseline}) \\ 25.0\% &= \text{Baseline risk of falls not related to nocturia} = 28.9\% / [(78\% \times 1.2) + (22\% \times 1.0)] \end{aligned}$$

^bEstimation of the incremental annual falls risk in women with significant nocturia

$$\begin{aligned} &= \text{Baseline falls risk (not nocturia-related)} \times \text{increased falls risk due to nocturia (≥3 episodes)} \\ 7\% &= \text{Incremental fall risk attributable to significant nocturia (≥3 episodes)} = 25.0\%^a \times 1.28^8 \end{aligned}$$

^cEstimation of the risk of serious injury (ED visit or hospitalization) in older females who fall

$$\begin{aligned} &= \text{Percentage of all older adults who experience a fall having a serious injury} \times \\ &\quad \text{Incremental relative risk associated with female gender} \\ 53.7\% &= \text{Risk of a fall resulting in serious injury in an older female} = 53.2\%^9 \times 1.01^9 \end{aligned}$$

^dEstimation of the annual risk of a serious fall attributable to significant nocturia

$$\begin{aligned} &= \text{Annual risk of a fall} \times \text{percentage of falls resulting in an ED visit or hospitalization} \\ 3.8\% &= \text{Annual risk of a serious fall attributable to significant nocturia} = 7.0\%^b \times 53.7\%^c \end{aligned}$$

^eEstimation of the mean annual increase in Medicare expenditures due to a serious fall

$$\begin{aligned} &= \$47,543 \text{ in the post fall year}^{10} - \$19,636 \text{ in the pre-fall year}^{10} = \$27,907 \text{ (2019 dollars)} \\ \$33,972 &= \$27,907 \text{ (conversion of July 2019 dollars to March 2024 dollars)}^{11} \end{aligned}$$

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Conclusions

Falls occur frequently in older, community-dwelling females⁶ and nocturia increases the risk of these accidents.^{4,8} Many of these falls require substantial care⁹ and those that do are costly.¹⁰ This model estimated that, on average, \$1,291 in additional Medicare expenses will accrue annually in older women in the community who present with significant nocturia defined as 3 or more episodes per night.

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