

Neurologist Care Prevents Over 4,600 Deaths Annually in Patients with Parkinson's Disease in the US: A Meta-Analysis

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Objective: While several studies have analyzed the benefit to individuals of neurologist care to patients with Parkinson's, the magnitude of the problem has not previously been determined.

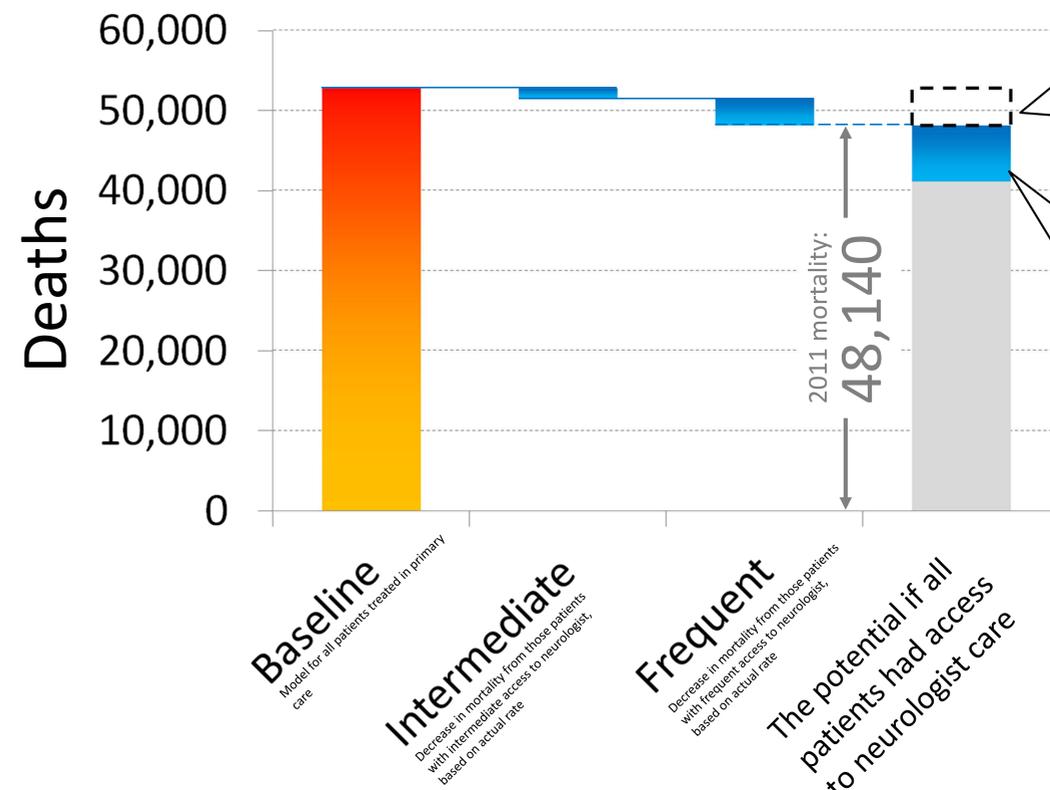
Background: Previously, studies of patients with Parkinson's disease covered by Medicare in the US have been shown, after risk adjustment, to have a 22% lower risk of death if treated by a neurologist [1]. The total number of deaths of people with Parkinson's can be calculated from the published death statistics for 2011 from the US Center for Disease Control [2] together with research on the frequency at which Parkinson's is mentioned on death certificates among patients with the condition [3].

Methods: The fraction of the population treated by a neurologist was combined with the relative risk of death for individuals with Parkinson's treated by a neurologist versus those managed in primary care. Based on these results, the total number of deaths prevented by neurologist care and the number expected should every patient receive neurologist care were computed.

Results: Of the projected 48,140 annual deaths of patients with Parkinson's disease in the US, approximately 25% (16,891) who died were managed by a neurologist (seen at least annually), in contrast, neurologists manage 29% of patients with Parkinson's disease in the cohort. We projected that 48% of deaths (23,150) were patients managed in primary care (individuals evaluated by a neurologist zero or one time), while this group managed 44% of patients. Based on the model, improved survival for patients receiving neurologist care prevented 4,645 deaths in 2011 and the extension of neurologist care to patients not currently receiving it would have further reduced overall mortality by another 6,967 patients.

Conclusions: Approximately 6,967 patients with Parkinson's disease die annually due to lack of access to a neurologist. Further study could provide insight into translatable factors that confer this survival benefit or models of care that could provide increased access at scale.

Annual mortality rate, US Showing benefit of expert care



Every year, neurologist care saves the lives of **4,645** people with Parkinson's.

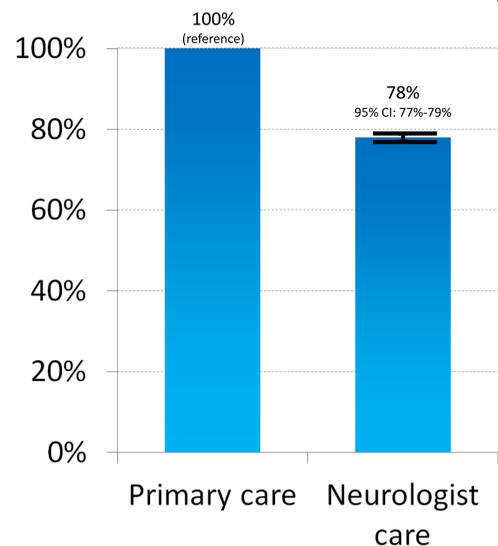
Approximately **6,967** people with Parkinson's die annually due to lack of access to a neurologist.

Selected annual death rates in the US, 2011:

| | |
|--------------|--|
| 48,140 | Total deaths of people with Parkinson's disease [2, 3] |
| 23,107 | Death from Parkinson's [2] |
| 11,101 | Homicide by firearm [2] |
| 7,638 | HIV/AIDS [2] |
| 7,011 | Atherosclerosis [2] |
| 6,967 | Parkinson's patients without neurologist care |
| 3,555 | Drowning [2] |

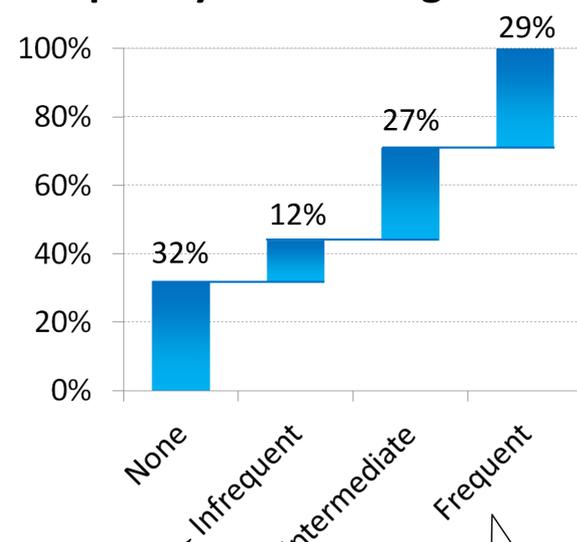
Analysis model

Hazard ratio for mortality



Data is for US Medicare beneficiaries diagnosed with Parkinson's disease in 2002 [1].

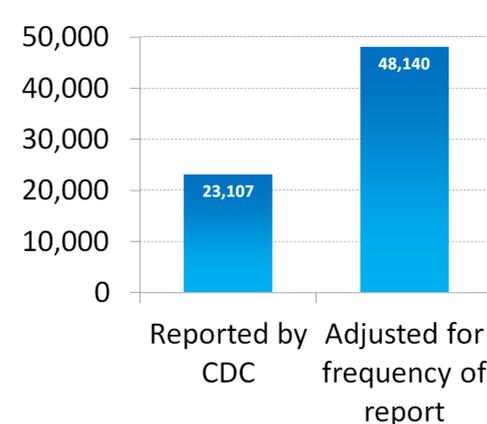
Frequency of neurologist care



Subject saw a neurologist once during 4 year follow-up period
 More than once but less than annually over 4 years.
 Subject saw a neurologist at least annually during 4 year follow-up period

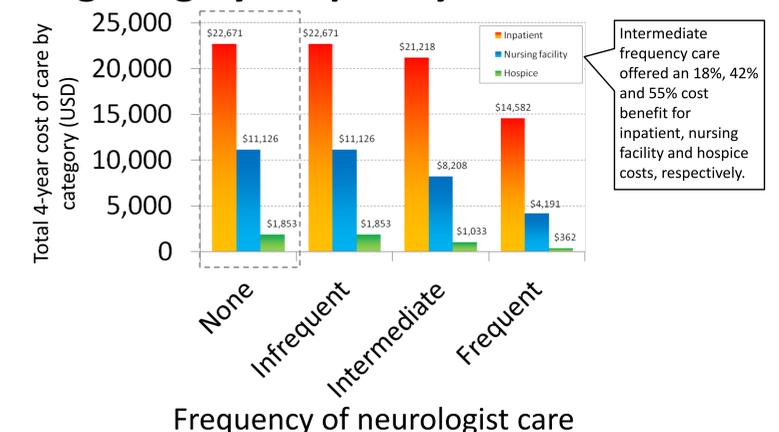
Data is for US Medicare beneficiaries diagnosed with Parkinson's disease in 2002 [1, 4].

Deaths from Parkinson's in the US



Data is from CDC report for 2011 [2]. Sleeman reports that 48% of death certificates for Parkinson's patients mention Parkinson's disease [3]. Note that the analysis by Willis et al [1] is agnostic to cause of death. This is likely a conservative estimate due to undercounting in the CDC data.

Weighting by frequency



Mortality data has been published for frequent versus infrequent neurologist care. Using the care utilization benefit based on frequency of neurologist care [4], the benefit of intermediate care can be determined. No neurologist care has been assumed to yield the same result as infrequent care because the frequency of misdiagnosis yields unreliable data for the no neurologist care cohort. Based on these results, the benefit of intermediate frequency access to a neurologist was modeled as 40% the benefit of frequent care.

References:

- [1] AW Willis et al, Neurologist care in Parkinson disease. *Neurology*. 2011. 77:851-857.
- [2] DL Hoyert and J Xu, National Vital Statistics Reports. Centers for Disease Control and Prevention. 2012. 61(6):4.
- [3] KE Sleeman et al, Palliative Medicine. 2013. 27(9):840-846.
- [4] AW Willis et al, Neurologist-associated reduction in PD-related hospitalizations and health care expenditures. *Neurology*. 2012. 79:1774-1780.

- Model assumptions:
1. Mortality odds ratio benefit of neurologist care from Medicare population is generalizable.
 2. Mortality for no neurologist group equals mortality for infrequent neurologist care.
 3. Mortality for intermediate frequency of neurologist care has 40% of the benefit of frequent neurologist care.