

Need for Care in Essential Tremor and the Indirect Burden on Care Partners

Andrew Lee, PhD¹, presenting on behalf of:
Margaret E. Gerbasi¹, Rodger J. Elble², Holly A. Shill³, Eddie Jones⁴, Alexander Gillespie⁴, John Jarvis⁵, Elizabeth Chertavian⁵, Zachary Smith⁵, Marie-Josée Martel¹, Mina Nejati⁶, Ludy C. Shih^{7,8}

1. Sage Therapeutics, Inc., Cambridge, MA, USA; 2. Southern Illinois University School of Medicine, Springfield, IL, USA; 3. Barrow Neurological Institute, Phoenix, AZ, USA; 4. Adelphi Real World, Adelphi Mill, Bollington, United Kingdom; 5. Medicus Economics, Milton, MA, USA; 6. Biogen, Inc., Cambridge, MA, USA; 7. Boston University Chobanian and Avedisian School of Medicine, Boston, MA, USA; 8. Boston Medical Center, Boston, MA, USA

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Introduction

- Essential tremor (ET) is among the most common movement disorders in the US, affecting an estimated 6.8 million US adults.^{1,2} Primary manifestations of ET include kinetic and postural tremor.³
- While ET burden on the healthcare system is becoming increasingly recognized, indirect care needs of patients with ET and care partner burden remain less understood.
- Limited research published on this topic suggests that:
 - Patients with ET often struggle to perform activities of daily living (ADL) and rely on care partners for physical and emotional support.⁴
 - Information about the specific experience of care partners of patients with ET is minimal; moreover, whether increased tremor severity correlates with increased care partner burden ought to be further explored.⁵
- To comprehensively characterize the indirect burden of ET, it is important to understand its impact on care needs and care partner burden, as well as the association between these aspects of indirect burden and ET severity.

Objectives

- To describe the need for indirect care for patients with ET and the time spent providing this support by care partners
- To evaluate the potential association between the extent of care partner burden (i.e., number of hours spent) and ET tremor severity

Methods

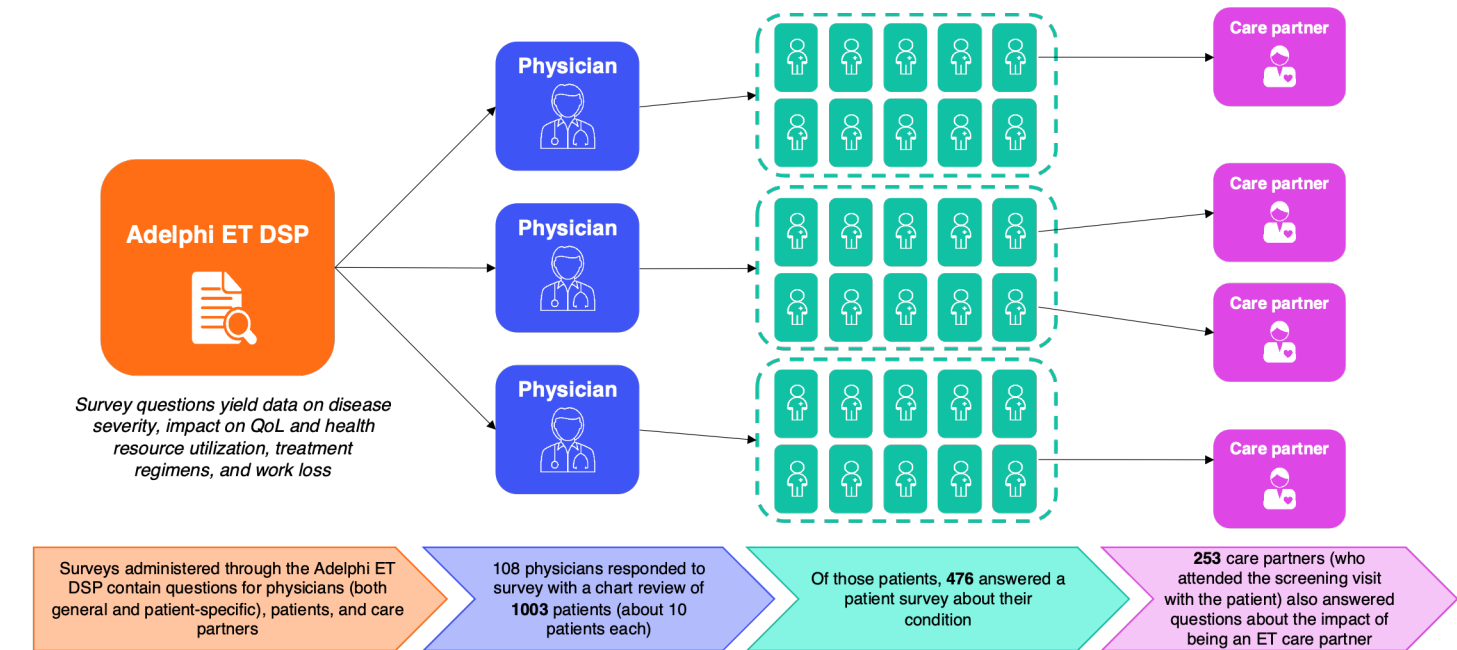
- This study used real-world data collected in the United States (US) from March 2021 to August 2021 through the Adelphi ET Disease Specific Programme (DSP)^{TM,6}
- Linked data from care partner/patient pairs were used to evaluate care partner-reported weekly hours of patient care.
- Key measures included:
 - Clinician-reported TETRAS (The Essential Tremor Rating Scale) ADL Subscale, Performance Subscale, and Performance Subscale Item 4 (TETRAS-PS Item 4)
 - TETRAS is a physician-administered, comprehensive clinical measurement tool composed of a Performance subscale assessing tremor amplitude and an ADL subscale assessing the impact of tremor on speech, upper limb function, and social activities.⁷
 - TETRAS-PS Item 4 measures upper limb tremor and includes 3 maneuvers for each arm that assess postural and kinetic tremor.
 - Clinician-reported care partner status
 - Care partner-reported time (hours of weekly care): If constant care was reported, time commitment was assumed as 112 hours/week (e.g., 2/3 of total weekly hours, or 16 hours/day for 7 days total).
- Pearson correlations and regression models, adjusting for relevant covariates (TETRAS subscale of interest, age, sex, race, Charlson Comorbidity Index [CCI]) were used to assess associations between care provision and tremor severity as measured by TETRAS Performance Subscale, TETRAS-PS Item 4, and TETRAS ADL.
- Analyses of TETRAS ADL were conducted considering Total Score, as well as a TETRAS ADL Composite Score, which excludes the ADL social item, includes Performance spirals, and was recoded to collapse 0 and 1 responses.

Results

- A subset of 476 patients with ET who completed patient-reported surveys was derived from the Adelphi ET DSP (Figure 1). A dataset of 253 care partners was obtained from patients who had physician-reported data on care partner status and who completed the care partner-reported surveys.

FIGURE 1. DESCRIPTION OF THE ADELPHI ET DISEASE SPECIFIC PROGRAMME AND ANALYTIC SAMPLE SELECTION

Adelphi collected **real-world data** from Neurologists and PCPs about their patients with ET, as well as linked data from patients and care partners:



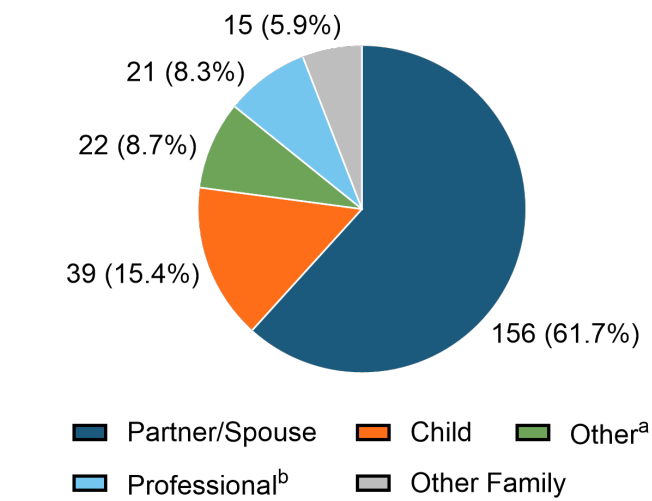
DSP, Disease Specific Programme; ET, essential tremor; PCP, primary care physician; QoL, quality of life
Note: Findings from the Adelphi ET Disease Specific Programme survey data may not fully represent the universe of ET patients, physicians, and care partners

Objective 1: Need for indirect care by patients with ET and time spent by their care partners

- Among patients with ET with physician-reported data on care partner status, 25% (240/960) required care partners.
- Patients with care partners were on average older than those without care partners (mean age=70.8 vs 63.0 years, respectively; $p<0.001$). Compared with the mean 70.8 years of age of the patients with ET, care partners were on average younger at 57.3 years of age (standard deviation [SD], 14.4).
- Most care partners were spouses (156/253; 61.7%) of the patient with ET (Figure 2); and most care partners were employed or students (152/253; 60.1%) and lived with the patient with ET (206/253; 81.4%).

- Constant care for patients with ET was provided by 21.3% (54/253) of care partners.
- Excluding care partners who reported providing constant care (time commitment defined as 112 hours/week), weekly care partner time averaged 24.5 hours (SD, 26.1). Including constant-care care partners resulted in an increase of time devoted to care to 43.9 weekly care hours, with more than half (148/253; 58.5%) of care partners giving at least 20 hours of care per week (Figure 3).
- Care partners only reported the amount of care time that they themselves provided; however, 92% of care partners reported that the patient with ET for whom they provided care had at least one more individual providing care (i.e., 2+ care partners in total).

FIGURE 2. CARE PARTNER (N=253) RELATIONSHIPS FOR PATIENTS WITH ET

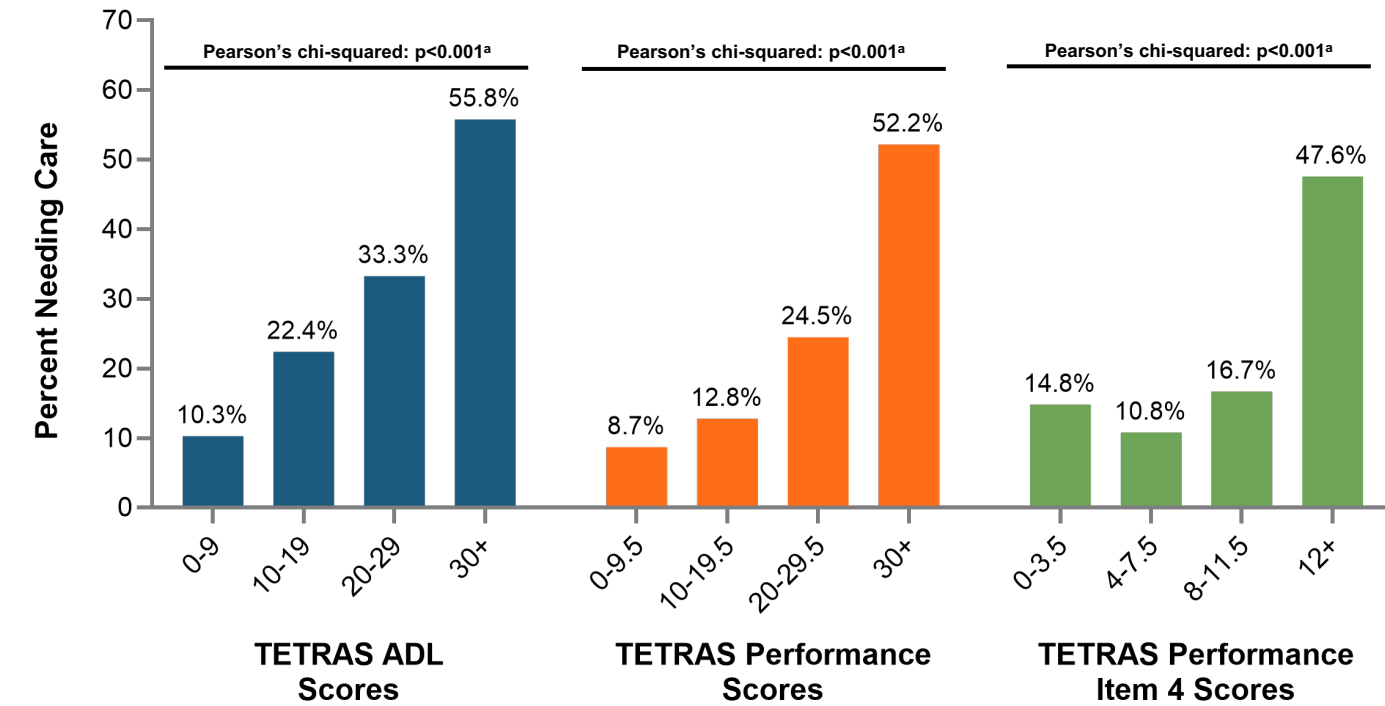


^aProfessional = nursing home staff, nurse, home help, or professional care partner
^bOther = voluntary care partner, friend/neighbor, other

Objective 2: Association between care partner need and measures of tremor severity

- Greater probability of needing a care partner was significantly associated with worsening tremor.
 - As TETRAS ADL scores increased (i.e., worsening tremor), the proportion of patients requiring care partners increased significantly ($p<0.001$). Similar patterns were seen for the Performance Subscale ($p<0.001$) and TETRAS-PS Item 4 ($p<0.001$) (Figure 4).
- The association between care partner need and tremor severity was moderate (bivariate $r = 0.32$ - 0.37), and the associations were not substantially impacted by the inclusion of additional covariates (age, sex, race, comorbidity, relationship with patient, and living with patient) in regression models.
- Multivariate regression models demonstrated a positive relationship between TETRAS scores and the odds of reporting the patient having a care partner responsible for daily needs (Table 1).

FIGURE 4. ASSOCIATION BETWEEN TETRAS MEASURES AND CARE PARTNER NEED



^aStatistical analyses tested a global null hypothesis that distributions are equal across the 4 subcategories within a given TETRAS measure. As such, p -values <0.05 indicate that the percentage of patients needing care is not equal across the subgroups.

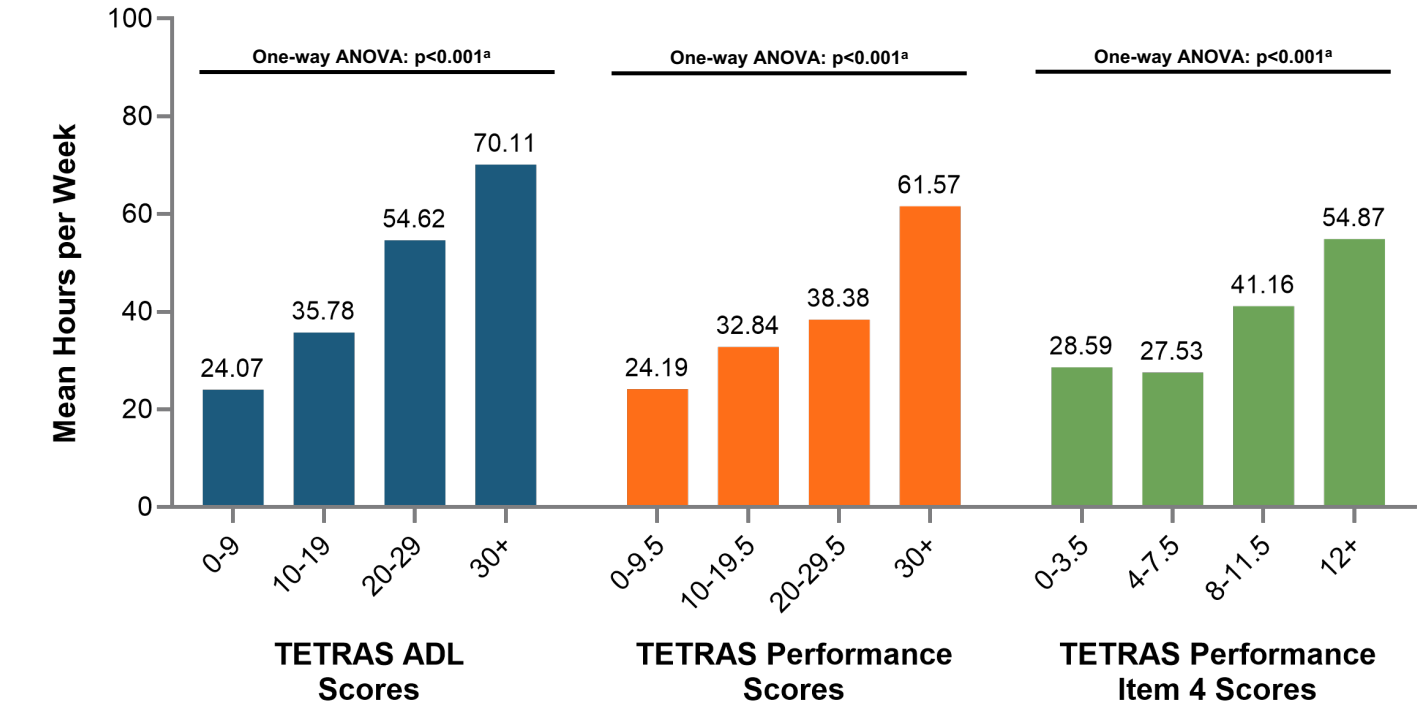
TABLE 1. ASSOCIATION BETWEEN WORSENING OF TETRAS SCORE (1-POINT INCREASE) AND HAVING A CARE PARTNER RESPONSIBLE FOR DAILY NEEDS

TETRAS Score	Increase in the odds of reporting a care partner responsible for daily needs	P-value
TETRAS ADL Total Score ^a	7.6%	$p<0.01$
TETRAS Performance Score	7.5%	$p<0.01$
TETRAS-PS Item 4	17.6%	$p<0.01$

^aSimilar results obtained with analyses conducted with TETRAS ADL Composite Score

- Similarly, the care partner time required for patients with ET increased with disease severity, as reflected by the increasing (i.e., worsening tremor) TETRAS ADL, TETRAS Performance, TETRAS-PS Item 4 scores (Figure 5).
- As TETRAS ADL scores increased (i.e., worsening tremor), care partner burden (i.e., number of hours spent) increased significantly ($p<0.001$). Similar patterns were seen for the Performance Subscale ($p<0.001$) and TETRAS-PS Item 4 ($p<0.005$).
- Multivariate regression models demonstrated a positive relationship between worsening TETRAS scores and the odds that the care partner provides 20 hours of care or more on average (Table 2).

FIGURE 5. ASSOCIATION BETWEEN TETRAS MEASURES AND CARE TIME REPORTED BY CARE PARTNERS



^aStatistical analyses tested a global null hypothesis that distributions are equal across the 4 subcategories within a given TETRAS measure. As such, p -values <0.05 indicate that the mean hours per week is not equal across the subgroups.

TABLE 2. ASSOCIATION BETWEEN WORSENING OF TETRAS SCORE (1-POINT INCREASE) AND HAVING A CARE PARTNER PROVIDING ≥20 HOURS OF CARE ON AVERAGE

TETRAS Score	Increase in the odds that a care partner provides ≥20 hours of care on average	P-value
TETRAS ADL Total Score ^a	5.3%	$p<0.01$
TETRAS Performance Score	3.0%	$p<0.05$
TETRAS-PS Item 4	6.4%	$p<0.05$

^aSimilar results obtained with analyses conducted with TETRAS ADL Composite Score

Limitations

- Given the sample recruitment method, the generalizability of descriptive information from the DSP to all patients with ET is limited.⁸
- Patients with more severe ET may make more frequent visits to their physician, and therefore may be more likely to be included in the study population. Similarly, patients requiring greater care partner support are more likely to have their care partner with them to be recruited to the sample.
- The above limitations may have a greater impact on descriptive data than associations with TETRAS scores and subscales.
- These analyses do not capture the full breadth of indirect impacts of ET.
 - Only one care partner perspective is captured, but most care partners indicated multiple individuals were involved in care of patients with ET.
- Reliance on an assumed number of hours for constant care (112 hours/week) may not accurately reflect the true effort provided by care partners but was deemed a conservative estimate for the purpose of this study. Additionally, assuming 0 hours for the 14 care partners who indicated "Not Selected" in their time spent providing care also provided a conservative estimate of the care hours required.

Conclusions

- Many patients with ET require indirect care by care partners, with care needs and hours spent by care partners increasing with worsening tremor severity.
- For each point increase (worsening) in all TETRAS measures assessed, statistically significant increases were observed in the likelihood of needing a care partner for daily needs, as well as the potential for care partners to dedicate ≥20 hours of care per week.
- Over 50% of care partners provided the support equivalent of over half a work-week, constituting a substantial indirect ET burden, which often goes unnoticed in traditional economic evaluations.
- These results suggest that improvements in ADL and/or tremor amplitude with treatment may also be associated with a reduced need for care partner activity and thus a lower indirect burden.

Abbreviations

ADL, activity of daily living; CCI, Charlson Comorbidity Index; DSP, Disease Specific Programme; ET, essential tremor; QoL, quality of life; SD, standard deviation; TETRAS, The Essential Tremor Rating Scale; TETRAS-PS Item 4, TETRAS Performance Subscale Item 4; US, United States

Acknowledgements

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Ethics Approval

This study was approved by the Western Institutional Review Board (protocol number AG-8947).

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Disclosures: MG is an employee of Sage Therapeutics, Inc., and may hold stock and/or stock options. RJE has served as a consultant for Applied Therapeutics, Attune, Clexio, Encora, Fasikl, Jazz, Neurocrine, Praxis Precision Medicines, and Sage Therapeutics, Inc. HAS has received research support from Transposon, Parkinson Study Group/UCB, Parkinson's Foundation, NINDS, Supernus/US World Meds, MJFF, Jazz Pharmaceuticals, Barrow Neurological Foundation and Cerevel Therapeutics. HAS has served as a consultant for the Parkinson Study Group/Nq, Biogen, Abbvie, Sage/Biogen, Praxis, KeefeRx, Fasikl and Jazz Pharmaceuticals. EJ and AG are employees of Adelphi Real World and received no personal compensation for their involvement in this research. JJ, EC, and ZS are employed by Medicus Economics, which received consulting fees from Sage Therapeutics, Inc. and Biogen Inc. MJM is a consultant for Sage Therapeutics. MN is an employee of Biogen Inc. and may hold stock. LCS has received consulting fees from Medtronic, WCG MedAvante, and Encora Therapeutics.