Supplementary Material

The Impact of Agitation in Dementia on Caregivers: A Real-World Survey

**Supplementary Table 1.** Type of regression analysis used for different outcomes

| Type of regression analysis | Outcomes                                      |
|-----------------------------|------------------------------------------------|
| Negative binomial regression | Non-professional caregiver time/week, hours   |
|                             | Non-professional caregiver burden - overall   |
|                             | Non-professional caregiver burden – personal strain |
|                             | Non-professional caregiver burden – role strain |
|                             | Non-professional caregiver burden – guilt     |
| Linear regression           | Non-professional caregiver EQ-5D-3L health utility index |
|                             | Non-professional caregiver EQ-5D-3L VAS score  |
|                             | Non-professional caregiver absenteeism        |
|                             | Non-professional caregiver presenteeism       |
|                             | Non-professional caregiver overall work impairment |
|                             | Non-professional caregiver total activity impairment |
### Supplementary Table 2. Patient demographics and clinical characteristics

|                                | Total (n=1,349) | Non-agitated (n=656) | Agitated (n=693) | p   | Total (n=1,244) | No Care (n=305) | Remote Care (n=248) | Proximate Care (n=691) | p   |
|--------------------------------|-----------------|----------------------|------------------|-----|-----------------|-----------------|----------------------|------------------------|-----|
| **Age, y**                     |                 |                      |                  |     |                 |                 |                      |                        |     |
| n                              | 1349            | 656                  | 693              | 0.0307 | 1,244           | 305             | 248                  | 691                    |     |
| Mean (SD)                      | 75.5 (9.0)      | 75.0 (8.8)           | 76.0 (9.1)       |     | 75.6 (9.1)      | 70.0 (8.6)      | 79.3 (8.6)           | 76.7 (8.4)             |     |
| Range                          | 50–90           | 50–90                | 50–90            |     | 50–90           | 50–90           | 52–90                | 50–90                  |     |
| **Sex, n (%)**                 |                 |                      |                  |     |                 |                 |                      |                        |     |
| n                              | 1346            | 655                  | 691              |     | 1,241           | 305             | 247                  | 689                    |     |
| Male                           | 625 (46)        | 295 (45)             | 330 (48)         | 0.3254 | 566 (46)      | 169 (55)       | 90 (36)              | 307 (45)               |     |
| Female                         | 721 (54)        | 360 (55)             | 361 (52)         |     | 675 (54)       | 136 (45)       | 157 (64)             | 382 (55)               |     |
| **Ethnicity, n (%)**           |                 |                      |                  |     |                 |                 |                      |                        |     |
| n                              | 1347            | 654                  | 693              |     | 1,243           | 305             | 247                  | 691                    |     |
| White/Caucasian                | 976 (73)        | 500 (77)             | 476 (69)         | 0.0014 | 906 (73)     | 234 (77)       | 182 (74)             | 490 (71)               | 0.1248 |
| African American               | 186 (14)        | 70 (11)              | 116 (17)         |     | 173 (14)       | 28 (9)         | 35 (14)              | 110 (16)               |     |
| Hispanic/Latino                | 99 (7)          | 51 (8)               | 48 (7)           |     | 89 (7)         | 24 (8)         | 13 (5)               | 52 (8)                 |     |
| Other                          | 86 (6)          | 33 (5)               | 53 (8)           |     | 75 (6)         | 19 (6)         | 17 (7)               | 39 (6)                 |     |
| **Employment status, n (%)**   |                 |                      |                  |     |                 |                 |                      |                        |     |
| n                              | 1327            | 644                  | 683              |     | 1,223           | 300            | 244                  | 679                    |     |
| Working full-time              | 53 (4)          | 34 (5)               | 19 (3)           |     | 51 (4)         | 43 (14)        | 0 (0)                | 8 (1)                  |     |
| Working part-time              | 46 (4)          | 34 (5)               | 12 (2)           |     | 42 (3)         | 30 (10)        | 1 (<1)               | 11 (2)                 |     |
| Homemaker                      | 129 (10)        | 61 (10)              | 68 (10)          |     | 116 (10)       | 21 (7)         | 21 (9)               | 74 (11)                |     |
| Student                        | 4 (0.3)         | 3 (0.5)              | 1 (0.1)          | 0.0007 | 4 (<1)        | 2 (1)          | 1 (<1)               | 1 (<1)                 |     |
| Retired                        | 1014 (76)       | 480 (75)             | 534 (78)         |     | 934 (76)       | 190 (63)       | 199 (82)             | 545 (80)               |     |
| Unemployed                     | 81 (6)          | 32 (5)               | 49 (7)           |     | 76 (6)         | 14 (5)         | 22 (9)               | 40 (6)                 |     |
| **Current hospital status, n (%)** |               |                      |                  |     |                 |                 |                      |                        |     |
| n                              | 1305            | 639                  | 666              | 0.0007 | 1,207        | 298            | 234                  | 675                    | <0.0001 |
| Outpatient                     | 1226 (94)       | 615 (96)             | 611 (92)         |     | 1133 (94)      | 286 (96)       | 195 (83)             | 652 (97)               |     |
| Inpatient                      | 79 (6)          | 24 (4)               | 55 (8)           |     | 74 (6)         | 12 (4)         | 39 (17)              | 23 (3)                 |     |
| **Home circumstances, n (%)**  |                 |                      |                  |     |                 |                 |                      |                        |     |
| n                              | 1338            | 650                  | 688              |     | 1,236           | 302            | 247                  | 687                    |     |
| Lives with spouse/partner      | 770 (58)        | 410 (63)             | 360 (52)         |     | 713 (58)       | 210 (70)       | 37 (15)              | 466 (68)               |     |
| Lives with other family        | 284 (21)        | 115 (18)             | 169 (25)         | <0.0001 | 254 (21)  | 25 (8)        | 23 (9)               | 206 (30)               |     |
| Lives alone                    | 102 (8)         | 70 (11)              | 32 (5)           |     | 96 (8)         | 59 (20)        | 36 (15)              | 1 (<1)                 |     |
| Nursing home                   | 121 (9)         | 30 (5)               | 91 (13)          |     | 117 (10)       | 0 (0)          | 116 (47)             | 1 (<1)                 |     |
| Sheltered housing              | 31 (2)          | 10 (2)               | 21 (3)           |     | 28 (2)         | 5 (2)          | 18 (7)               | 5 (1)                  |     |
| Lives with friends             | 9 (1)           | 3 (0.5)              | 6 (1)            |     | 8 (1)          | 2 (1)          | 2 (1)                | 4 (1)                  |     |
| Reason for living in a nursing home, n (%) | Total (n=1,349) | Non-agitated (n=656) | Agitated (n=693) | p  | Total (n=1,244) | No Care (n=305) | Remote Care (n=248) | Proximate Care (n=691) | p   |
|-------------------------------------------|-----------------|----------------------|------------------|----|-----------------|-----------------|--------------------|-----------------------|-----|
| Other                                     | 21 (2)          | 12 (2)               | 9 (1)            |    | 20 (2)          | 1 (<1)          | 15 (6)             | 4 (1)                 |    |
| Dementia                                  | 120 (91)        | 29 (23)              | 91 (74)          | 0.0232 | 116 (91)        | 0 (0)           | 115 (91)           | 1 (100)               | 0.1379 |
| Other                                     | 16 (13)         | 8 (28)               | 8 (9)            |    | 16 (14)         | 0 (0)           | 15 (13)            | 1 (100)               |    |
| Current diagnosis, n (%)                  |                |                      |                  |    |                 |                 |                    |                       |     |
| n                                         | 1,205 (91)      | 585 (48)             | 620 (51)         |    | 1,115 (89)      | 269 (22)        | 228 (18)           | 618 (51)              |     |
| MCI                                       | 237 (20)        | 154 (26)             | 83 (13)          |    | 220 (20)        | 135 (50)        | 18 (8)             | 67 (11)               |     |
| Amnestic MCI                              | 13 (1)          | 12 (2)               | 1 (0.2)          |    | 12 (1)          | 9 (3)           | 1 (<1)             | 2 (<1)                |     |
| Pre-dementia AD                           | 84 (7)          | 43 (7)               | 41 (7)           |    | 77 (7)          | 20 (7)          | 10 (4)             | 47 (8)                |     |
| Prodromal AD                              | 49 (4)          | 28 (5)               | 21 (3)           | <0.0001 | 43 (4)       | 14 (5)          | 8 (4)              | 21 (3)                |     |
| AD                                        | 649 (54)        | 271 (46)             | 37 (61)          | <0.0001 | 597 (54)      | 51 (19)         | 150 (66)           | 396 (64)              | <0.0001 |
| Early onset AD                            | 106 (9)         | 54 (9)               | 52 (8)           |    | 101 (9)         | 29 (11)         | 13 (6)             | 59 (10)               |     |
| Mixed vascular dementia / AD              | 61 (5)          | 19 (3)               | 42 (7)           |    | 59 (5)          | 9 (3)           | 25 (11)            | 25 (4)                |     |
| Other                                     | 6 (1)           | 4 (1)                | 2 (0.3)          |    | 6 (1)           | 2 (1)           | 3 (1)              | 1 (<1)                |     |
| Physician-perceived dementia stage, n (%) |                |                      |                  |    |                 |                 |                    |                       |     |
| n                                         | 1,340 (91)      | 651 (48)             | 689 (51)         | <0.0001 | 1,238 (91) | 304 (22)        | 246 (18)           | 688 (51)              |     |
| MCI                                       | 250 (19)        | 177 (27)             | 73 (11)          | <0.0001 | 236 (19)      | 172 (57)        | 13 (5)             | 51 (7)                | <0.0001 |
| Mild                                      | 473 (35)        | 270 (42)             | 203 (30)         |    | 433 (35)       | 115 (38)        | 68 (28)            | 250 (36)              |     |
| Moderate                                  | 482 (36)        | 183 (28)             | 299 (43)         |    | 439 (36)       | 16 (5)          | 103 (42)           | 320 (47)              |     |
| Severe                                    | 135 (10)        | 21 (3)               | 114 (17)         |    | 130 (11)       | 1 (<1)          | 62 (25)            | 67 (10)               |     |
| Most recent MMSE score                    |                |                      |                  | <0.0001 | 1,031        | 253 (22)        | 188 (18)           | 590 (22)              | <0.0001 |
| Mean (SD)                                 | 20.5 (5.7)      | 22.0 (5.4)           | 19.2 (5.7)       | <0.0001 | 20.5 (5.8)   | 24.5 (4.4)      | 17.4 (5.9)         | 19.7 (5.4)             | <0.0001 |
| Range                                     | 0–30            | 0–30                 | 0–30             |    | 0–30           | 0–30           | 0–30               | 0–30                  |     |
| Agitation symptoms severity score         |                |                      |                  | <0.0001 | 1,244        | 305 (22)        | 248 (18)           | 691 (22)              | <0.0001 |
| Mean (SD)                                 | N/A             | 3.6 (3.1)            | 3.6 (3.1)        | <0.0001 | 1.8 (2.9)    | 0.7 (1.3)       | 3.1 (4.0)          | 1.9 (2.7)              |     |
| Range                                     | N/A             | 1–21                 | 21–60            |    | 0–21           | 0–6            | 0–21               | 0–20                  |     |

AD, Alzheimer’s disease; IPA, International Psychogeriatric Association; MCI, Mild cognitive impairment; MMSE, Mini Mental State Examination; SD, standard deviation
### Supplementary Table 3. Summary of all findings

| Outcome                        | Assessed by                      | Regression analysis of agitation severity score versus outcome |
|--------------------------------|----------------------------------|---------------------------------------------------------------|
| **All caregivers**             |                                  |                                                               |
| Hours/week                     | Physician-reported caregiver time | n=701; IRR (95% CI) = 1.02 (0.98, 1.05); p=0.314             |
| Burden                         | Zarit Burden Interview           | n=191; Coef (95% CI) = 0.12 (0.01, 0.23); p=0.027             |
|                                | Guilt:                           | Coef (95% CI) = 0.73 (0.28, 1.19); p=0.002                   |
|                                | Role strain:                     | Coef (95% CI) = 1.04 (0.41, 1.66); p=0.001                   |
|                                | Personal strain:                 | Coef (95% CI) = 1.62 (0.67, 2.56); p=0.001                   |
|                                | Total burden:                    |                                                              |
| Health status                  | EuroQoL-5D-3L                    | Health utility index: n=203 Coef (95% CI) = -0.003 (-0.009, 0.003); p=0.294 |
|                                | VAS:                             | Coef (95% CI) = -0.036 (-1.09, 0.27); p=0.259                 |
| Productivity                   | Work Productivity and Activity    |                                                              |
|                                | Impairment questionnaire         | Absenteeism: n=60; Coef (95% CI) = -0.88 (-2.80, 1.03); p=0.358 |
|                                | Presenteeism:                    | Coef (95% CI) = 2.52 (0.76, 4.29); p=0.006                   |
|                                | Overall work impairment:         | Coef (95% CI) = 2.05 (0.06, 4.04); p=0.043                   |
|                                | Total activity impairment:       | Coef (95% CI) = 3.14 (1.97, 4.30); p<0.001                   |
| **Proximate caregivers**       |                                  |                                                               |
| Hours/week                     | Physician-reported caregiver time | n=523; IRR (95% CI) = 1.05 (1.02, 1.08); p=0.001             |
| Burden                         | Zarit Burden Interview           | n=152; Coef (95% CI) = 0.057 (-0.028, 0.141); p=0.186        |
|                                | Guilt:                           | Coef (95% CI) = 0.87 (0.40, 1.33); p=0.001                   |
|                                | Role strain:                     | Coef (95% CI) = 1.15 (0.48, 1.83); p=0.001                   |
|                                | Personal strain:                 | Coef (95% CI) = 1.76 (0.73, 2.78); p=0.001                   |
|                                | Total burden:                    |                                                              |
| Health status                  | EuroQoL-5D-3L                    | Health utility index: n=160 Coef (95% CI) = -0.004 (-0.012, 0.003); p=0.262 |
|                                | VAS:                             | Coef (95% CI) = -0.550 (-1.354, 0.254); p=0.178              |
| Productivity                   | Work Productivity and Activity    |                                                              |
|                                | Impairment questionnaire         | Absenteeism: n=33; Coef (95% CI) = -0.58 (-2.84, 1.69); p=0.607 |
|                                | Presenteeism:                    | Coef (95% CI) = 2.77 (0.49, 5.04); p=0.019                   |
|                                | Overall work impairment:         | Coef (95% CI) = 2.38 (-0.18, 4.93); p=0.067                  |
|                                | Total activity impairment:       | Coef (95% CI) = 3.33 (2.00, 4.65); p<0.001                  |
| **Remote caregivers**          |                                  |                                                               |
| Hours/week                     | Physician-reported caregiver time | n=178; IRR (95% CI) = 1.03 (0.92, 1.16); p=0.609             |
| Outcome         | Assessed by                              | Regression analysis of agitation severity score versus outcome                                      |
|-----------------|------------------------------------------|--------------------------------------------------------------------------------------------------|
| Burden          | Zarit Burden Interview                   | Guilt: n=39; Coef (95% CI) = 0.57 (0.31, 0.82); p=0.001                                           |
|                 |                                          | Role strain: n=39; Coef (95% CI) = -0.03 (-1.50, 1.44); p=0.970                                      |
|                 |                                          | Personal strain: n=39; Coef (95% CI) = 0.37 (-1.38, 2.12); p=0.671                                 |
|                 |                                          | Total burden: n=39; Coef (95% CI) = 0.96 (-1.86, 3.78); p=0.493                                     |
| Health status   | EuroQoL-5D-3L                            | Health utility index: n=43 Coef (95% CI) = -0.006 (-0.017, 0.004); p=0.232                         |
|                 |                                          | VAS: n=43 Coef (95% CI) = 0.102 (-1.212, 1.416); p=0.876                                         |
| Productivity    | Work Productivity and Activity Impairment questionnaire | Absenteeism: n=27; Coef (95% CI) = -3.32 (-8.95, 2.32); p=0.235                                 |
|                 |                                          | Presenteeism: n=28; Coef (95% CI) = 1.76 (-1.55, 5.07); p=0.284                                   |
|                 |                                          | Overall work impairment: n=26; Coef (95% CI) = 1.10 (-3.00, 5.21); p=0.583                        |
|                 |                                          | Total activity impairment: n=43; Coef (95% CI) = 2.27 (-0.13, 4.66); p=0.063                    |

All regressions were controlled for patient demographics (age and sex) and clinical characteristics (time since diagnosis, current MMSE score). Coef, coefficient; CI, confidence interval; IRR, incidence rate ratio; MMSE, Mini-Mental State Examination; VAS, visual analog scale; ZBI, Zarit Burden Interview
Supplementary Figure 1. Hours/week non-professional caregiving by agitation severity score – all patients

All regressions were controlled for patient demographics (age and sex) and clinical characteristics (time since diagnosis, current MMSE score). CI, confidence interval; IRR, incidence rate ratio; MMSE, Mini-Mental State Examination
Supplementary Figure 2. Caregiver burden by agitation score – all patients: (a) Total burden; (b) Personal strain; (c) Role strain; (d) Guilt

All regressions were controlled for patient demographics (age and sex) and clinical characteristics (time since diagnosis, current MMSE score). Coef, coefficient; CI, confidence interval; MMSE, Mini Mental State Examination; ZBI, Zarit Burden Interview
Supplementary Figure 3. EQ-5D-3L-assessed caregiver health status by agitation score – all patients: (a) Health utility index; (b) VAS score

All regressions were controlled for patient demographics (age and sex) and clinical characteristics (time since diagnosis, current MMSE score). CI, confidence interval; EQ-5D-3L, EuroQoL-5D-3L; MMSE, Mini Mental State Examination; VAS, visual analog scale
Supplementary Figure 4. WPAI-assessed productivity and activity by agitation score – all patients: (a) Absenteeism; (b) Presenteeism; (c) Overall work impairment; (d) Total activity impairment

All regressions were controlled for patient demographics (age and sex) and clinical characteristics (time since diagnosis, current MMSE score). CI, confidence interval; MMSE, Mini Mental State Examination; WPAI, Work Productivity and Activity Index
Supplementary Figure 5. Hours/week non-professional caregiving by agitation severity score and type of care

Remote Care, caregiver not living with patient; Proximate Care, caregiver living with patient
All regressions were controlled for patient demographics (age and sex) and clinical characteristics (time since diagnosis, current MMSE score). CI, confidence interval; IRR, incidence rate ratio; MMSE, Mini-Mental State Examination
Supplementary Figure 6. Caregiver burden by agitation score and type of care: (a) Total burden; (b) Personal strain; (c) Role strain; (d) Guilt

Remote Care, caregiver not living with patient; Proximate Care, caregiver living with patient
All regressions were controlled for patient demographics (age and sex) and clinical characteristics (time since diagnosis, current MMSE score). Coef, coefficient; CI, confidence interval; MMSE, Mini Mental State Examination; ZBI, Zarit Burden Interview
Supplementary Figure 7. EQ-5D-3L-assessed caregiver health status by agitation score and type of care (a) Health utility index (b) VAS score

Remote Care = caregiver not living with patient; Proximate Care = caregiver living with patient
All regressions were controlled for patient demographics (age and sex) and clinical characteristics (time since diagnosis, current MMSE score)
CI, confidence interval; EQ-5D-3L, EuroQoL-5D-3L; MMSE, Mini Mental State Examination; VAS, visual analog scale
Supplementary Figure 8. WPAI-assessed productivity and activity by agitation score and type of care: (a) Absenteeism; (b) Presenteeism; (c) Overall work impairment; (d) Total activity impairment

Remote Care, caregiver not living with patient; Proximate Care, caregiver living with patient
All regressions were controlled for patient demographics (age and sex) and clinical characteristics (time since diagnosis, current MMSE score).
CI, confidence interval; MMSE, Mini-Mental State Examination; WPAI, Work Productivity and Activity Index