


RESEARCH ARTICLE

Utilization of occupational therapy services and relation to survival in people taking dementia-specific medication in Austria—A retrospective population-based study with a 13-year observation period

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Abstract

Objectives: Evidence-based treatment of dementia includes pharmacological and non-pharmacological methods of which psycho-social interventions are an important component, commonly administered by occupational therapists. The aim of this study was to investigate the utilization of occupational therapy (OT) services and its association with survival in people taking dementia-specific medication in a population-based Austrian dataset compared to a two times as large control group without dementia-specific medication.

Methods/Design: A retrospective study with a 13-year observation period (2003–2016) was conducted on real-world data. Two stratifications were done and we used descriptive statistics, Chi-squared/Fisher's Exact Tests and survival analyses including three Cox models.

Results: Data from 286,553 participants were analysed. Only 4.5% ($n = 12,950$) received OT services. In the dementia-medication group ($n = 111,033$), participants who received OT services (3.6%; $n = 4032$) had significantly more comorbidities (4.7%) compared to those without OT (3.5%; $p < 0.001$) and were also more likely to be male (4 vs. 3.5%; $p < 0.001$). While persons taking dementia-specific medication showed a slightly reduced survival with OT ($p < 0.001$) compared to those without, the result in the control group without dementia-specific medication showed a slightly better result of the participants who received OT ($p < 0.001$). The reduced survival in the dementia-medication group with OT is likely to be related to the higher number of comorbidities in this group.

Conclusion: People receiving dementia-specific medication were more likely to receive OT if they had additional comorbidities, however our analysis showed that

utilization of OT services in Austria was very low indicating an overall insufficient accessibility of OT services for patients who needed it.

KEYWORDS

Austrian population-based data, dementia-specific medication, occupational therapy, retrospective study, survival analysis

Key points

- This study presents the first population-based data on the utilization of OT services in people taking dementia-specific medication across all Austrian federal states with regard to age, sex, medication use and comorbidities.
- In a 13-year observation period only 3.6% ($n = 4032$) of all people taking dementia-specific medication received occupational therapy (OT) services paid or reimbursed from the social insurance companies.
- Participants taking dementia-specific medication were more likely to receive OT services, if they had comorbidities and were men.

1 | INTRODUCTION

Dementia affects approximately 50 million people worldwide and is the seventh leading cause of death.¹ The most common form, contributing to 60%–70% of cases, is Alzheimer's disease.² Dementia is a serious and growing public health problem with almost ten million new cases are diagnosed annually.¹ Since incidence and prevalence increase with age, it is expected that the number of people affected by dementia worldwide will rise to 74.7 million by 2030 and to 131.5 million people by 2050.^{3,4} In 2018 there were more than 146,000 people living with dementia in Austria, representing 1.66% of the total population,⁵ and that number is anticipated to more than double by 2050.^{6,7} Moreover, dementia has a destructive impact on the daily life of not only the affected person, but also their families, caregivers and society at large. The global costs of dementia have increased substantially,⁸ requiring urgent action from governments, policy makers and authorities, as well as health care and services providers.⁹ According to the Austrian Alzheimer Association, yearly costs for the care of people with dementia are approximately one billion euros.^{7,10}

Evidence-based treatment of dementia includes pharmacological and non-pharmacological methods.^{3,8,9,11} Several consensus statements recommend non-pharmacological methods as the initial treatment for people with dementia.^{12,13} An important component of non-pharmacological treatment are psycho-social interventions,¹⁴ which are commonly administered by occupational therapists.^{3,15} National¹⁶ and international guidelines¹¹ for people with dementia as well as various studies,^{17–30} stress the importance of receiving occupational therapy (OT) services in order to reinforce functional ability and increase quality of life of people with dementia and also to reduce caregivers' burden. A systematic review of the most frequently reported benefits of OT interventions for people living with dementia listed reductions in agitation, passivity and depression, increase in wellbeing and interest in the environment as well as

improved quality of life.³¹ OT interventions differ across the stages of dementia and are based on individual's life-history, interests and preferences.³²

In the early stages of dementia, in order to promote participation in activities of everyday living (ADLs), some of the interventions include setting up the physical environment (such as installing visual cues for daily routine schedules, calendars, medication and appointment reminders) as well as maintaining relationship and social participation. In the middle stages of dementia, facilitating engagement and enhancing function in ADLs is paramount. Retraining basic ADLs (such as self-feeding, dressing, toileting, taking a shower and other) through demonstration, physical-, verbal- and visual guidance, at the same time and place and through the same sequence is critical in order to increase memory retention.³² In the late stages, people with dementia will have difficulties performing basic ADLs such as feeding, drinking, dressing, washing, brushing teeth along with other activities. Thus, the focus will be on educating caregivers on proper body positioning of people with dementia and avoiding contractures, skin protection, increasing comfort and providing enjoyable sensory stimulation. Providing support groups for family members and caregivers is also crucial.³² People with early- or mild stage of dementia could benefit even more from OT interventions to potentially delay and/or prolong functional decline.^{33,34}

While OT interventions were found to show effects in clinical studies, there is a lack of observational, real world data on a national level that could show how many people with dementia need and/or receive non-pharmacological interventions such as OT. Information such as regional or socio-economic differences could show areas where underutilization exist and thus provide important insights for future health care planning. Such population-based datasets could provide information whether OT is equally implemented in daily routine health care and accessible to all people with dementia, or if specific characteristics such as presence of comorbidities, age, sex or other influence participation in OT.

The purpose of this study was to investigate the utilization of OT services in a population-based Austrian dataset of all people taking dementia-specific medication in relation to age, sex, comorbidities and region of residence. We compared people in the dementia medication group to a control group of older adults without dementia-specific medication. We also explored the overall survival of participants taking dementia-specific medications in relation to whether they received OT services or not. We used OT services as an indicator for psychosocial interventions because OT services are commonly prescribed and also reimbursed by Austrian health insurances, thus population-based data are available.

2 | MATERIALS AND METHODS

2.1 | Design

A retrospective cohort study with a 13-year observation period from 2003 to 2016 was conducted on real world data of the Austrian health insurance funds covering 98% of all insured Austrians.

2.2 | Participants

Two stratifications were done. First, we extracted population-based health services data from persons who had received dementia-specific medication including donepezil, rivastigmine, galantamine and memantine at least once between 2003 and 2016. In addition, we obtained data from an age-stratified twice as large control group without dementia-specific medication. In a second stratification we divided the participants into a group who received OT services at least once in the observation period (starting from January 2009 until July 2016) and another group without. Since our main aim was to investigate the utilization of OT services in a population-based Austrian dataset of all people taking dementia-specific medication, we analysed sociodemographic characteristics (sex, age, date of birth/death), a set of comorbidities (non-traumatic subarachnoid, intracerebral and other cranial haemorrhage; cerebral infarction and sequelae of cerebrovascular disease; fracture of the femur), other relevant pharmacological treatment (ginkgo, antipsychotic drugs, antidepressants and Parkinson's disease medication) and the use of OT services per quarter as represented by OT appointments reimbursed by social insurance companies. Comorbidities were extracted from hospital discharge diagnoses and by using medications as surrogate parameters, where appropriate. As no dementia-specific, clinician-reported data were available in population-based health services in Austria, we considered participants taking memantine according to treatment guidelines^{11,16,35} to be more likely to have more severe cognitive decline. The study was approved by the ethical committee of the Medical University of Vienna (EK 2029/2016).

2.3 | Statistical analysis

Descriptive statistics were calculated for persons with and without dementia-specific medication regarding age, sex, comorbidities and region of residence. We used histograms and Kolmogorov-Smirnov tests to determine data distribution. Measures for central tendency and dispersion, as well as absolute and relative frequencies were reported where appropriate. We applied non-parametric methods to non-normally distributed data. Differences in frequency of categorical variables were determined by the Chi²-test for independence together with the Fisher's Exact Test and Bonferroni correction, which was calculated using categorical, dichotomized and continuous variables where appropriate. The Chi²- and Fisher's Exact Test were employed for comparing sex, age groups, different comorbidities, co-medications and people from various Austrian regions. Since we did multiple analysis on the same dependent variable (OT: yes/no), we applied Bonferroni corrections for those covariates in order to avoid type I error. Kaplan-Meier (KM) estimates for survival time were fitted separately for persons who received OT and those who did not and tested for statistically significant differences with the Log-Rank test.³⁶ In order to estimate hazard ratios for risk of death, we used Cox proportional hazards regression model.³⁷ Three Cox proportional ratio models were done with the main outcome variable being dichotomized OT attendance (yes/no). The full model was adjusted for sex, comorbidities and medications as these parameters were likely to have a significant effect on death in our dataset. Hazard ratios with 95% confidence intervals were calculated. All *p*-values below 0.05 were considered statistically significant. The statistical analyses were performed using R (<https://www.r-project.org/>) and SPSS 26.0 statistical software.

3 | RESULTS

3.1 | Participant characteristics

We identified 111,033 participants who received dementia-specific medication at least once in the observation period and 175,520 age-matched controls (286,553 persons in total). Because of the high prevalence of dementia in very old age groups, the two times as large control group was not available for all birth cohorts. Women were represented at a higher rate (61.5%; *n* = 176,215) as compared to men (Table 1). In the group with dementia-specific medication, the most frequent comorbidity was fracture of the femur with 6.5% (*n* = 7167) as well as cerebral infarction and sequelae of cerebrovascular disease with 4.5% (*n* = 4957), whereas in the control group, the majority had cerebral infarction and sequelae of cerebrovascular disease with 3.8% (*n* = 6725). In the sub-group of the participants who received OT services and dementia-specific medication (either donepezil, rivastigmine, galantamine and/or memantine), the majority were between 75 and 84 years of age (48%; *n* = 1935).

TABLE 1 Sociodemographic characteristics of the study population stratified by those who received and did not receive occupational therapy (OT) services

| Variables | Total N = 286,553 | Attended OT n = 12,950 | Did not attend OT n = 273,603 | p |
|----------------------------------|----------------------|------------------------|-------------------------------|--------|
| Age: | | | | <0.001 |
| Range; mean years (SD) | 30–105; 79.82 (7.17) | 30–102; 79.09 (7.04) | 30–105; 79.86 (7.17) | |
| | | | | <0.001 |
| 30%–64 % (n) | 3.5 (10,131) | 4.8 (489) | 95.2 (9642) | |
| 65%–74 % (n) | 14.5 (41,659) | 5.1 (2121) | 94.9 (39,538) | |
| 75%–84 % (n) | 55.6 (159,357) | 4.7 (7525) | 95.3 (151,832) | |
| ≥85 % (n) | 26.3 (75,406) | 3.7 (2815) | 96.3 (72,591) | |
| Sex: | | | | 0.432 |
| Female % (n) | 61.5 (176,215) | 4.5 (7921) | 95.5 (168,294) | |
| Male % (n) | 38.5 (110,338) | 4.6 (5029) | 95.4 (105,309) | |
| Comorbidities ^a : | | | | <0.001 |
| No comorbidity % (n) | 90.8 (260,317) | 4.3 (11,310) | 95.7 (249,007) | |
| One comorbidity % (n) | 8.7 (25,021) | 6.2 (1554) | 93.8 (23,467) | |
| Two or more comorbidities % (n) | 0.4 (1215) | 7.1 (86) | 92.9 (1129) | |
| Medication ^b : | | | | <0.001 |
| No medication % (n) | 60.5 (173,248) | 5.1 (8887) | 94.9 (164,361) | |
| One medication % (n) | 5.2 (14,921) | 2.2 (329) | 97.8 (15,592) | |
| Two or more medications % (n) | 34.3 (98,386) | 3.8 (3734) | 96.2 (94,650) | |
| Austrian regions: | | | | <0.001 |
| Vienna % (n) | 19 (54,352) | 1 (526) | 99 (53,826) | |
| Lower Austria % (n) | 15.9 (45,689) | 1.4 (660) | 98.6 (45,029) | |
| Burgenland % (n) | 5.2 (15,006) | 0.2 (29) | 99.8 (14,977) | |
| Upper Austria % (n) | 11.7 (33,408) | 0.2 (61) | 99.8 (33,347) | |
| Styria % (n) | 12.7 (36,260) | 28.9 (10,486) | 71.1 (25,774) | |
| Carinthia % (n) | 5.1 (14,729) | 0.1 (20) | 99.9 (14,709) | |
| Salzburg % (n) | 3.3 (9524) | 4.2 (403) | 95.8 (9121) | |
| Tyrol % (n) | 5.7 (16,434) | 1.9 (318) | 98.1 (16,116) | |
| Vorarlberg % (n) | 1.2 (3477) | 0 | 100 (3477) | |
| Over regional ^c % (n) | 20.1 (57,674) | 0.8 (447) | 99.2 (57,227) | |
| Died within observation period | | | | <0.001 |
| % (n) | 26.4 (75,660) | 3.4 (2579) | 96.6 (73,081) | |

Abbreviation: SD, standard deviation.

Note: p-values from the Chi-Square test of independence

^aComorbidities include ¹ non-traumatic subarachnoid, intracerebral and other cranial haemorrhage, ² cerebral infarction and sequelae of cerebrovascular disease and ³ fracture of the femur.

^bMedication include ¹: dementia specific medication (memantine, donepezil, rivastigmine, galantamine) and ² not-dementia-specific medication (ginkgo, antipsychotic drugs, antidepressants and Parkinson disease medication).

^cOver regional includes four social-insurance companies that cover more than one Austrian region.

Incidence of OT services in relation to comorbidities, gender and place of residence.

Only 4.5% ($n = 12,950$) of all participants received OT services during the observational period (Table 1). In the dementia medication group, 3.6% ($n = 4032$) participants attended OT and had significantly more coexisting conditions (4.7%) compared to those without

comorbidities (3.5%; $p < 0.001$) and were also more likely to be male (4%) versus female (3.5%; $p < 0.001$). Additional information is presented in Table 2.

Regarding the frequency of OT across different Austrian regions, the federal state of Styria had the highest number of participants who attended OT (28.9%; $n = 10,486$), while in

TABLE 2 Sociodemographic characteristics of the study population with and without dementia-specific medication, stratified by those who received and did not receive occupational therapy (OT) services

| Variables | People taking dementia-specific medication | | | <i>p</i> | People not taking dementia-specific medication | | | <i>p</i> |
|--|--|-------------------------|---------------------------------|----------|--|-------------------------|----------------------------------|----------|
| | Total N = 111,033 | Attended OT n = 4032 | Did not attend OTN = 107,001 | | Total N = 175,520 | Attended OT n = 8918 | Did not attend OT n = 166,602 | |
| Age: | | | | <0.001 | | | | 0.001 |
| All sample range; mean years (SD) | 30–105; 81.24 (7.55) | 30–102; 79.76 (7.95) | 30–105; 81.30 (7.53) | | 31–86; 78.92 (6.76) | 32–86; 78.79 (6.57) | 31–86; 78.93 (6.77) | |
| | | | | <0.001 | | | | 0.019 |
| 30%–64 % <i>(n)</i> | 2.7 (3031) | 4.1 (166) | 94.5 (2865) | | 4 (7100) | 3.6 (323) | 95.5 (6777) | |
| 65%–74 % <i>(n)</i> | 14.2 (15,793) | 4.7 (739) | 95.3 (15,054) | | 14.7 (25,866) | 5.3 (1382) | 94.7 (24,484) | |
| 75%–84 % <i>(n)</i> | 46.8 (51,934) | 3.7 (1935) | 96.3 (49,999) | | 61.2 (107,423) | 5.2 (5590) | 94.8 (101,833) | |
| ≥85 % <i>(n)</i> | 36.3 (40,275) | 3 (1192) | 97 (39,083) | | 20 (35,131) | 4.6 (1623) | 95.4 (33,508) | |
| Sex: | | | | <0.001 | | | | 0.001 |
| Female % <i>(n)</i> | 65.3 (72,535) | 3.5 (2506) | 96.5 (70,029) | | 59.1 (103,680) | 5.2 (5415) | 94.8 (98,265) | |
| Male % <i>(n)</i> | 34.7 (38,498) | 4 (1526) | 96 (36,972) | | 40.9 (71,840) | 4.9 (3503) | 95.1 (68,337) | |
| Comorbidities: | | | | <0.001 | | | | <0.001 |
| Have one or more comorbidity % <i>(n)</i> | 12.2 (13,536) | 4.7 (634) | 95.3 (12,902) | | 7.2 (12,700) | 7.9 (1006) | 92.1 (11,694) | |
| No comorbidity % <i>(n)</i> | 87.8 (97,497) | 3.5 (3398) | 96.5 (94,099) | | 92.8 (162,820) | 4.9 (7912) | 95.1 (154,908) | |
| Medication: | | | | <0.001 | | | | <0.001 |
| Only memantine ^a % <i>(n)</i> | 18.3 (20,288) | 3.1 (628) | 96.9 (19,660) | | 0 | 0 | 0 | |
| Memantine and other ^b medication % <i>(n)</i> | 15.2 (16,910) | 4.1 (697) | 95.9 (16,213) | | 0 | 0 | 0 | |
| No memantine ^c % <i>(n)</i> | 66.5 (73,835) | 3.7 (2707) | 96.3 (71,128) | | 0 | 0 | 0 | |
| Only Parkinson disease medicine % <i>(n)</i> | 0 | 0 | 0 | | 0.2 (278) | 1.4 (4) | 98.6 (274) | |
| Only antidepressants % <i>(n)</i> | 0 | 0 | 0 | | 1.1 (1846) | 1.4 (26) | 98.6 (1820) | |
| Both medications ^d % <i>(n)</i> | 0 | 0 | 0 | | 0.1 (148) | 0.7 (1) | 99.3 (147) | |
| No medication % <i>(n)</i> | 0 | 0 | 0 | | 98.7 (173,248) | 5.1 (8887) | 94.9 (164,361) | |
| Austrian regions: | | | | <0.001 | | | | <0.001 |
| Vienna % <i>(n)</i> | 18.7 (20,734) | 1.4 (300) | 98.6 (20,434) | | 19.2 (33,618) | 0.7 (226) | 99.3 (33,392) | |
| Lower Austria % <i>(n)</i> | 13.5 (14,971) | 1.3 (196) | 98.7 (14,775) | | 17.5 (30,718) | 1.5 (464) | 98.5 (30,254) | |
| Burgenland % <i>(n)</i> | 4.7 (5178) | 0.2 (9) | 99.8 (5169) | | 5.6 (9828) | 0.2 (20) | 99.8 (9808) | |
| Upper Austria % <i>(n)</i> | 10.1 (11,208) | 0.1 (1) | 99.9 (11,207) | | 12.6 (22,200) | 0.3 (60) | 99.7 (22,140) | |
| Styria % <i>(n)</i> | 11.5 (12,778) | 24.5 (3135) | 75.5 (9643) | | 13.4 (23,482) | 31.3 (7351) | 68.7 (16,131) | |
| Carinthia % <i>(n)</i> | 4.7 (5255) | 0.2 (10) | 99.8 (5245) | | 5.4 (9474) | 0.1 (10) | 99.9 (9464) | |
| Salzburg % <i>(n)</i> | 3 (3368) | 2.2 (74) | 97.8 (3294) | | 3.5 (6156) | 5.3 (329) | 94.7 (5827) | |
| Tyrol % <i>(n)</i> | 5.1 (5631) | 1.3 (73) | 98.7 (5558) | | 6.2 (10,803) | 2.3 (245) | 97.7 (10,558) | |
| Vorarlberg % <i>(n)</i> | 0.9 (996) | 0 | 100 (996) | | 1.4 (2481) | 0 | 100 (2481) | |

(Continues)

TABLE 2 (Continued)

| Variables | People taking dementia-specific medication | | | | People not taking dementia-specific medication | | | |
|--------------------------------|--|-------------------------|---------------------------------|--------|--|-------------------------|----------------------------------|--------|
| | Total N = 111,033 | Attended OT n = 4032 | Did not attend OTN = 107,001 | p | Total N = 175,520 | Attended OT n = 8918 | Did not attend OT n = 166,602 | p |
| Over regional %(n) | 27.8 (30,914) | 0.8 (234) | 99.2 (30,680) | | 15.2 (26,760) | 0.8 (213) | 99.2 (26,547) | |
| Died within observation period | | | | <0.001 | | | | <0.001 |
| %(n) | 42 (46,686) | 3.3 (1552) | 96.7 (45,134) | | 16.5 (28,974) | 3.5 (1027) | 96.5 (27,947) | |

Abbreviation: SD, standard deviation.

Note: *p*-values from the Chi-Square test of independence.

^aParticipants took only memantine medication.

^bParticipants took memantine and at least one other dementia specific medication (donepezil, rivastigmine, galantamine) and/or not-dementia-specific medication (ginkgo, antipsychotic drugs, antidepressants or Parkinson disease medication).

^cParticipants did not take memantine medicine, but they took at least one dementia-specific medication (donepezil, rivastigmine, galantamine) and/or at least one not-dementia-specific medication (ginkgo, antipsychotic drugs, antidepressants or Parkinson disease medication).

^dParticipants took both—Parkinson disease medicine and antidepressants.

TABLE 3 Crude and adjusted hazard ratio models stratified by those who received and did not receive occupational therapy services

| | Cases %(n) | Crude HR (95% CI) | Model 1 HR (95% CI) | Model 2 HR (95% CI) | Model 3 HR (95% CI) |
|---|---------------|-------------------|---------------------|---------------------|---------------------|
| People taking dementia-specific medication | | | | | |
| Occupational therapy | No | 96.4 (107,001) | 1 [Reference] | 1 [Reference] | 1 [Reference] |
| | Yes | 3.6 (4032) | 1.14 (1.08–1.20) | 1.12 (1.07–1.18) | 1.12 (1.06–1.18) |
| People not taking dementia-specific medication | | | | | |
| Occupational therapy | No | 94.9 (166,602) | 1 [Reference] | 1 [Reference] | 1 [Reference] |
| | Yes | 5.1 (8918) | 0.73 (0.68–0.78) | 0.73 (0.69–0.78) | 0.72 (0.68–0.77) |

Note: Model 1: Adjusted for sex Model 2: Adjusted for sex + comorbidities (non-traumatic subarachnoid, intracerebral and other cranial haemorrhage, cerebral infarction and sequelae of cerebrovascular disease and fracture of the femur) Model 3: Adjusted for all factors from Model 1 and Model 2 + medication (memantine, antidepressants and Parkinson disease medicine).

Abbreviations: CI, confidence intervals; HR, hazard ratio.

Vorarlberg, no instances of OT services were recorded (Table 1). In the dementia-medication group, without Styria and Vorarlberg which were likely to be 'outliers' for different reasons, Salzburg had the highest frequency of individuals who received OT (2.2%), whereas Upper Austria showed the lowest percentage (0.1%, Table 2).

3.2 | Survival

Participants who received OT interventions were more likely to die at an earlier age than people without OT (Log-Rank Test; $p < 0.001$). Moreover, the majority of people who died while attending OT were 65 years old or older (98%; $n = 1521$; $p < 0.001$). The mean survival age for those who received OT services and who were taking dementia-specific medication was 86.35 (SD: 0.15) versus 87.19 (SD: 0.27) years for those without OT. As shown in Table 3, the crude and all adjusted hazard models showed significantly higher risk of death in people who received OT services in all models, with 1.12 times

higher chances to die in the full model after adjusting for sex, all comorbidities and memantine use.

In the control group without dementia-specific medication, participants who received OT interventions were likely to live longer than people without OT (Log-Rank Test; $p < 0.001$). The mean survival age was 85.12 (SD: 0.30) for those who attended OT versus 84.79 (SD: 0.08) years for those without OT. The crude and adjusted hazard ratio models (Table 3) indicated that those participants who received OT services had 28% less chances to die in the full model which was adjusted for sex, all comorbidities, antidepressants and Parkinson disease medication.

4 | DISCUSSION

This is the first study to explore the utilization of OT services in population-based data of people taking dementia-specific medication in Austria in relation to age, sex, a set of selected comorbidities and region of residence. Our results showed that only 3.6% of

participants taking dementia-specific medication received OT services in Austria. This proportion is surprisingly low, as national¹⁶ and international guidelines¹¹ together with numerous reports and studies^{17–34} emphasize the importance of receiving non-pharmacological bio-psycho-social interventions, including OT services, in order to promote optimal functioning for people with dementia, their families and care providers. The reasons for not receiving OT services cannot be clearly interpreted from this dataset analysis, however they are most likely multifactorial. One reason for the low level of OT services for people taking dementia-specific medication could be that there is a substantial reduction of occupational therapists in the long-term care geriatric institutions in Austria. Moreover, the fact that OT services are not fully covered by insurance companies for people with dementia compels end-users to rely on private funding for OT treatment.

Our analysis showed that the majority of OT services were recorded in the federal state of Styria. One potential reason for this very high frequency of OT treatment in Styria could be that the local insurance companies in that federal state provide and reimburse the costs for OT treatment more than in other parts of Austria. Another reason may be that a larger percentage of occupational therapists working in Styria are specialized in working with adults with dementia. Interestingly, Vorarlberg was the only federal state in Austria where no OT services were reimbursed for people who were taking both dementia/non-dementia specific medications, with or without comorbidities. Some of the reasons for that could be the relatively low number of occupational therapists working in Vorarlberg (28 officially registered in 2016)³⁸ as well as the fact that the local insurance institutions mostly work on the reimbursement basis for OT.^{38,39}

Participants who received OT services in our study and who were taking dementia-specific medication died earlier than people without OT. This could be related to the fact that OT attenders had significantly more comorbidities and were more likely to be male, as described in the results section. Without a doubt, this was a most unexpected finding and we had actually assumed the opposite would be the case. We had drawn these conclusions from existing studies reporting the positive effects of OT interventions on people with dementia.^{17–30} To explain this unexpected finding of our study, we first hypothesized that people with dementia would receive OT services later in the course of their disease and we therefore took memantine as a surrogate parameter for more severe disease. However, persons taking only memantine were less likely to receive OT service compared to people taking other dementia-specific medication, which actually showed that people with more severe disease might even receive fewer OT services than people in the earlier disease course. We then explored the frequencies of comorbidities. As participants with more comorbidities were more likely to receive OT services, this might be an explanation for the reduced survival in the OT services group. It might also show that people need to have more comorbidities to receive OT services and that dementia alone might not be reason enough to prescribe/pay OT services in Austria. Moreover, in a group of those who were taking dementia-specific medication and had received OT services, the

majority of those who died were 65 years old or older (98%) and the observed differences in survival time between the groups were small (86.35 vs. 87.19 years). Participants started to die at a certain age due to the limited observation period and their 'guaranteed' survival until then. Only persons who survived up until the observation period—that is until the first prescription of dementia medication (where majority had already been at a higher age) were included in the study. Thus, survival needs to be interpreted with caution and relative to the study context as participants who died did not necessarily die because of dementia but rather due to advanced age.

Although we were not able to show the positive effects of OT on overall survival in our study, it could be that those participants who were taking dementia-specific medication and who received OT services actually lived longer than they would have without OT, regardless of the number of comorbidities and medication use. Since, at the present moment, dementia cannot be cured, it is important that people taking dementia-specific medication receive OT services as early as possible. OT interventions have been shown to promote participation in ADLs, improve social engagement and well-being, reduce psychiatric symptoms and prolong cognitive and functional decline especially in the early and mild stages of dementia.^{31–34} Given that OT interventions have proved to be beneficial for people with dementia as well as their families/caregivers, adequate diagnosis and proactive dementia-management treatment including an early start of non-pharmacological methods, especially OT, is of utmost importance.

It has also been reported in literature that people with dementia often have various comorbidities and have higher levels of polypharmacy, making dementia very rarely reported as a direct cause of death.⁹ On the other hand, when we compared the survival analysis and individual hazard ratio models of people taking and not taking dementia-specific medications, we found that those who were not taking dementia-specific medications but were attending OT had from 27%–28% reduced chances of dying. So, this might speak for the beneficial effect of OT services. Further research needs to explore these findings in greater depth.

Taken together, our findings suggest that in Austria people with dementia are more often referred to OT not due to dementia alone, but rather due to one or more comorbidities accompanying dementia. Lack of referral to OT services may unintentionally allow more rapid progression of dementia symptoms than necessary. Consequently, reshaping already existing health care non-pharmacological intervention programs for people with dementia, particularly provision of OT services at the national level, is of utmost importance. Additionally, further longitudinal studies measuring the effect of OT on people with dementia and their survival rate/prediction are needed.

4.1 | Strengths and limitations

Limitations include the higher number of women compared to men; however, this representation is in accordance with previously published studies in people with dementia as well as with the Austrian dementia report. Moreover, the subtype of dementia as well as the

frequency and type of OT services for people with dementia were not recorded, precluding any further cause-effect relationship analysis. Additionally, another significant limitation with regard to the survival analysis is that the majority of those who died while receiving OT services were 65 years old or older, where 'old age' might be the reason for dying, rather than OT itself. Furthermore, no official reports have been published on a national level about the incidence of OT services in persons taking dementia-specific medication, so reflections presented in the discussion were based on unpublished reports and websites.

One of the major strengths is that these results are reported for the first time, thus providing a first look into incidence of OT services in people taking dementia-specific medication across all Austrian federal states with regard to age, sex, medication use and comorbidities. Moreover, a large sample size allowed more precise results depicting current trends of OT services in Austria for persons taking dementia-specific medication. A lack of prior research studies on the national/international level concerning utilization of OT services and survival rate of people taking dementia-specific medication might show the importance of studies of this kind. We therefore recommend that further studies should be done in this area and build upon our findings.

5 | CONCLUSION

As the human lifespan as well as the number of people affected by dementia worldwide increase, there is a growing need for OT services in people with dementia. As shown in this paper, OT services in Austria may not be accessible to all people with dementia who need them, which is a substantial public health problem. Since the benefits of OT services for people with dementia are well known, consistent OT services should be provided to all people with any form of dementia, starting from the earliest stage of the disease. Considering a lack of data on OT services and their effect on the overall survival of people with dementia, further longitudinal studies in this area are warranted.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

Data sharing—not applicable.

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REFERENCES

- World Health Organization. *Towards a Dementia Plan: A WHO Guide* 2018. [cited 2018.06.07; Report]. Available from: http://www.who.int/mental_health/neurology/dementia/en/.
- Schaller S, Mausekopf J, Kriza C, Wahlster P, Kolominsky-Rabas PL. The main cost drivers in dementia: a systematic review. *International Journal of Geriatric Psychiatry*. 2015;30(2):111–129. <http://dx.doi.org/10.1002/gps.4198>.
- Alzheimer's Disease International. *World Alzheimer Report*; 2016. [cited 2018.20.12; Report]. Available from: <https://www.alz.co.uk/research/world-report-2016>.
- Alzheimer's Disease International. *Policy Brief for G8 Heads of Government: The Global Impact of Dementia 2013-2050*; 2013. [cited 2020.08.04; Report]. Available from: <https://www.alz.co.uk/research/G8-policy-brief>.
- Europe Alzheimer. *Dementia in Europe Yearbook 2019: Estimating the Prevalence of Dementia in Europe*; 2019. [cited 2020.08.04; Report]. Available from: <https://www.alzheimer-europe.org/Publications/Dementia-in-Europe-Yearbooks>.
- Wancata J, Kaup B, Krautgartner M. [Projections in the incidence of dementia in Austria for the years 1951 to 2050]. *Wien Klin Wochenschr*. 2001;113(5-6):172-180.
- Österreichische Alzheimer Gesellschaft. *Zahlen und Statistik*; 2019. [cited 2019.02.11; Report]. Available from: <http://www.alzheimer-gesellschaft.at/informationen/zahlen-statistik/>.
- World Alzheimer Report. *The Global Impact of Dementia - an analysis of Prevalence, Incidence, Cost and Trends*; 2015. [cited 2019.02.11; Report]. Available from: <https://www.alz.co.uk/research/WorldAlzheimerReport2015.pdf>.
- World Health Organization and Alzheimer's Disease International. *Dementia: A Public Health Priority*; 2012. [cited 2019.02.11; Report]. Available from: https://apps.who.int/iris/bitstream/handle/10665/75263/9789241564458_eng.pdf;jsessionid=B0831192B598A033B73B4FE0C8B222FB?sequence=1.
- Fröschl B, Antony K, Pertl D, Schneider P. *Nicht-medikamentöse Prävention und Therapie bei leichter und mittelschwerer Alzheimer-Demenz und gemischter Demenz*; 2015. [cited 2020.08.04; Report]. Available from: https://www.wegweiser-demenz.de/fileadmin/de.wegweiser-demenz/content.de/downloads/10_informationen_fuer_Fachkraefte/evidenzbericht_demenz_-_nicht-medikamentoes_praevention_und_therapie.pdf.
- National Institute for Health and Care Excellence. *Dementia: Assessment, Management and Support for People Living with Dementia and Their Carers*; 2018. [cited 2020.08.04; Report]. Available from: <https://www.nice.org.uk/guidance/ng97/resources/dementia-assessment-management-and-support-for-people-living-with-dementia-and-their-carers-pdf-1837760199109>.
- Lyketsos CG, Colenda CC, Beck C, et al. Position statement of the American Association for Geriatric Psychiatry regarding principles of care for patients with dementia resulting from Alzheimer disease. *Am J Geriatr Psychiatry*. 2006;14(7):561-572.
- Salzman C, Jeste DV, Meyer RE, et al. Elderly patients with dementia-related symptoms of severe agitation and aggression: consensus statement on treatment options, clinical trials methodology, and policy. *J Clin Psychiatry*. 2008;69(6):889-898.
- Ngandu T, Lehtisalo J, Solomon A, et al. A 2 year multidomain intervention of diet, exercise, cognitive training, and vascular risk monitoring versus control to prevent cognitive decline in at-risk elderly people (FINGER): a randomised controlled trial. *Lancet*. 2015;385(9984):2255-2263.
- Sacuiu SF. *Dementias*. *Handb Clin Neurol*. 2016;138:123-151.
- Höfler S, Bengough T, Winkler P, Griebler R. *Österreichischer Demenzbericht 2014*; 2015. [cited 2020.08.04; Report]. Available from: https://goeg.at/sites/goeg.at/files/2017-06/oesterreichischer_demenzbericht_2014.pdf.
- Gitlin LN, Winter L, Burke J, Chernett N, Dennis MP, Hauck WW. Tailored activities to manage neuropsychiatric behaviors in persons with dementia and reduce caregiver burden: a randomized pilot study. *Am J Geriatr Psychiatry*. 2008;16(3):229-239.

18. Graff MJ, Vernooij-Dassen MJ, Thijssen M, Dekker J, Hoefnagels WH, Rikkert MG. Community based occupational therapy for patients with dementia and their care givers: randomised controlled trial. *BMJ*. 2006;333(7580):1-6.
19. Gitlin LN, Corcoran M, Winter L, Boyce A, Hauck WW. A randomized, controlled trial of a home environmental intervention: effect on efficacy and upset in caregivers and on daily function of persons with dementia. *Gerontol*. 2001;41(1):4-14.
20. Gitlin LN, Winter L, Corcoran M, Schinfeld S, Hauck WW. Effects of the home environmental skill-building program on the caregiver-care recipient dyad: 6-month outcomes from the Philadelphia REACH Initiative. *Gerontol*. 2003;43(4):532-546.
21. Gitlin LN, Winter L, Dennis MP, Hodgson N, Hauck WW. A biobehavioral home-based intervention and the well-being of patients with dementia and their caregivers: the COPE randomized trial. *J Am Med Assoc*. 2010;304(9):983-991.
22. Gitlin LN, Winter L, Dennis MP, Hodgson N, Hauck WW. Targeting and managing behavioral symptoms in individuals with dementia: a randomized trial of a nonpharmacological intervention. *J Am Geriatr Soc*. 2010;58(8):1465-1474.
23. Dooley NR, Hinojosa J. Improving quality of life for persons with Alzheimer's disease and their family caregivers: brief occupational therapy intervention. *Am J Occup Ther*. 2004;58(5):561-569.
24. Voigt-Radloff S, Graff M, Leonhart R, et al. A multicentre RCT on community occupational therapy in Alzheimer's disease: 10 sessions are not better than one consultation. *BMJ Open*. 2011;1(1):1-11.
25. Lam LC, Lee JS, Chung JC, Lau A, Woo J, Kwok TC. A randomized controlled trial to examine the effectiveness of case management model for community dwelling older persons with mild dementia in Hong Kong. *Int J Geriatr Psychiatry*. 2010;25(4):395-402.
26. Clare L, Linden DE, Woods RT, et al. Goal-oriented cognitive rehabilitation for people with early-stage Alzheimer disease: a single-blind randomized controlled trial of clinical efficacy. *Am J Geriatr Psychiatry*. 2010;18(10):928-939.
27. Callahan CM, Boustani MA, Schmid AA, et al. Targeting functional decline in Alzheimer disease: a randomized trial. *Ann Intern Med*. 2017;166(3):164-171.
28. Novelli M, Machado SCB, Lima GB, et al. Effects of the tailored activity program in Brazil (TAP-BR) for persons with dementia: a randomized pilot trial. *Alzheimer Dis Assoc Disord*. 2018;32(4):339-345.
29. Graff MJ, Vernooij-Dassen MJ, Thijssen M, Dekker J, Hoefnagels WH, Olderkert MG. Effects of community occupational therapy on quality of life, mood, and health status in dementia patients and their caregivers: a randomized controlled trial. *J Gerontol A Biol Sci Med Sci*. 2007;62(9):1002-1009.
30. McLaren AN, Lamantia MA, Callahan CM. Systematic review of non-pharmacologic interventions to delay functional decline in community-dwelling patients with dementia. *Aging Ment Health*. 2013;17(6):655-666.
31. Travers C, Brooks D, Hines S, et al. Effectiveness of meaningful occupation interventions for people living with dementia in residential aged care: a systematic review. *JBI Database Syst Rev Implementation Rep*. 2016;14(12):163-225.
32. Forbes D, Forbes SC, Blake CM, Thiessen EJ, Forbes S. Exercise programs for people with dementia. *Cochrane Database Syst Rev*. 2015(4):1-77.
33. Pimouguet C, Le Goff M, Wittwer J, Dartigues JF, Helmer C. Benefits of occupational therapy in dementia patients: findings from a real-world observational study. *J Alzheimers Dis*. 2017;56(2):509-517.
34. Smallfield S, Heckenlaible C. Effectiveness of occupational therapy interventions to enhance occupational performance for adults with Alzheimer's disease and related major neurocognitive disorders: a systematic review. *Am J Occup Ther*. 2017;71(5):1-9.
35. Deutsche Gesellschaft für Psychiatrie Psychotherapie Psychosomatik und Nervenheilkunde and Deutsche Gesellschaft für Neurologie. *S3-Leitlinie "Demenzen"*; 2016. [cited 2020.08.04; Report]. Available from: https://www.awmf.org/uploads/tx_szleitlinien/038-013l_S3-Demenzen-2016-07.pdf.
36. Kaplan EL, Meier P. Nonparametric estimation from incomplete observations. *J Amer Statist Assn*. 1958;53(282):457-481.
37. Cox D. Regression models and life tables. *J R Stat Soc B*. 1972;34:187-220.
38. Statistik Austria. *Demenz*; 2016. [cited 2020.05.05; Report]. Available from: http://www.statistik.at/web_de/nomenu/suchergebnisse/index.html.
39. Ergotherapie in Österreich. *ErgotherapeutInnen - Voralberg*; 2020. [cited 2020.01.07; Report]. Available from: https://www.ergotherapeuten.at/go.asp?sektion=personen&bereich_id=9105&berufsgruppe=erg&geschlecht=A&order_by=crabc&order_by_marker=Y&suchformular_id=9&aktion=view®ional=AT%2D8.

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