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RESEARCH

# Predictors of Aged Residential Care Placement in Patients Newly Diagnosed with Dementia at a New Zealand Memory Service

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**Background:** Aged residential care (ARC) is a significant cost of dementia care. However, little is known about the predictors of ARC placement in New Zealand (NZ), which is important for service planning and funding. The aim of this study was to investigate the sociodemographic and clinical characteristics that predict future ARC placement among people who received a new diagnosis of dementia at a NZ memory service.
**Methods:** Routinely collected baseline sociodemographic and clinical data in a memory service from 14/06/13 and 14/12/19 were linked with administrative LTC admission data up to 24/1/2020. Survival analysis was carried out using multivariate Cox regression models to determine significant risk factors and their association with ARC placement.
**Results:** A total of 657 NZ European, Māori and Pacific Islander patients were included in the analyses. There were significant differences by ethnicity including age, living situation, comorbidity and ARC placement. Adjusted analyses showed that risk of ARC placement was increased by older age (HR 1.02 per year, 95%CI:1.00–1.05), moderate dementia (HR 1.45, 95%CI:1.05–1.99), severe dementia (HR 2.25, 95%CI:1.33–3.81), and antipsychotics (HR 1.55, 95%CI:1.04–2.32); while risk was reduced in Māori (HR 0.35, 95%CI:0.18–0.68) and Pacific Islanders (HR 0.32, 95%CI:0.20–0.51).
**Conclusions:** Despite having more severe dementia and higher comorbidity, Māori and Pacific Islanders had reduced risks of ARC placement. There is an urgent need to better understand dementia care issues and to ensure culturally safe and responsive dementia services are accessible by Māori and Pacific Islanders living in the community.

**Keywords:** dementia; risk factors; long-term care; indigenous; Māori; Pacific Islander; antipsychotic

## Introduction

As the world population ages, dementia is a growing health priority in many countries, including New Zealand (NZ). Based on current estimates there are approximately 70,000 people living with dementia in NZ, with the prevalence of dementia expected to triple by 2050 (Deloitte Access Economics, 2017). The costs associated with dementia are also expected to rise, including the cost of aged residential care (ARC), which is primarily subsidised by the NZ public health sector and therefore a cost to the limited resources of the public purse.

In 2018, there were approximately 38,600 ARC beds operated by the 668 facilities (McDougall et al., 2018), with a relatively high per capita use by the over-65 population, compared to other OECD countries (Ernst and Young, 2019). In 2016, the total ARC cost attributed to dementia in NZ was $849.2 million (Deloitte Access Economics, 2017). Estimates suggest that 47% of the over-65 population will use ARC at some point (Broad et al., 2015) and that 52% of those in ARC have cognitive impairment (Deloitte Access Economics, 2017). Delaying ARC for those with dementia in NZ by 3, 6 or 12 months could save an estimated $66, $131 and $262million respectively, even taking into account the cost of providing care for these same individuals in the community (Deloitte Access Economics, 2017). Apart from the financial savings, research consistently reports that individuals with dementia want to remain living in their own homes for as long as possible (Livingston et al., 2017). Understanding the drivers of admission to ARC for people with dementia is therefore important from both a financial and humanitarian perspective.

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Previous research has identified several sociodemographic and clinical factors that predict time to ARC placement. For example, older age, being unmarried, caregiver burden and living alone all predict earlier ARC placement, as do more severe dementia, greater cognitive impairment, greater functional impairment, and more severe neuropsychiatric symptoms (Toot et al., 2017). However, these factors have not been investigated in Aotearoa New Zealand, which is a bicultural (Māori and NZ European) nation and also has the largest Pacific Islander population in the world. From a cultural perspective, Māori and Pacific Islander peoples are far less likely to use ARC facilities for their relatives with dementia, probably due to inclusive family structures and the responsibility to care for their elders. Therefore, it is important to understand the predictive factors of ARC placement in these ethnic groups as well as in European people living in NZ.

The aim of this study was to investigate the sociodemographic and clinical characteristics that predict ARC placement among Māori, Pacific Islander and European people with newly diagnosed dementia at a New Zealand memory service.

## Methods

### *Participants and setting*

The sample was ascertained from consecutive referrals to Counties Manukau District Health Board (CMDHB) Memory Service at Middlemore Hospital in South Auckland between 14/06/13 and 14/12/19. It extends by two years a cohort previously used to investigate the predictors of mortality in dementia (Cullum et al., 2020). The majority of referrals to the memory service during the study period were from Māori, Pacific Islander and NZ European ethnic groups. The memory service accepts referrals from primary and secondary care services but does not assess people living in ARC. The referred patients must have a primary concern of subjective and/or objective cognitive decline to meet the referral criteria for the memory service. We selected only those patients that received a new diagnosis of dementia for inclusion in this study, to reduce the impact of lead time bias on the ARC placement outcome.

### *Procedures and measures*

#### Baseline data

We examined routinely collected clinical data at the time of initial assessment, including age, gender, ethnicity, living situation and cognitive function. In English speakers, cognitive function was assessed using the Addenbrooke Cognitive Assessment-III (ACE-III) (Hsieh et al., 2013). Translated versions of the Montreal Cognitive Assessment (MoCA) (Nasreddine et al., 2005) and/or the Rowland Universal Dementia Assessment Scale (RUDAS) (Storey et al., 2004) were used (via interpreters) for non-English speakers. Dementia diagnoses, subtypes and severity were made by consensus at weekly memory service multidisciplinary team meetings, using clinical and neuroradiological information. The multidisciplinary team included a geriatrician, psychiatrist, psychologist, occupational therapist, physiotherapist, social worker and nursing staff. Dementia diagnosis was made using DSM-IV criteria (American Psychiatric Association, 1994) and dementia severity using Clinical Dementia Rating (CDR) criteria (Morris, 1997). Dementia subtyping was guided by NINCDS-ADRDA criteria for Alzheimer disease dementia (McKhann et al., 1984; McKhann et al., 2011), NINCDS-AIREN criteria for vascular dementia (Roman et al., 1993), Lewy body dementia (McKeith et al., 1996; McKeith et al., 2005), and frontotemporal dementia (The Lund and Manchester Groups, 1994).

The baseline data were extracted by three cohorts of undergraduate students on summer scholarships in 2017 (CV, LH, AR, BL, BY), 2018 (KA, MC) and 2019 (LK, RK, CP, JA) under the supervision of SC and GC. The students calculated the comorbidity score using the Cumulative Illness Rating Scale-Geriatric (CIRS-G) score (Miller et al., 1992) from automated information on medical conditions available on the electronic referral letter, using a predefined algorithm (available from the authors). The community pharmacy database was used to identify whether any prescriptions for cholinesterase inhibitors (CEIs) (donepezil and rivastigmine) and antipsychotics (quetiapine, risperidone, and haloperidol) had been dispensed for each patient since the date of baseline assessment. These medications were selected because they are the most commonly prescribed CEIs for dementia and antipsychotics used in treating behavioural and psychological symptoms of dementia (BPSD) in NZ.

### *Outcome data*

There are four levels of ARC in NZ: rest home level of care for those requiring minimal support, hospital level of care for those requiring increased nursing care, dementia level of care for those requiring a more secure environment, and psychogeriatric level of care for residents with more challenging behaviours that require specialist nursing care. The level of ARC placement is decided on the basis of a needs assessment using the interRAI assessment tool (interRAI New Zealand, 2020). The majority of people with dementia are placed in residential or hospital level of care, and only a minority require dementia or psychogeriatric level of care. There is rarely a waiting list to be placed in any of the four levels of care, so we don't believe level of care will be a confounder in the time-dependent survival analysis. Some residents will move to different levels of care (e.g., from residential to hospital level) depending on their needs assessment, which is conducted every 6 months. We have taken the first placement to be the censoring date.

The District Health Board (DHB) receives invoicing data on all residents in hospital level, dementia level and psychogeriatric level of care and on 70% of those in rest home level of care, as the DHB pays for a component of the care in all these cases. However, about one third of the residents in rest home level of care pay the full cost of care, and these are therefore not recorded by the DHB. The CMDHB Informatics Team linked the baseline data with administrative data on ARC placement using the National Hospital Index number to extract the numbers

of days spent in each level of care. Following data linkage, the resulting dataset was de-identified for analyses.

### *Data analysis*

Patient ethnicities were categorised as NZ European, Māori, Pacific Islander, other European, Asian and other. Only NZ European, Māori and Pacific Islander were included in this analysis. Patients' diagnoses were categorically coded as Alzheimer's disease dementia, vascular dementia, mixed dementia (Alzheimer's disease dementia and vascular dementia combined), and other dementia. Clinical dementia severity ratings were dichotomised to 'mild' dementia (CDR≤1) or 'moderate to severe' dementia (CDR ≥ 2). The cognitive scores on the ACE-III, MoCA and RUDAS were recorded as raw scores (with incomplete answers scored as zero). Cognitive scores were re-categorised according to the dementia driving guidelines on www.healthnavigator.org.nz as mild (ACE-III score > 64, MOCA score > 10, RUDAS score > 16), moderate (ACE-III score 35–64, MOCA score 6–10, RUDAS 10–16), or severe (ACE-III score < 35, MOCA score < 6, RUDAS < 10). Living situation was recorded as a binary measure: living alone (yes/no). The CIRS-G severity index was calculated as total CIRS-G score divided by the number of CIRS-G categories endorsed. Use of CEIs (donepezil and rivastigmine) and antipsychotics (quetiapine, risperidone and haloperidol) was defined as whether any of the drugs in each class had ever been dispensed between the date of baseline assessment and the censoring date. The censoring date for the time-dependent statistical analyses was defined, in hierarchical order, as date of first ARC placement, date of death or date of last hospital contact up to and including 24/01/2020 (the date on which the outcome report was generated).

### *Statistical analysis*

Statistical analysis was performed in R version 3.6.1 (R Core team, 2016). Baseline characteristics were compared using chi-squared test or Fisher's exact test to compare across ethnic groups, where appropriate. Continuous variables between those who were and were not placed in ARC were compared via student t test if parametric or Mann-Whitney U test if non-parametric. Continuous variables between ethnicities were compared via analysis of variance (ANOVA) if parametric or Kruskal-Wallis test if non-parametric. Log-rank tests were used to evaluate the equality of survival distributions for dementia across the demographic variables and presented with unadjusted hazard ratios using Cox regression. Survival analysis was carried out using multivariate Cox regression models to determine significant risk factors and their associations with ARC placement. Model selection was carried out based on backward stepwise method and smallest Akaike information criteria (AIC). Based on univariate results, those variables that were significant at the 10% level were retained in the model and adjusted for the important demographic and clinical variables (age, gender, ethnicity, and CIRS-G). A two-by-two interaction term between ethnicity and antipsychotics was explored out of clinical interest. Proportional hazard assumption was verified. Multicollinearity and non-linearity for continuous variables was checked in the model. Results are presented as hazard ratios with associated 95% confidence intervals (95% CI). $P < 0.05$ was considered statistically significant.

### *Ethics approval*

This project was approved by the NZ Health and Disability Ethics Committee, ref: 17/NTB/191.

## Results

### *Sociodemographic and clinical characteristics of the sample*

In our cohort of 779 patients diagnosed with dementia at the CMDHB Memory Service, 40.9% were NZ European, 11.0% were Māori, 32.3% were Pacific Islanders, 3.0% were Asian (mostly Indian and Chinese), 5.9% were non-NZ Europeans and 6.9% were from other countries.

**Table 1** presents the sociodemographic and clinical characteristics of the 657 NZ European, Māori and Pacific Islander patients. Their mean age was 77.4 (SD 7.96), just over half (56.2%) were female and 21.5% lived alone. Most (38.8%) were diagnosed with Alzheimer's disease, the rest having diagnoses of vascular dementia (18.4%), mixed Alzheimer's disease dementia and vascular dementia (26.2%) and other dementias including frontotemporal dementia, alcoholic dementia and dementia not otherwise specified (16.6%). The clinical dementia severity was judged to be mild in 62.1%, the remainder having moderate or severe disease. Cognitive scores were mostly in the mild (49.6%) or moderate dementia range (41.4%). CEIs were dispensed to 41.2% of the cohort and antipsychotics were dispensed to 16.9% in the period before censoring due to ARC placement or end of follow-up.

Approximately one quarter (n = 177, 26.9%) of the total sample were recorded by the DHB as being placed in ARC during the period of follow-up: hospital level of care (n = 111, 62.7%), dementia level of care (n = 57, 32.2%), rest home level of care (n = 48, 27.1%), and psychogeriatric level of care (n = 5, 2.8%). Some (n = 44, 22%) were placed in more than one level of care but were only counted from their first placement.

There were significant differences at baseline assessment by ethnicity, which confirmed our findings from a smaller embedded cohort (n = 311) three years earlier (Cullum et al., 2018). Compared to NZ European patients with dementia, Māori patients were younger, more likely to be female, have higher comorbidity scores, and to be diagnosed with vascular dementia, and were less likely to be prescribed antipsychotic medication. Pacific Islander patients were also younger than NZ European patients, were less likely to live alone, had higher comorbidity scores, and were more likely to present at a later stage with more severe dementia. In our sample, both Māori (36.0%) and Pacific Islanders (34.1%) were less likely to receive CEIs compared with NZ Europeans (48.3%). However, in a recent clinical audit we found that CEIs are prescribed at the same rates across ethnicities, so the difference in dispensing may reflect cultural choice.

**Table 1:** Baseline clinical and sociodemographic characteristics of a NZ memory service sample by ethnicity.

| | | Total N = 657 | Maori N = 86 | Pacific N = 252 | European N = 319 | p value |
|---|---|---|---|---|---|---|
| **Mean age (SD)** | | 77.4 (7.96) | 72.7 (7.89) | 75.5 (7.60) | 80.1 (7.26) | **<0.001** |
| **Female (%)** | | 369 (56.2) | 54 (62.8) | 144 (57.1) | 171 (53.6) | 0.289 |
| **Male (%)** | | 288 (43.8) | 32 (37.2) | 108 (42.9) | 148 (46.4) | |
| **Lives alone[†] (%)** | | 141 (21.5) | 22 (25.6) | 19 (7.6) | 100 (31.3) | **<0.001** |
| **Lives with others (%)** | | 515 (78.5) | 64 (74.4) | 232 (92.4) | 219 (68.7) | |
| **Mean CIRS-G index (SD)** | | 1.63 (0.48) | 1.64 (0.49) | 1.70 (0.46) | 1.58 (0.48) | **0.014** |
| **Alzheimer's disease (%)** | | 255 (38.8) | 39 (45.3) | 93 (36.9) | 123 (38.6) | **0.004** |
| **Mixed dementia (%)** | | 172 (26.2) | 8 (9.3) | 74 (29.4) | 90 (28.2) | |
| **Vascular dementia (%)** | | 121 (18.4) | 23 (26.7) | 50 (19.8) | 48 (15.0) | |
| **Other dementia (%)** | | 109 (16.6) | 16 (18.6) | 35 (13.9) | 58 (18.2) | |
| **Clinical severity: mild (%)** | | 408 (62.1) | 58 (67.4) | 131 (52.0) | 219 (68.7) | **<0.001** |
| **Clinical severity: mod-severe (%)** | | 249 (37.9) | 28 (32.6) | 121 (48.0) | 100 (31.3) | |
| **Cognitive score: mild (%)** | | 326 (49.6) | 49 (57.0) | 115 (45.6) | 162 (50.8) | **0.026** |
| **Cognitive score: moderate %)** | | 272 (41.4) | 30 (34.9) | 104 (41.3) | 138 (43.3) | |
| **Cognitive score: severe (%)** | | 59 (9.0) | 7 (8.1) | 33 (13.1) | 19 (6.0) | |
| **Cholinesterase inhibitors (%)** | | 271 (41.2) | 31 (36.0) | 86 (34.1) | 154 (48.3) | **0.002** |
| **No cholinesterase inhibitors (%)** | | 386 (58.8) | 55 (64.0) | 166 (65.9) | 165 (51.7) | |
| **Antipsychotics (%)** | | 111 (16.9) | 8 (9.3) | 32 (17.1) | 60 (18.8) | 0.113 |
| **No antipsychotics (%)** | | 546 (83.1) | 78 (90.7) | 209 (82.9) | 259 (81.2) | |
| **ARC placement (%)** | | 177 (26.9) | 15 (17.4) | 40 (15.9) | 122 (38.2) | **<0.001** |
| **No ARC placement (%)** | | 480 (73.1) | 71 (82.6) | 212 (84.1) | 197 (61.8) | |
| **Antipsychotics** | **ARC** | | | | | |
| Not dispensed (total = 546) | Yes | 123 (23%) | 11 (14%) | 28 (13%) | 84 (32%) | **<0.001** |
| | No | 423 (77%) | 67 (86%) | 181 (87%) | 175 (68%) | |
| Dispensed (total = 111) | Yes | 54 (49%) | 4 (50%) | 12 (28%) | 38 (63%) | **<0.001** |
| | No | 57 (51%) | 4 (50%) | 31 (72%) | 22 (37%) | |

[†]1 person did not have living status available. ARC = aged residential care.

More than twice as many NZ Europeans (38.2%) were placed in ARC, compared to Māori (17.4%) and Pacific Islander (15.9%) patients. The proportion of people with dementia in ARC was substantially higher among those who had been prescribed antipsychotic medications. Compared to those not prescribed antipsychotics, the proportion doubled for NZ Europeans and Pacific Islanders and tripled for Māori.

### *Sociodemographic and clinical characteristics associated with ARC placement*

**Table 2** shows the results of the unadjusted analysis of sociodemographic and clinical characteristics associated with ARC placement. The following variables predicted ARC placement: older age (HR 1.05 per year, 95%CI:1.03–1.07), ethnicity (HR for Māori 0.31, 95%CI:0.18–0.53, HR for Pacific Islanders 0.31, 95%CI:0.22–0.45), living alone (HR 1.79, 95%CI:1.29–2.47), mixed dementia subtype (HR 1.61, 95%CI:1.11–2.34), clinical severity (HR 1.62, 95%CI:1.20–2.17), cognitive score (HR for moderate impairment 1.44, 95% CI:1.05–1.97, HR for severe impairment 1.85, 95% CI:1.14–3.00) and antipsychotics (HR 1.78, 95%CI:1.29–2.45). Gender (HR for females 0.88, 95% CI:0.65–1.18), comorbidity (HR per point increase in CIRS-G index 0.82, 95%CI:0.59–1.12) and CEIs (HR 0.91, 95% CI:0.68–1.23) were not associated with ARC placement.

**Figures 1** and **2** show the Kaplan Meier curves for the effect of antipsychotics and ethnicity on ARC placement.

In the adjusted analysis, variables that were significant at the 10% level and clinically important demographic characteristics (age, gender, ethnicity and comorbidity) were kept in the model. From a clinical perspective, clinical severity and cognitive score are likely to be measuring the same characteristic of dementia so, to improve the model, we removed clinical severity as the cognitive score had been measured using well validated cognitive assessment tools and was likely to be more accurate. The interaction between ethnicity and antipsychotics was also included as it improved the model, see **Table 3**.

**Table 2:** Predictors of aged residential care placement in an NZ memory service sample of patients diagnosed with dementia (unadjusted analysis).

| | Total | LTC placement | % in ARC | p | Univariate HR (95% CI) | p |
|---|---|---|---|---|---|---|
| | 657 | 177 | | | | |
| **Mean age (SD)** | 77.4 (7.96) | 78.7 (7.95) | | **0.009** | 1.05 (1.03–1.07) | **<0.001** |
| **NZ European** | 319 | 122 | 38.2 | **<0.001** | Reference | |
| **Maori** | 86 | 15 | 17.4 | | 0.31 (0.18–0.53) | **<0.001** |
| **Pacific** | 252 | 40 | 15.9 | | 0.31 (0.22–0.45) | **<0.001** |
| **Male** | 288 | 81 | 28.1 | 0.606 | Reference | |
| **Female** | 369 | 96 | 26 | | 0.88 (0.65–1.18) | 0.385 |
| **Lives with others** | 515 | 125 | 24.3 | | Reference | |
| **Lives alone** | 141 | 52 | 36.9 | **0.004** | 1.79 (1.29–2.47) | **<0.001** |
| **Mean CIRS-G Index (SD)** | 1.63 (0.48) | 1.61 (0.41) | | 0.415 | 0.82 (0.59–1.12) | 0.207 |
| **Alzheimers disease** | 255 | 60 | 23.5 | 0.184 | Reference | |
| **Mixed dementia** | 172 | 53 | 30.8 | | 1.61 (1.11–2.34) | **0.012** |
| **Other** | 109 | 35 | 32.1 | | 1.51 (0.99–2.29) | 0.055 |
| **Vascular dementia** | 121 | 29 | 24 | | 1.05 (0.67–1.64) | 0.825 |
| **Clinical severity: mild** | 408 | 89 | 21.8 | **<0.001** | Reference | |
| **Clinical severity: mod-severe** | 249 | 88 | 35.3 | | 1.62 (1.20–2.17) | **0.001** |
| **Cognitive score: mild** | 326 | 73 | 22.4 | **0.024** | Reference | |
| **Cognitive score: moderate** | 272 | 83 | 30.5 | | 1.44 (1.05–1.97) | **0.023** |
| **Cognitive score: severe** | 59 | 21 | 35.6 | | 1.85 (1.14–3.00) | **0.013** |
| **No cholinesterase inhibitors** | 386 | 96 | 33.6 | | Reference | |
| **Cholinesterase inhibitors** | 271 | 81 | 29.9 | 0.181 | 0.91 (0.68–1.23) | 0.543 |
| **No antipsychotics** | 546 (83.1) | 123 (69.5) | 22.5 | | Reference | |
| **Antipsychotics** | 111 (16.9) | 54 (30.5) | 48.6 | **<0.001** | 1.78 (1.29–2.45) | **<0.001** |

ARC = aged residential care.

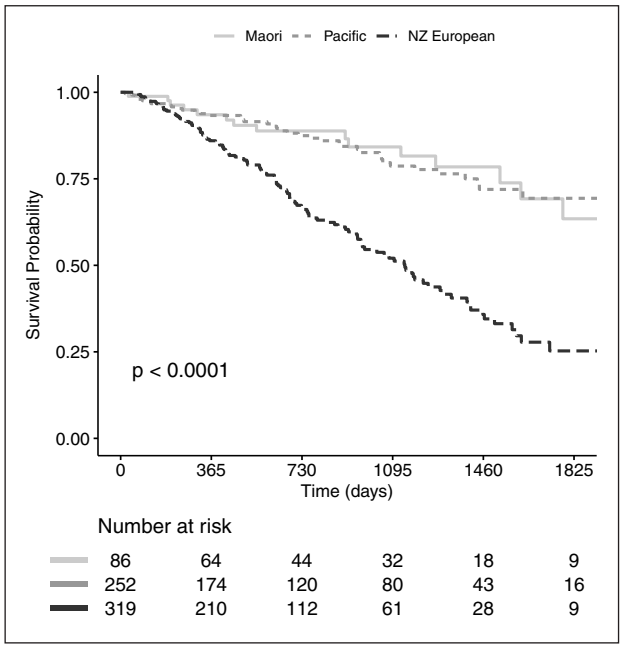


**Figure 1:** Kaplan Meier curve for the effect of ethnicity on ARC placement.

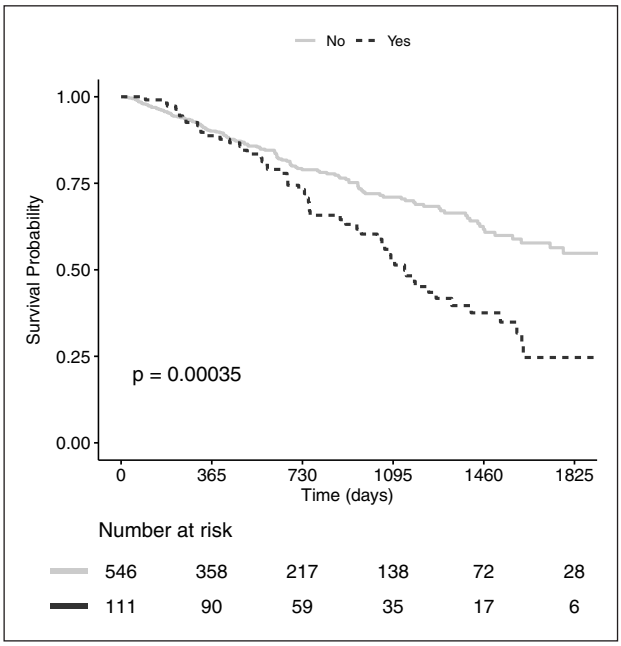


**Figure 2:** Kaplan Meier curve for the effect of antipsychotic medication on ARC placement.

**Table 3:** Predictors of aged residential care placement in an NZ memory service sample of patients diagnosed with dementia (adjusted analysis).

| **Adjusted model AIC: 1889.88** | | **HR** | **95% confidence intervals** | **p value** |
|---|---|---|---|---|
| **Age** | (continuous) | 1.02 | 1.00, 1.05 | **0.036** |
| **Ethnicity (reference = NZ European)** | Māori | 0.35 | 0.18, 0.68 | **0.002** |
| | Pacific | 0.32 | 0.20, 0.51 | **<0.001** |
| **Gender (reference = male)** | Female | 0.93 | 0.67, 1.27 | 0.635 |
| **Lives alone (reference = no)** | Yes | 1.26 | 0.89, 1.79 | 0.184 |
| **CIRS-G Index score** | (continuous) | 0.96 | 0.68, 1.35 | 0.798 |
| **Cognitive function (reference = mild)** | Moderate | 1.45 | 1.05, 1.99 | **0.023** |
| | Severe | 2.25 | 1.33, 3.81 | **0.002** |
| **Cholinesterase inhibitors (reference = no)** | Yes | 0.78 | 0.57, 1.07 | 0.123 |
| **Antipsychotics dispensed (reference = no)** | Yes | 1.55 | 1.04, 2.32 | **0.032** |
| **Interaction antipsychotics * ethnicity** | | See table below | | **<0.001** |
| **Antipsychotics and ethnicity interaction** | | | | |
| **Ethnicity** | **Antipsychotics** | **HR** | **95% confidence intervals** | **p value** |
| **NZ European (reference)** | 0 | Ref | – | |
| **Māori** | 0 | 0.28 | 0.15, 0.53 | <0.001 |
| **Pacific** | 0 | 0.31 | 0.20, 0.47 | <0.001 |
| **NZ European** | 1 | 1.48 | 1.01, 2.18 | 0.044 |
| **Māori** | 1 | 0.9 | 0.33, 2.45 | – |
| **Pacific** | 1 | 0.53 | 0.29, 0.96 | – |

In the final model these variables were found to have the following associations:

(i) reduced time to ARC placement: older age (HR 1.02 per year, 95%CI:1.00–1.05), moderate cognitive impairment (HR 1.45, 95%CI:1.05–1.99), severe cognitive impairment (HR 2.25, 95%CI:1.33–3.81), and antipsychotics (HR 1.55, 95%CI:1.04–2.32)
(ii) increased time to ARC placement: Māori ethnicity (HR 0.35, 95%CI:0.18–0.68) and Pacific Islander ethnicity (HR 0.32, 95%CI:0.20–0.51).
(iii) no impact on ARC placement: gender (HR for female 0.93, 95%CI: 0.67–1.27), living alone (HR 1.26, 95%CI:0.89–1.79), and comorbidity (HR 0.78 for each point increase in CIRS-G, 95%CI:0.68–1.35) and CEIs (HR 0.78, 95% CI:0.57–1.07).

## Discussion

We used routinely collected health and social care data to investigate the sociodemographic and clinical predictors of ARC placement in a cohort of patients newly diagnosed with dementia at a South Auckland memory service. We found that older age, cognitive impairment and antipsychotics all increased the risk of ARC placement; Māori and Pacific Islander ethnicity reduced the risk; gender, living alone, comorbidity and CEIs had no independent effect on ARC placement.

As far as we know, this is the first study to examine the predictors of ARC placement in people living with dementia in New Zealand using routinely collected data. The findings are unique as they establish predictors of ARC for people with dementia in a clinical sample that represents the major ethnic groups in New Zealand. In our total cohort of 779 patients diagnosed with dementia at the CMDHB Memory Service, 32% were Pacific Islanders, 11% were Māori, 41% were NZ European, 3% were Asian (mostly Indian and Chinese), and 13% other ethnicities. In the 2018 census, 12% of the South Auckland over-65 population identified as Pacific Islander, 7% as Maori, 62% as European, 19% as Asian (mostly Chinese and Indian), and 6% as other ethnicity (Census population and dwelling counts, Stats NZ, 2018). The differences reflect the fact that during the study time period of 2013 to 2019 the CMDHB Memory Service catchment area included local areas with a high Pacific Islander population but did not cover East Auckland, which has a high Asian population.

### *Comparison with previous research*

Many factors influence the decision to place an individual in ARC, including sociocultural context, caregiver preferences, poor cognition, behavioural and psychological symptoms of dementia (BPSD), poorer health/comorbidity, and impairments in activities of daily living (Toot et al., 2017). Our findings replicate some of the findings from

studies in similar memory clinic populations in Australia (Brodaty et al., 2014) and England (Knapp et al., 2016). They also reported that older age, cognitive impairment and antipsychotics increased the risk of ARC placement, in addition to living alone, physical comorbidity, impaired activities of daily living, and behavioural and psychological symptoms of dementia (BPSD). The lack of association with comorbidity and living alone in our study was surprising; however, this may be due to lack of power due to our smaller sample size as the associations were significant in the unadjusted analysis. Caregiver burden has also been identified as a predictor of long-term care placement (Verbeek et al., 2015) but information on caregiver characteristics was not captured in our routinely collected data.

### *Ethnicity*

Our findings demonstrate that ethnicity is a significant predictor of ARC placement. Nearly 40% of NZ Europeans with dementia presenting at CMDHB Memory Service moved into ARC compared with only 17% of Māori and 18% of Pacific Islanders. This is despite Pacific Islanders having more severe dementia and both Māori and Pacific Islanders having higher comorbidity at their baseline assessment. It is likely that this is due to cultural choice and family living arrangements. For example, nearly one third of NZ European people with dementia were living alone at the time of diagnosis compared to only 8% from Pacific Islander families and 26% from Māori families, most of whom will move back in with younger family members when they require care and support. A recent qualitative study of Māori and dementia found that Māori families are generally inclusive and have a strong obligation to care for their elders at home (Dudley et al., 2019), while another local study found Pacific Islander families are reluctant to admit their loved ones to ARC because the quality of care is perceived as a concern (Fakahau et al., 2019). People with dementia from non-white ethnic groups in the USA (Cooper et al., 2010) and the UK (Knapp et al., 2016) are also 40% less likely to enter an ARC facility compared to their white counterparts. These findings have been interpreted as being due to cultural preferences, or a reluctance to place people with dementia in facilities where few speak their language. These findings raise issues about the nature of dementia care in non-European communities living with dementia and the possibility that care provided at home in these communities may be protective against ARC placement.

### *Antipsychotics*

When people with dementia were prescribed antipsychotics, the risk of ARC placement nearly doubled in Pacific Islanders and NZ Europeans and tripled amongst Māori, although this was not statistically significant for Māori or Pacific Islanders as the total number of events were small, and therefore confidence intervals were wide and overlapped. This is likely to reflect the emergence of BPSD, which are independently associated with ARC placement and closely associated with caregiver burden, which is also an independent risk factor for ARC placement (Toot et al., 2017). We were unable to measure BPSD in our study using routinely collected data, but it is likely that antipsychotic medication is a proxy measure for BPSD. However, antipsychotics have also been reported as having an independent association with ARC placement (Brodaty et al., 2014). Our finding would therefore support the argument that unnecessary institutionalisation of people with dementia might be achieved by reducing their use of antipsychotics.

### *Cholinesterase inhibitors*

Anti-dementia medications such as CEIs are designed to delay or reduce cognitive decline and may also delay the need for ARC (Howard et al., 2015). We did not find such an association in our analyses, which may be due to the fact that our study is based on real world data rather than trial data (Howard et al., 2015), as was another recent study that found no reduced risk of placement with CEIs (San-Juan-Rodriguez et al., 2019).

### *Strengths and limitations*

The strength of our study is that we have used real world data from a memory service located in a geographical area of Auckland that has a highly diverse population, and is therefore representative of some of the major NZ ethnic groups. We were able to collect an almost complete dataset at baseline. These data were part of a standardised dementia assessment and were not subject to observer bias. The clinical sample is relatively large and therefore has sufficient statistical power to adjust for potential confounding. The use of routinely collected data is a non-expensive, efficient method of assessing the predictors of ARC placement, which can be easily replicated by other researchers who wish to compare their findings with ours. Our *a priori* objective was to use only routinely collected health and social care data, so a major limitation of our study is that approximately 7% of the ARC placements were not counted, only those that the DHB paid all or part of the fees. However, these participants would have been from higher income households and therefore more likely to be of NZ European origin (Long-term residential care, Ministry of Health, 2020). It is likely that inclusion of this group would have further increased the ethnic differences in the proportion of people with dementia placed in care homes. Another limitation of our study design is that our findings are only generalisable to those patients that are referred to the CMDHB Memory Service, but we know that up to 50% of people with dementia never get assessed or receive a formal diagnosis of dementia (Lang et al., 2017), and that referral practices differ across NZ depending on availability of specialist services (Stone et al., 2019).

### *Implications for policy and practice*

Our main findings indicate that Māori and Pacific Islander families are far less likely to use ARC, which suggests that they continue to look after their relatives with dementia at home. Although this could be an appropriate choice for Māori and Pacific Islanders, it may also add to families' economic burden as caregivers forgo paid work. Recent research (Dudley et al., 2019) and interRAI data (InterRAI NZ Annual Report, 2017) suggest that care arrangements and caregiver input are disproportionately higher in Māori and Pacific Islander families. Many families express concerns that ARC services in NZ are not culturally or linguis-

tically appropriate for their relatives, as they were mostly designed for English-speaking NZ Europeans. Looking after the relative with dementia at home may add to families' economic burden as caregivers forgo paid work. This suggests potential inequity in allocation of social care resources (including home-based support services) for Māori and Pacific Islanders, which requires further investigation in a national dataset. Our findings suggest that culturally safe and responsive community services, including caregiver training and support, are urgently required for Māori and Pacific Island families to continue to care for their relatives at home.

In addition to Māori, Pacific Islanders and NZ Europeans, the numbers of older people with dementia are also increasing in other ethnic groups living in Aotearoa, with the most rapid rise in Chinese and Indian populations (Deloitte Access Economics, 2017). Many of these communities also choose to care for their older relatives at home. Consequently, there is a future need for a larger, more detailed study that includes all of these groups, which will help to evaluate the impact and consequences of providing care at home in different communities, and the culturally sensitive support services they require in order to continue.

## Conclusion

Despite having more severe cognitive impairment and higher comorbidity, Māori and Pacific Islanders in this memory service cohort had reduced risks of ARC placement. The interplay of culture and dementia care is complex and future research should aim to better understand how best to meet the needs of Māori and Pacific Island people living with dementia, including dedicated health resources to provide culturally safe and responsive dementia services in the community.

## Data Accessibility Statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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## Competing Interests

The authors have no competing interests to declare.

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