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Use of psychiatric medication in three Arctic nursing homes: association with dementia and psychiatric symptoms

Sigurveig Gisladottir[a,b], Arun K. Sigurdardottir [iD][b,c] and Ingibjörg Hjaltadottir[d,e]

aFossahlid Nursing Home, Health Care Institution of Eastern Iceland; bUniversity of Akureyri, School of Health Sciences, Akureyri, Iceland; cAkureyri Hospital, Akureyri, Iceland; dFaculty of Nursing, University of Iceland; eDivision of Clinical Services Landspítali, National University Hospital, Reykjavik, Iceland

ABSTRACT

As more people reaches advanced age, more people experience cognitive impairment and dementia. Dementia is a degenerative disease in which behavioural and psychological symptoms frequently occur, resulting in admissions to nursing homes (NHs), where the most common treatment has been medical treatment. The aim was to compare three rural Arctic NHs in Iceland in their use of psychiatric medication, type of dementia among residents, level of cognitive impairment and selected quality indicators, as well as considering national data, for the period 2016–2018. Data from the interRAI-MDS 2.0 evaluation were used. Residents with severe cognitive impairment used more antipsychotic medications, and residents with mild and severe cognitive impairment used more antidepressants than residents with no cognitive impairment did. Diagnoses of Alzheimer's Disease and Related Dementias (ADRD) are more common in the capital area and the national average than they are in the rural NHs. This indicates need for diagnostic assessments of ADRD to be conducted in rural areas. Benchmarking is beneficial for local and national regulatory bodies to find areas for improvement. The NHs did not have a lower quality of care compared with the whole country, but areas for improvement were identified. One of the NHs has already started this process.

Introduction

Rural life differs from urban life in terms of the geographical conditions people experience, as well as the population's educational level, income, and access to public transport [1,2] and specialist treatment [3]. Availability of specialist health services is important for older people because the number of people with such cognitive impairment as dementia is projected to increase, driven by population growth and demographic ageing [4]. Dementia is a degenerative disease in which behavioural and psychological symptoms frequently occur [5,6]; these symptoms can include agitation, aggression, wandering, depressive symptoms, and hallucination [5,7]. Dementia increases the rate of admission to nursing homes (NHs) [8,9]. Moreover, symptoms of dementia are more common and more severe in NHs than outside these institutions [6,10]. Management in the context of dementia symptoms usually involves medical treatment that focuses on complications, such as behavioural problems and depressive symptoms [11]. In NHs, psychotropic medications are often used to treat people with dementia,

behaviour problems, and depression [12,13]. However, there is a general lack of evidence for the efficacy of using antipsychotic medications for elderly people suffering from dementia [7,12], and regulatory bodies have issued warnings about using antipsychotics for this purpose [12].

Strategies to reduce the use of antipsychotics in NHs have resulted in moderately reducing the prevalence of these drugs in NHs [7]. Research has indicated that the location of NHs in rural areas is associated with less use of antipsychotic medications compared with NHs located in urban areas [13,14]. Contradicting results have however been published according to the size of nursing homes and use of antipsychotic for residents with dementia. In a review of 19 studies, Cioltan et al. [14] found that larger NHs in the USA used fewer antipsychotics; in contrast, in a review covering 20 NHs with 1,090 residents in the Netherlands, Kleijer et al. [13] revealed that smaller NHs were less likely to administer antipsychotic medications to residents.

CONTACT Arun K. Sigurdardottir ✉ arun@unak.is 🖥 University of Akureyri, School of Health Sciences, Akureyri, Iceland Akureyri Hospital, Akureyri, Iceland

The Icelandic population is ageing, and projections show the highest expected increase in the oldest old [15], with a greater proportion of people ≥ 65 years in rural areas compared with the capital area [15]. Such a population shift will increase the prevalence of dementia and the need for NHs in rural Iceland.

The aim of this study was to compare residents in three Arctic NHs in the period of 2016–2018 in terms of their level of cognitive impairment, use of psychiatric medications over the last 7 days, types of dementia, and selected quality indicators (QIs). A further aim was to compare their use of psychotropic medications in the last 7 days according to the residents' level of cognitive impairment. Additionally, to compare data from the three small NHs with data from all nursing homes in Iceland and data from nursing homes in the capital area of Iceland over the same period.

Materials and methods

Setting and participants

Around 2,600 people live in 73 NHs and long-term facilities in Iceland [16], in this study NH is referred to as an institutional setting. In 2019, the total population of people ≥ 65 years of age was 47,684, which is around 13.6% of the Icelandic population [15]. The eastern part of Iceland is the rural area that is furthest away from the Icelandic capital area, where slightly under two-thirds of the total Icelandic population lives (see Figure 1). The eastern part of Iceland is sparsely populated, with a total population around 10,000, or about 3.2% of the total population of Iceland, in an area that is around 16,000 m² [17]. The inhabitants live on farms and in small fishing villages, where the largest village has around 2,800 inhabitants. The area has one healthcare institution, an umbrella institution consisting of one small hospital serving as an emergency department for the area, seven primary healthcare centres, and four primary health clinics open for a few hours each week. As a part of the umbrella healthcare institution, there are three small NHs in different villages, and those are the settings for our study. In addition, there are three small NHs in the area run by the local municipalities. The Icelandic health service, including NHs, is publicly funded.

Most residents in our three NHs had been admitted to the NHs from the local area, and most were from the same postcode as their NH. However, there were some differences: In the largest NH (NH A), the proportion of residents from other postal codes was 22%; in NH B, it was 31%; and in NH C, it was 41%. Although the three NHs are part of the same umbrella institution, the staff are different in each NH because more registered nurses work at NH C compared with the other two NHs. Only one out of the three NHs received an annual visit from a geriatrician at that time.

The data for this study were from the Resident Assessment Instrument Minimum Data Set 2.0 instrument (interRAI-MDS 2.0), designed for use in nursing homes. Since 1996, it has been mandatory for Icelandic NHs to assess residents with the interRAI-MDS 2.0 instrument at admission and since 2003 at least three times a year. Results from interRAI-MDS 2.0 are used as a basis for nursing home reimbursement [18]. The interRAI-MDS 2.0 assessment used in our study was the newest assessment for each resident over the research period 2016–2018.

Figure 1. Map of Iceland: Box illustrates East Iceland, where the study was conducted; circle demarcates the capital area.

Design

Descriptive, retrospective study of data from the interRAI-MDS 2.0. The instrument consists of five parts: a) the Minimum Data Set 2.0 (MDS 2.0); b) Quality Indicators (QIs), c) interRAI scales, d) Resident Assessment Protocols, and e) Resource Utilisation Groups. The interRAI-MDS 2.0 was initially designed to rate the functioning and healthcare needs of NH residents although instruments for other settings have since been developed [19]. The assessment is conducted by nurses who have received standardised training in using the interRAI-MDS 2.0 and is based on observations, clinical documentation, and interviews with residents and their family members. The interRAI-MDS 2.0 assessment was originally designed as a clinical tool to improve care, but it has also been used internationally for research purposes and is considered over all a reliable and valid instrument [19]. However, other studies have pointed out that some data elements in the interRAI-MDS 2.0 has shown poor inter-rater reliability [20], which can affect the outcome of scales and QI's. The MDS 2.0 for NHs is the documentation part of the interRAI with about 350 clinical data elements.

Selected variables from interRAI-MDS 2.0 were used; these comprised background variables, such as age, gender and NH A, B, or C; psychotropic medications; and type of dementia. Psychotropic medications included in the analyses were antipsychotics (N05A), anxiolytics (N05B), antidepressants (N06A), and hypnotics and sedatives (N05C). Residents receiving any type of these medications the last 7 days before assessment were considered to be using the medications.

The Cognitive Performance Scale (CPS) was used to measure residents' cognitive performance; it rates impairment from 0, indicating that the resident is cognitively intact, to 6, indicating severe cognitive impairment. The scale is a part of the interRAI-MDS 2.0 and the outcome is calculated using selected variables from the instrument such as comatose status, short-term memory, cognitive skills for daily decision making, and self-performance in eating. The scale correlates moderately well with the Mini-Mental State Examination (MMSE; $r = 0.65$) [21].

QIs were calculated using one or more variables from the interRAI-MDS 2.0 assessment of each resident. They represent certain treatments the resident either has or has not received or conditions s/he is presenting. A high proportion of residents presenting a certain QI in a nursing home indicates low quality of care [22]. Research has shown that some of the QI's show more sensitivity in measuring quality of care [23] and other QI's have been found unsuitable for public reporting of nursing home quality [24]. The Directorate of Health in Iceland uses the interRAI-MDS 2.0 QI for quality inspections in the nursing homes among other quality measures. The following QIs were used in this study: behavioural symptoms affecting others; use of nine or more different medications; antipsychotic drug use in the absence of psychotic and related conditions; anti-anxiety or hypnotic drug use; hypnotic drug use on more than 2 days in the past week; prevalence of depression; and little or no activity. The Directorate of Health provided information about selected variables and interRAI-MDS 2.0 QIs for the whole country and the capital area in Iceland for the research period.

Statistical analysis

Data were analysed using descriptive statistics (mean, standard deviation, percentages), as well as inferential statistics. Residents were compared according to cognitive status measured with the CPS scale, rated as no cognitive impairment (CPS: 0–1), mild cognitive impairment (CPS: 2–3), or severe cognitive impairment (CPS: 4–6) [20]. Residents were also compared according to the use of psychotropic medications, with possible responses of "yes" or "no." In the comparison, we used univariate analysis of variance (ANOVA) and chi-squared tests. Binary logistic regression was employed to estimate the association between psychotropic medication use and cognitive impairment, the association among cognitive impairment and diagnoses of anxiety and hallucination, and the association between QIs of behaviour problems and depressive symptoms of cognitive impairment compared to residents with no cognitive impairment. A significant statistical difference was set at $p \leq 0.05$.

Ethical considerations

The Icelandic National Bioethics Committee (VSN–18–121) and Data Protection Authority of the Icelandic Ministry of Justice approved the research.

Results

Over three years, 156 residents were assessed in the three NHs. Table 1 shows that NH A was the biggest, with 51.9% of all the study's residents. The age range was 34–99 years, and around 17% were younger than 70 years. The mean age for all residents was 80.8 (±9.5) years, with a median of 84 years, and 92 (58%) were women. Residents with no cognitive impairment were 57 or 36.5%. No association was found between

Table 1. Mean age, age range, gender, cognitive impairment, and psychotropic medication use in the last 7 days in the three nursing homes (*N* = 156). Number (*n*) and percentage (%) according to each nursing home.

	NH A (*n* = 81; 52%)	NH B (*n* = 26; 17%)	NH C (*n* = 49; 31%)	*p*-value
Mean age, year (sf)	81.3 (10.517)	83.7(7.244)	78.4(10.766)	0.083*
Age groups, *n* (%)				
≤70 years	11 (13.6)	2 (12.5)	14 (28.6)	
71–84 years	32 (39.5)	9 (34.6)	17 (34.7)	
84–99 years	38 (46.9)	15 (57.7)	18 (36.7)	
Gender				0.223**
Female	51 (63.0)	17 (65.4)	24 (49.0)	
Male	30 (37.0)	9 (34.6)	25 (51.0)	
Cognitive impairment				
No cognitive impairment	25 (30.9)	14 (53.8)	18 (36.7)	
Mild cognitive impairment	36 (44.4)	5 (19.2)	17 (34.7)	0.062**
Severe cognitive impairment	20 (24.7)	7 (26.9)	14 (28.6)	0.885**
Medication use last 7 days				
Antipsychotics (N05A)	5 (6.2)	9 (34.6)	18 (36.7)	0.001**
Sedatives (N05B)	26 (32.1)	7 (26.9)	12 (24.5)	0.632**
Antidepressants (N06A)	28 (34.6)	13 (50.0)	25 (51.0)	0.126**
Hypnotics (N05C)	35 (43.2)	11 (42.3)	14 (28.6)	0.228**
Medical diagnosis				
Delusions (health condition)	12 (14.8)	4 (15.4)	19 (38.8)	0.001**
Anxiety	44 (54.3)	8 (30.8)	14 (28.6)	0.017**
Alzheimer disease	10 (12.4)	4 (15.4)	10 (20.4)	0.071**
Dementia other than Alzheimer	30 (37.0)	3 (11.5)	13 (26.5)	0.042**
Quality indicators				
Behavioural symptoms affecting others	19 (23.5)	5 (19.2)	16 (32.7)	0.009**
Use of nine or more different medications	40 (49.4)	10 (38.5)	32 (65.3)	0.116**
Antipsychotic drug use in the absence of psychotic and related conditions	3 (3.7)	8 (30.8)	12 (24.5)	0.001**
Antianxiety or hypnotic drug use	42 (51.9)	12 (46.2)	19 (38.8)	0.002**
Hypnotic drug use more than 2 days in past week	33 (40.7)	11 (42.3)	13 (26.5)	0.331**
Depression prevalence	23 (28.4)	9 (34.6)	19 (38.8)	0.658**
Little or no activity	13 (16.1)	9 (34.6)	14 (28.6)	0.198**

* Univariate ANOVA
** Chi-square test

cognitive impairment and gender or age of the resident or NHs (A, B, or C). Antidepressants were the most used psychotropic medication, and they were used by 66 (42.3%) of all 156 residents. Antipsychotics were used by only five residents in NH A, and antipsychotics were used less there than in the other two NHs. The average number of medications used was 9.1 medications per day. One resident did not use any prescribed medications, but 11 (7.1%) residents used more than 17 medications per day. No association was found among how many prescribed medications the residents used and cognitive status, gender, or NH (A, B, or C). The QI of "behavioral symptoms affecting others" was less common in NHs A and B compared with NH C, and in the largest NH (NH A), the QI "antipsychotic drug use in the absence of psychotic and related conditions" was only active for three residents.

Considering psychotropic medication use for the last 7 days according to residents' cognitive impairment, we found an association between cognitive impairment and the use of antipsychotics, as well as antidepressant medications. Residents with severe cognitive impairment used more antipsychotic medications, whereas residents with mild and severe cognitive impairment

used more antidepressants than residents with no cognitive impairment did. In the last 7 days, 50% of residents with severe cognitive impairment used antipsychotic medications, and they were over three times more likely to use antipsychotics (odds ratio [OR] 3.41 [95% confidence interval (CI) 1.32–8.82], *p* = 0.011) compared with residents without cognitive impairment or exhibiting a mild form of cognitive impairment. They were also three times more likely to be prescribed antidepressants than those with absent or mild cognitive impairment (OR 3.32 [95% CI 1.4–-7.70], *p* = 0.005). There was no difference in the prescription of hypnotic sedatives (N05C) and anxiolytics (N05B) according to cognitive status. Residents with cognitive impairment were more often diagnosed with anxiety and delusions (health condition), and residents with severe cognitive impairment were three times more likely to be diagnosed with anxiety compared with those without cognitive impairment (OR 2.97 [95% CI 1.28–6.89], *p* = 0.011). The OR of the QI of "behavioral problems affecting others" among residents with severe cognitive impairment was 28-fold higher compared with those with no impairment (OR 28.125 [95% CI 7.51–105.40], *p* = 0.001). The QI of "prevalence

of depression" increased with more cognitive impairment, and in residents with severe cognitive impairment, the odds were almost 7-fold (OR 6.82 [95% CI 2.66–17.48], p = 0.001), compared to residents without cognitive impairment.

Table 2 shows data from the Directorate of Health for the period of 2016–2018. The mean age of residents was 84.4 years, and 61.7% were women (N = 5,242 RAI-MDS 2.0 assessments). The two medical diagnoses of Alzheimer disease versus Dementia other than Alzheimer disease, were more common in the capital area and the national average than in our three NHs. The data also show that the use of antipsychotics (N05A) was lower in NH A than the national average or the average in the capital area, but the two other NHs used more antipsychotics. It is also noteworthy that, in NH A, only three residents used antipsychotic drugs in the absence of psychotic and related conditions over the three years that were studied; moreover, the occurrence of behavioural problems towards others was similar in NH A compared with the other two NHs, the national average, and the average in the capital area. In addition, the QI "little or no activity" was lower in NH A than in the two other NHs and the national average.

Discussion

This study contributes significantly to the sparse knowledge about the use of psychiatric medication in small rural NHs in Arctic areas. It is noteworthy that the greatest difference between the three NHs was in the use of antipsychotics (NO5A; p < 0.001). The biggest NH in our study, or NH A, had a minimal usage of antipsychotics (6.2%), which would be considered a good outcome. Contradictory results have been reported regarding the use of antipsychotics according to the size of NHs, but in their review, Cioltan et al. [14] claimed that larger NHs in the USA used fewer antipsychotics compared with smaller ones. Here, the QI of "antipsychotic drug use in absence of psychotic and related conditions" was active among 14.7% of residents in the three NHs. However, there was a difference among the three NHs in terms of this QI: Fewer residents in NH A (3.7%) exhibited this QI compared with NH B (30.8%) and NH C (24.5%), and the average for Iceland was 23.9%. This demonstrates the importance of analysing data from each NH for improvements. In addition, NH A used fewer antipsychotics compared with the other two NHs (34.6–36.7%), which used more antipsychotics than the average in the capital area (27.2%), as well as the average for Iceland (23.2%). A nationwide study [25] from Icelandic NHs from the period 1999–2009

demonstrated this QI to be active in 25–30% of all cases, which is comparable to our results.

Researchers have reported prescription of strong psychotropic drugs in NHs to be around 30% [13,26]. A literature review from NHs in 12 Western European countries [27], looking at prescription of antipsychotics (37 studies) and antidepressants (27 studies) during the years 2004–2015, found the pooled prevalence of use of antipsychotics to be 27%. It should be noted that, even though antipsychotics were used less in NH A, the QI of "behavior symptoms affecting others" was not more common there compared to the other two NHs, and the percentage was similar as in the capital area and Iceland. Warnings about adverse events associated with the use of strong psychotropics for older people with dementia and behavioural problems have been discussed over the years [27] and have pointed out that non-pharmacological treatments have shown positive effects in the treatment of behavioural problems [11,28]. Our study showed the OR to be more than threefold that at severe cognitive impairment increased the risk of use of psychotropic medication (antipsychotics; N05A) and antidepressants (N06A) in the last 7 days compared with residents without severe cognitive impairment. In a Canadian study, the risk of being prescribed antipsychotic medications for residents (N = 47,768) newly admitted to NHs was largest if the resident had both cognitive impairment and dementia [29].

The medical diagnoses of Alzheimer disease are more prevalent in the capital area (40.6%) and nationally in Iceland (31.1%) than in our three NHs. One explanation for this could be that, in rural Iceland, there are few specialists in geriatric medicine who can diagnose ADRD specifically [3]. This issue is concerning if it means people in rural areas do not get the right medical diagnosis of Alzheimer disease in time because a delayed diagnosis can affect their opportunities to receive treatment for the disease [30]. However, most people with dementia do not receive a diagnosis, or if they do, this happens late in the disease course [4]. In a study of Norwegian NHs [31], 83.8% out of 696 residents were diagnosed with Alzheimer disease but only 55.9% of those with Alzheimer were registered with medical diagnoses in their medical records. It is known that medical diagnosis is not always documented in medical records [32], but medical diagnosis is the foundation for appropriate treatment.

For people with ADRD, care should be evidence based, and the prescription of antipsychotic medication should be based on professional assessment and that the resident is really in need of the medication. A nationwide study in the USA [26] including 1,257

Table 2. Medical diagnosis and quality indicators. Number and percentage (%) in the three NHs (HH3), the Icelandic capital area (CA) and national average (NA).

	Three rural nursing homes N(%)	NH A N(%)	NH B N(%)	NH C N(%)	Icelandic capital area %	Iceland N(%)
Medical diagnosis						
Alzheimer disease	24 (15.4)	10 (12.3)	4 (15.4)	10 (20.4)	40.6%	1630 (31.1)
Dementia other than Alzheimer disease	46 (29.5)	30 (37.0)	3 (11.5)	13 (26.5)	38.1%	2086 (39.8)
Antipsychotics (N05A) last 7 days	32 (20.5)	5 (6.2)	9 (34.6)	18 (36.7)	27.2%	1478 (28.2)
Quality indicators						
Behavioural symptoms affecting others	40 (25.6)	19 (23.5)	5 (19.2)	16 (32.7)	22.4%	1164 (22.2)
Use of nine or more different medications	82 (52.6)	40 (49.4)	10 (38.5)	32 (65.3)	50.0%	2736 (52.2)
Antipsychotic drug use in the absence of psychotic and related conditions	23 (14.7)	3 (3.7)	8 (30.8)	12 (24.5)	23.3%	1253 (23.9)
Antianxiety or hypnotic drug use	73 (46.8)	42 (51.2)	12 (46.2)	19 (38.8)	59.7%	3119 (59.5)
Hypnotic drug use more than 2 days in past week	57 (36.5)	33 (40.7)	11 (42.3)	13 (26.5)	37.2%	1929 (36.8)
Prevalence of depression	51 (32.7)	23 (28.4)	9 (34.6)	19 (38.8)	NA	NA
Little or no activity	36 (23.1)	13 (16.0)	9 (34.6)	14 (28.6)	27.1%	1625 (31.0)
Total	156	81	26	49	*	5242

* Only % for the CA were available from the Directorate of Health for the years 2016–2018.

NHs, where data (N = 66,181) were collected through interRAI evaluation, reported that around 29% (n = 4,818) of residents received at least one strong antipsychotic medication and 32% (1545) had no identified indication for use of the medication; other studies have supported these findings [33].

What in the rural areas may explain the differences among our three NHs? Although the three NHs are a part of the same healthcare institution, there are multiple elements that are different in their practice. For example, access to medical staff was different; some of the NHs did not have the same doctor evaluating residents from week to week, and thus, residents may not have had stability in their treatment. Only one of the three NHs received annual consultations and visits from a geriatrician. The combination of staff was also different in the NHs, including nurses, nurse assistants, and helpers with no professional education. It is known that staff's attitudes affect how psychotic and related conditions are handled [14] and the challenges the nursing staff may experience due to those symptoms [10].

The eastern part of Iceland has few inhabitants, and people in the local areas often know each other and the relatives of NH residents. This can affect how the local staff approach residents. A difference was evident between the NHs in how many residents moved from other parts of the country to stay in the three NHs. In NH C, over 40% of the residents were not from the local fishing village, whereas in NH A, around 20% were not from the local village. People with ADRD are often sensitive to the familiarity of the environment and local residents might even have had some previous contact with the staff, which can affect both the behaviour of the staff and the residents´.

It is important that small and larger NHs use interRAI-MDS 2.0 results to evaluate and improve the quality of the service they provide. They need to compare QI thresholds to identify the need for improvement for the NH as a whole, as well as for each resident in the NH, to be able to make improvements based on the QIs. One NH in this study (NH C) successfully used the results to work on improvements emphasising QIs concerning the use of psycholeptic medications (NO5A–B and NO5 C). In that process, outcomes from individual QIs were used, as well as the outcome for the whole nursing home.

The strength of the study is that almost all residents in the three NHs were assessed with interRAI-MDS 2.0 during the study period. It can also be considered a strength that benchmarking was conducted between our NHs and national data, giving valuable information for the three NHs. There are however some weaknesses concerning the data that need to be taken into consideration when interpreting the findings of this study. Although the interRAI-MDS 2.0 instrument [34] and the scales [19] are a valuable resource for research some data elements of the instrument have poor inter-rater reliability [20] and therefore caution must be used when interpreting findings. There is also a need for further research on the reliability and validity of the interRAI-MDS 2.0 QI as mixed results have been published and the suitability of the QI for comparisons questioned [35]. It is also a limitation of the study that at the NHs are small with few residents in each NH and therefore the outcome is more sensitive to results of one resident and it limited how many variables could be included into the regression models. As the study was cross-sectional, causality cannot be inferred. In addition, the data used were collected for clinical use, not research. However, the registered nurses responsible for collecting the data were qualified to carry out the assessment.

Conclusion

This study contributes to the sparse knowledge about how small rural Arctic NHs use psychiatric medication, as well as to information about prevalence of dementia and psychiatric symptoms in the NHs. Small rural NHs are understudied, and our NHs are located in sparsely populated areas. That the diagnoses of ADRD were more common in the capital area than in the three NHs stresses the importance of distributing healthcare services into rural areas to increase the accessibility for vulnerable groups, such as residents living in NHs. Benchmarking is beneficial for local and national regulatory bodies to find areas for improvement. We demonstrated that our NHs did not have a lower quality of care compared to the whole country, but there were areas for improvements, and one of the NHs had already started that process, to analyse the use of psycholeptic medications. Indicating how outcomes from individual interRAI-MDS 2.0 QIs, as well as the outcome for the whole nursing home can be used to improve quality of care in NHs.

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ORCID

Arun K. Sigurdardottir 🔟 http://orcid.org/0000-0002-4287-5409

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