OSSI SUTINEN, HELINÄ HAKKO, PIRKKO RIIPINEN, LIISA KANTOJÄRVI

A 10-YEAR TIME TREND ANALYSIS OF ELDERLY PATIENTS IN PSYCHOGERIATRIC WARD IN OULU UNIVERSITY HOSPITAL

ABSTRACT

Psychiatric disorders are relatively common in the elderly, and prevalence of these disorders is parallel to or greater than in younger cohorts. The aim of this study was to examine a 10-year time trend in inpatient episode data of elderly patients, who were treated in the psychogeriatric ward at Oulu University Hospital during 1.1.2012-31.12.2021. Major focuses were on gender differences and inpatient days in main psychiatric diagnoses among patient groups by age: 65-74 years old (young-old), 75-84 years old (middle-old) and >85 years old (oldest-old).

A total of 1034 psychogeriatric inpatient episodes were reported in the study period. 755 (73%) of inpatient episodes were in women and 279 (27%) in men. The proportion of young-old patients significantly decreased (trend test, p=0.009), while those of middle-old patients remained rather stable (p=0.689). In oldest-old patients, an increasing trend was observed (p=0.182), particularly from year 2017 onwards (p=0.074). Among the main three diagnostic groups, affective disorders were the most common, forming 50.8% of diagnoses, followed by psychotic disorders (28.7%) and anxiety disorders (10.5%). The distribution of psychiatric main diagnostic categories was the same in all age groups, except among oldest-old men, in which psychotic disorders were more common than in other age groups. Among age groups, middle-old men with affective disorder diagnosis had longer inpatient episodes than same age women (36.4 days vs. 28.3 days, p=0.013).

Our study also illustrates the need for better means to identify age-related and varied causes of elderly patients being admitted to psychogeriatric wards. These elderly patient groups may need different mental health services in young-old age than in oldest-old age. Elderly persons are known to benefit from timely treatment. Longer delay in appropriate care can lead to greater loss of level of daily functioning in the elderly.

INTRODUCTION

Psychiatric disorders are relatively common in the elderly, and they associate with several social and demographic variables, e.g., age, gender, marital status, education and social support [1] as well as somatic conditions [2,3]. Furthermore, psychiatric disorders may decrease quality of life and even increase mortality [4].

The prevalence of psychiatric disorders among the elderly is equal to or greater than in younger subjects [5,6]. Some estimates suggest that the overall prevalence of psychiatric disorders in the elderly without dementia may be as high as 20-30% [7,8]. Psychiatric comorbidity is also very common. For example, a comorbidity of 50-90% has been reported between depression and anxiety disorders [8].

Depression is a prevalent psychiatric disorder and a common cause of disability among the elderly [9]. The prevalence of depression has varied largely in different studies due to methodological differences. Sjöberg et al. [9] established a 4.2% prevalence of any depression for ICD-10. In addition, 10 to 15% of the elderly are found to exhibit less severe depressive symptoms, not diagnosed as depressive disorders [10]. A review article by Djernes [3] established that female gender, somatic illness, widowhood and a history of depression may be risk factors for depression in the elderly. According to their findings, depression in old patients is often poorly recognized and treated [3].

Anxiety disorders typically develop between childhood and young adulthood. Compared to younger cohorts, lifetime prevalence of anxiety disorders is lower in the elderly [11]. Wolitzky-Taylor et al. [11] have reported that prevalence of anxiety disorders varies by age-specific subgroups within the elderly population from 3.2 to 14.2%, with lowest prevalence reported in the subgroups aged <65 and >85 and highest in the subgroup aged 65-85. Furthermore, anxiety is found to be common among geriatric psychiatric patients and associated with, for example, severity of depression and female gender [12].

Like depression and anxiety, psychotic symptoms and psychotic disorders are relatively common in the elderly population [13,14]. Prevalence is dependent on age, for example, Skoog [8] reports that psychotic disorders are considerably more common among people aged between 85 and 95 than in younger cohorts. Skoog [8] suggests that those aged 70 have a prevalence of 1% for psychotic symptoms whereas the prevalence in older age groups is much higher, 10% and 8% in patients aged 85 and 95, respectively. Psychotic symptoms, e.g., schizophrenia, delusional disorders and schizoaffective disorders, may arise from a primary psychotic disorder or be of secondary origin.

Geriatric psychiatry is a subspecialty of psychiatry, which concentrates on the assessment and treatment of elderly patients [14]. Further, geriatric psychiatric wards are a limited resource in psychiatric hospitals [15]. Previous studies have established that several factors affect the length of stay in hospital among elderly patients, like age, gender and living alone. Furthermore, number of recent psychiatric admissions, involuntary admission and close or constant observation level predict longer hospital length of stay in geriatric patients [1,16]. Previous studies have dealt with factors predicting hospitalization among the elderly population, but there is a lack of studies concerning inpatient episodes among elderly psychiatric inpatients.

The proportion of the elderly, more precisely those of over 65 years of age, has increased in the total population of the world. This trend has some important implications over many fields of society, including healthcare [17]. The elderly population's need for primary and specialized mental health services, as well as welfare and social services, has been recognized in the wellbeing services counties [18]. Further research in psychiatric hospitalization is necessary for study among elderly subjects, planning new psychiatric and health services for the growth of the elderly population [19].

The aim of this study was to examine the 10-year time trend of elderly patients needing inpatient hospitalization in the psychogeriatric ward at Oulu University Hospital during years 2011–2021. Major focuses were on gender differences and inpatient days in main psychiatric diagnoses among patients in three age groups. Patients were divided by Erber's classification [20] in groups by age: 65-74 years old (young-old), 75-84 years old (middle-old) and >85 years old (oldest-old).

DATA SOURCES

STUDY SAMPLE

This register-based study analysed 10-year inpatient episode data of elderly patients, who were treated in the psychogeriatric ward at Oulu University Hospital during 1.1.2012-31.12.2021. The psychogeriatric ward is the only psychiatric ward specialized in psychiatric disorders for patients over 65 years old in the catchment area of Oulu University Hospital in Northern Finland, covering the Wellbeing Services Counties of North Ostrobothnia (Pohde) and Lapland (Lapha). It has 12 inpatient beds for voluntary

and involuntary admissions, except during a three-month period from January to March 2012 (9 beds). During the years 2012-2018, the length of ward closure varied from eight to 66 days. From year 2019 onwards, the ward has been open 24/7 every day of the year [21].

Specialized level psychiatric inpatient care is supposed to offer treatment to patients with psychiatric illness by a multi-professional team (psychiatrist, nurses, psychologist, social worker, occupational therapist, physiotherapist). Besides treating underlying psychiatric diagnoses, it is also necessary to take care of severe somatic comorbidity of the patients. Psychogeriatric inpatient care is based on individual needs, constituting nurse-patient relationships and on-ward events, like different therapeutic groups, medication and, when necessary, methods of neuromodulation, such as transcranial magnetic stimulation (rTMS), transcranial direct current stimulation (tDCS) and electroconvulsive therapy (ECT).

The initial data included 1078 episodes. Those occurring with patients aged under 65 years old (n=44, 4.1%) were excluded from further analysis. Thus, the final data of elderly patients comprised 1034 inpatient episodes.

VARIABLES

The sociodemographic characteristics included gender (female, male) and age of patients. Patients were categorized according to Erber [20] into three age groups: 65-74 years old (young-old), 75-84 years old (middle-old) and >85 years old, (oldest-old).

Our study analyses the primary diagnosis of patients recorded in inpatient episodes. These diagnoses were based on the International Classification of Diseases, tenth revision (ICD-10) [22]. The psychiatric diagnoses were categorized into seven major groups: 1) Organic mental disorders (F0-09), 2) Substance use disorders (F10-19), 3) Psychotic disorders (F20-29), 4) Affective disorders (F30-39), 5) Anxiety disorders (F40-49), 6) Behavioural syndromes associated with physiological disturbances and physical factors and 7) Personality disorders (F60-69). Furthermore, the rest of the diagnoses were analysed in the groups for neurological (G20-G39) and other somatic diagnoses.

The approval for the use of the inpatient episode data for research purposes was obtained from the department of psychiatry at Oulu University Hospital (Permission 9/2023, 19.1.2023).

STATISTICAL ANALYSIS

The statistical significance of group differences in the categorical variables were examined with Pearson's Chi-squared or Fisher's Exact test. All statistical tests were two-tailed and the limit for statistical significance was set at $p<0.05$. The statistical software used in analyses was IBM SPSS Statistics, version 26.

RESULTS

A total of 1034 inpatient episodes were reported for elderly patients treated in the ward of geriatric psychiatry at Oulu University Hospital between 2012-2021. As seen in *Table 1*, 755 (73%) of inpatient episodes were in women and 279 (27%) in men. During this 10-year study period, the annual number of inpatient episodes varied between 87-123 days. The median length of stay varied annually between 22-35 days.

Table 1. Ten-year inpatient episode statistics for elderly patients treated in the psychogeriatric ward at Oulu University Hospital

	Number of Inpatient episodes			Length of stay (in days) in psychogeriatric unit			
Year	Total data	Women n (%)	Men n (%)	sum	median	25 percentile	75 percentile
2012	103	74 (71.8)	29 (28.2)	3137	25	8	42
2013	105	70 (66.7)	35 (33.3)	2489	22	12	35
2014	87	63 (72.4)	24 (27.6)	2937	28	16	48
2015	97	76 (78.4)	21 (21.6)	3299	32	13	46
2016	92	72 (78.3)	20 (21.7)	3226	34	12	48
2017	123	90 (73.2)	33 (26.7)	3567	23	7	39
2018	99	73 (73.7)	26 (26.3)	3770	32	21	50
2019	111	79 (71.2)	32 (28.8)	4089	29	15	49
2020	106	73 (68.9)	33 (31.1)	4041	35	17	49
2021	111	85 (76.5)	26 (23.4)	3697	26	17	41
Total 2012-2021	1034	755 (73.0)	279 (27.0)	34252	28	14	45

During 2012-2018 the length of unit closure varied from 8 to 66 days.
During 2019-2021 the ward was open every day of the year

Among all elderly inpatient episodes in the 10-year time period, 409 (39.6%) were young-old, 510 (49.3%) middle-old and 115 (11.1%) oldest-old. As *Figure 1* shows, during the 10-year time period the proportion of young-old patients significantly decreased (trend test, p=0.009), while that of middle-old patients remained rather stable (p=0.689). In oldest-old patients, an increasing trend was observed (p=0.182), particularly from year 2017 onwards (p=0.074).

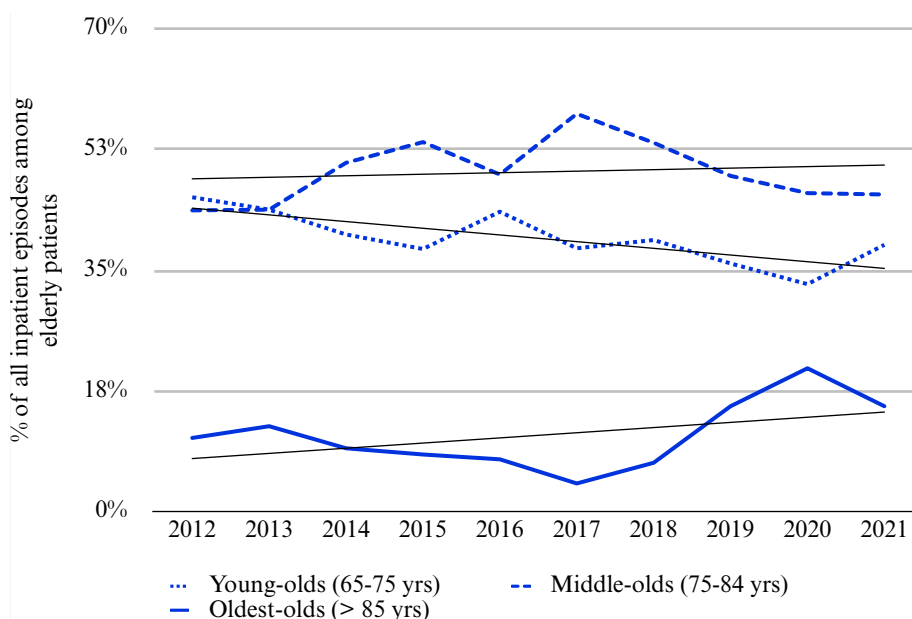Figure 1. Percentages of all inpatient episodes among elderly patients in years 2012-2021

Table 2 presents the most common psychiatric diagnoses in inpatient episodes by main diagnostic groups. Psychiatric diagnoses covered the majority (93.6%) of all diagnoses set in inpatient episodes. In the main three diagnosis groups, affective disorders were the most common, forming 50.8% of diagnoses, followed by psychotic disorders (28.7%) and anxiety disorders (10.5%). The rest of psychiatric diagnoses covered 4.2% of all main diagnoses. Neurological disorders (G20-G39) were recorded in 5.1% and other somatic disorders were 1.3% of all inpatient episodes. The distribution of psychiatric main diagnostic categories was the same in all age groups, except among oldest-old men, in which psychotic disorders were more common than in other age groups.

Table 2. The prevalence of main diagnoses (ICD-10) assessed in inpatient episodes by gender and age groups

	Total data n (%)	All age groups(n=1034)		65-74 years (n=409)		75-84 years (n=510)		85 > years (n=115)	
		Women n (%)	Men n (%)	Women n (%)	Men n (%)	Women n (%)	Men n (%)	Women n (%)	Men n (%)
Psychiatric diagnoses									
Organic mental disorders	33 (3.2)	25 (33.1)	8 (2.9)	10 (3.6)	1 (0.7)	10 (2.6)	5 (4.0)	5 (5.3)	2 (9.5)
Substance use disorders	2 (0.2)	1 (0.1)	1 (0.4)	1 (0.4)	1 (0.7)	0	0	0	0
Psychotic disorders	291 (28.7)	208 (27.5)	83 (29.7)	102 (37.1)	38 (28.4)	80 (20.7)	33 (26.6)	26 (27.7)	12 (57.1)
Affective disorders	525 (50.8)	390 (51.7)	135 (48.4)	116 (42.2)	60 (44.8)	225 (58.3)	71 (57.3)	49 (52.1)	4 (19.0)
Anxiety disorders	109 (10.5)	94 (12.5)	15 (5.4)	34 (12.4)	8 (5.9)	56 (14.5)	5 (4.0)	4 (4.0)	2 (9.5)
Behavioural syndromes	2 (0.2)	2 (0.2)	0	0	0	1 (0.3)	0	1 (1.1)	0
Personality disorders	6 (0.6)	2 (0.2)	4 (1.4)	2 (0.8)	2 (1.4)	0	2 (1.6)	0	0
Psychiatric diagnoses Total	970 (93.6)	722 (95.6)	246 (88.2)	265 (96.4)	110 (82.1)	372 (96.4)	116 (93.5)	85 (90.4)	20 (95.3)
Somatic diagnoses									
Neurological disorders	53 (5.1)	24 (3.2)	29 (10.4)	6 (2.2)	23 (17.2)	11 (2.8)	5 (4.0)	7 (7.4)	1 (4.7)
Other somatic disorders	13 (1.3)	9 (1.2)	4 (1.4)	4 (1.5)	1 (0.4)	3 (0.8)	3 (2.4)	2 (2.1)	0
Somatic diagnoses Total	66 (6.4)	33 (4.4)	33 (11.8)	10 (3.6)	24 (17.9)	14 (3.6)	8 (6.5)	9 (9.6)	1 (4.7)
Total	1034	755 (100)	279 (100)	275 (100)	134 (100)	386 (100)	124 (100)	94 (100)	21 (100)

Figure 2 visualizes the average length (days) of stay of inpatient episodes in main psychiatric diagnoses by gender and age groups of elderly patients. In psychotic disorders, the average length of stay between age groups varied from 33.0 to 46.7 days in men (p=0.210) and from 35.3 to 41.1 days in women (p=0.644). In affective disorders, the length of stay between age groups varied from 36.4 to 41.3 days in men (p=0.941) and from 27.9 to 39.5 days in women (p<0.001). Further, in anxiety disorders, the length of stay between age groups varied from 16.8 to 49.5 days in men (p=0.026) and from 23.2 to 33.3 days in women (p=0.270).

In additional analysis, a significant difference between genders was found in affective disorders in which men had longer inpatient episodes (36.6 days) compared to women (31.5 days, p=0.048). Among the age group middle-old, men with affective disorders had longer inpatient episodes than same age women (36.4 days vs. 28.27 days, p=0.013).

Figure 2. Length of inpatient episode (days) in age groups and in main diagnoses
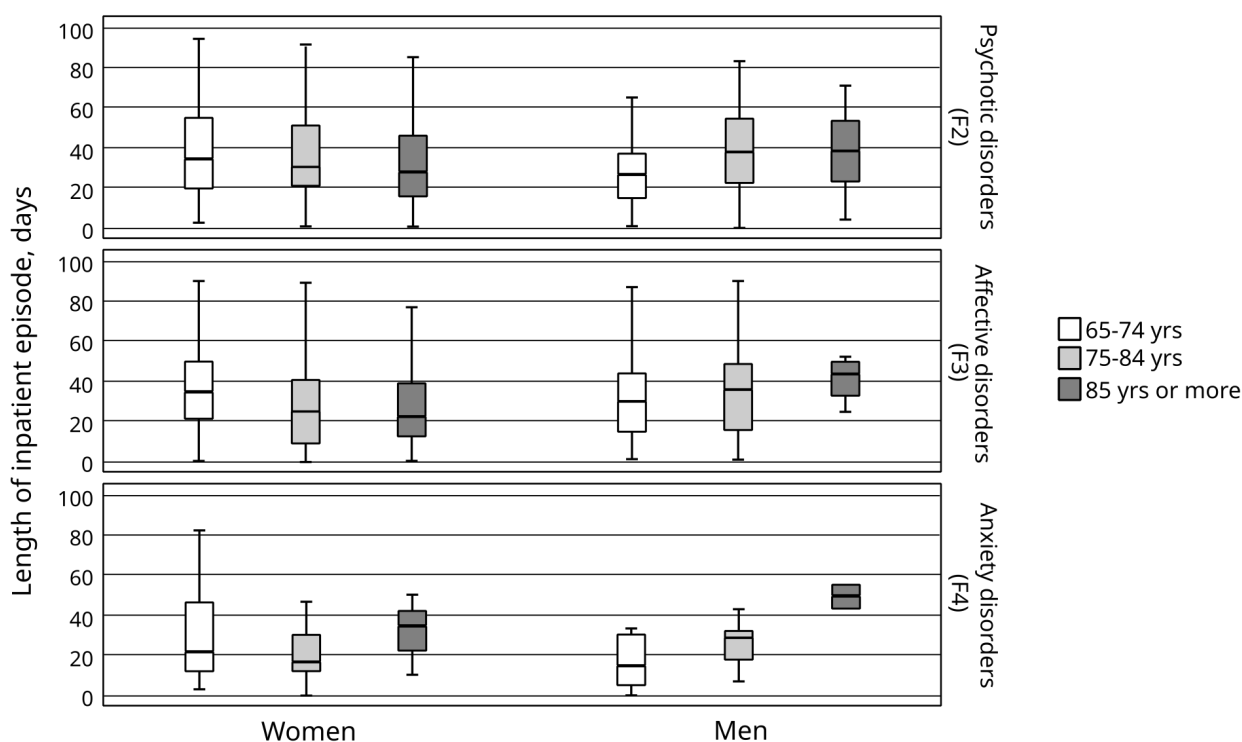
DISCUSSION

The results of our 10-year time trend data of elderly psychiatric inpatients show that the proportion of all hospital episodes that had increased the most was among the oldest-old patients, over 85 years old, in the 10-year study period, particularly from year 2017 onwards. Middle-old and oldest-old patient groups in this study had more inpatient episodes than the proportion of those age groups in the general population [23]. Our finding is in line with a previous Finnish follow-up study, in which depressiveness was found to increase in women from age 80 to 85 years and that men reached the same depressive symptoms at an earlier age than women [24]. A French study by Parent et al. [25] reported that the population of very old patients is increasing and they require appropriate high quality care and prolonged hospitalization. Ageing and a longer life increases risk of experiencing negative consequences, like physical and mental disorders and social isolation [26], which inevitably increases the need for various healthcare services focused on the elderly population.

Affective disorders were the most common diagnoses in our study, accounting for half of the diagnoses in inpatient episodes in all age groups, expect oldest-old male patients. Our finding is in line with previous studies, in which depression in old age has been found to be common among the elderly and also to associate with psychiatric inpatient service utilization [10,27]. In our study, female patients represented the majority of patients treated during the whole ten-year study period. This result is in agreement with earlier research, reporting affective disorders more in women than men [3]. Furthermore, the average length of stay in women was longer in the young-old group compared to older women. One possible reason for this finding may be that those young-old patients may have had more often severe or psychotic depression than older female patients. Previously, it has been found that longer hospital episode associates with patient functional incapacity and negative depressive symptoms, such as anhedonia, loss of interest and lack of motivation and motor retardation [16].

In addition, the average length of inpatient episode in affective disorders was longer in men, especially middle-old age group, compared to same age women. Bergdahl et al. [26] found that depression in old age differs between genders. According to their findings, men had more motivation-related symptoms and agitation, while women had more often mood-related symptoms. Feasible explanations for longer inpatient episodes include health problems, chronic disease

and widowhood, which have previously been associated with depression in males [26]. Further, according to the previous review study by Kessing [28], it has been suggested that some forms of depressive illness, for example, depression before young-old age (before age 65 years) and recurrent depression, may constitute long-term risk factors for development of dementia, whereas the onset of more recent depressive symptoms may reflect a prodromal phase of dementia. Still, it is not clear whether specific subtypes of depression correspond to specific types of dementia.

Future research examining more detailed sociodemographic and clinical factors, which are likely associated with length of inpatient episodes among patients with affective disorders is called for.

Psychotic disorders formed over one-fourth of all diagnoses in inpatient episodes. We found that the average length of hospital treatment in psychotic disorders was longest in middle-olds (75-84 years old patients) in both genders. In a review article, Gopalakrishna et al. [1] showed that psychotic and affective disorders, as well as patient age, was associated with longer length of stay in hospital. Explanations for longer inpatient episodes among elderly patients may be that patients have less social support, are living alone or have poorer overall health [29].

Our study indicates that inpatient episodes with psychotic disorders were more common among oldest-old men than women. Henderson et al. [30] established in their population-based study that risk factors for psychotic symptoms in old age are male gender and cognitive impairment. Previously, it had been established that psychotic symptoms in old people may be a part of prodromal symptoms of dementia [31]. Some estimates suggest that up to 60% of all psychotic episodes in the elderly begin due to onset of a secondary medical condition [13]. Some conditions that may lead to secondary psychotic episodes include metabolic, infectious, neurological and endocrine diseases. This would suggest to diagnose for psychotic symptoms at an early stage, as it has been found to affect several outcomes, such as mortality and somatic disorders [7].

Anxiety disorders formed 10% of psychiatric diagnoses in inpatient episodes in our study. Further, inpatient episodes due to anxiety disorders were twice that of middle-old and oldest-old women than men in the same age groups. Our findings are in line with results from the Berlin Aging study [32] which established that anxiety disorders were slightly more common among females than males among 70-84 years old subjects. They also found that anxiety disorders do not increase with age. One possible explanation for our findings

is that we focused only on main psychiatric diagnoses. In a previous study [2], anxiety feelings associated with females and psychiatric disorders, like comorbid anxiety disorders and depression as well as with dementia. Furthermore, anxiety may also associate with several factors, like social loneliness or somatic comorbidity [32]. Anxiety may be a premorbid symptom of even Parkinson's disease, which is a common progressive neurodegenerative disorder among older adults [33]. Anxiety disorders have been found to have an adverse impact on cognitive functioning ([34], and thus they may weaken performance at home. It has been argued that anxiety among old people is more common than depression, but less studied [34]. Our finding of the association of anxiety disorders and oldest-old patients, however, warrants further studies in large samples of elderly patients from different treatment settings.

In our study, the average length of stay of hospital episode was longer among anxiety disorders with oldest-old patients compared to younger patients. Earlier studies have suggested that anxiety feelings may be associated with depressive disorder or dementia as well as with decreased health and stressful life events, which may be more common in older subjects than in younger [2]. Though anxiety disorders are infrequent in the elderly, they may, however, increase the need for health and social services [35]. In conclusion, our study emphasizes the importance of evaluating the anxiety disorders of oldest-old people, especially those with cognitive impairment or somatic complaints.

The study sample consisted of patients in psychogeriatric ward, and therefore it is obvious that the number of somatic diagnoses marked as main diagnosis was low. Nevertheless, elderly patients may have somatic disorders at the same time as psychiatric disorders. Our focus in this study was the main diagnoses of inpatient episodes and therefore psychiatric and somatic comorbidity was beyond the focus of our analysis. Inpatient episodes and average inpatient days per patient have remained stable with little fluctuation year by year. These differences may be explained by ward closures during 2012-2018, with more patients treated in the ward during years without closure after year 2019.

As is well known, the length of stay of hospital episode may be associated with various demographic, treatment-related and diagnosis-related variables [1]. In order to get a deeper understanding of factors related to psychogeriatric inpatients, further studies by larger databases than ours are called for to investigate the relationship between psychiatric and somatic morbidity in old age.

In terms of our time series data, the Covid-19 pandemic had an impact on the Finnish healthcare system during 2020-2021 [36]. Our study revealed that there was an increase in the proportion of oldest-old inpatient group (aged over 85) in 2020, with a decline in 2021 to near pre-pandemic levels. Notably, in 2021 there occurred a relative increase in proportion of episodes for young-olds. Whether these changes were a result of the pandemic remains an important question for further research.

During the years 2012-2018, the length of closure of the psychogeriatric ward varied from eight to 66 days, mainly because of lack of labour resources due to vacations. We believe, however, that these ward closures may have had only minimal, if any, impact on our main results regarding characteristics of psychogeriatric patients. Unfortunately, no data was available for evaluating generally the impact of ward closure days on the patients needing psychiatric care in the Oulu University Hospital.

Although the psychogeriatric ward is a small unit located in Oulu University Hospital, providing specialized level healthcare, it has several roles in mental health services for the elderly population in the wellbeing services counties of North Ostrobothnia (Pohde) and Lapland (Lapha) in Northern Finland. Firstly, it has a special role for diagnosing and taking care of the most challenging elderly inpatients needing specialized level psychiatric care. Secondly, it has an essential consultation role with geriatric and other healthcare units of the two northernmost wellbeing service counties of Finland. Thirdly, the psychogeriatric unit has an important role in educating trainers in psychiatry and geriatrics in northern Finland.

STRENGTHS

The most important strength of our study is register-based data giving us access to comprehensive follow-up data of all inpatient episodes in the psychogeriatric ward during 2012-2021. Another strength is that all psychiatric diagnoses were based on clinicians' judgement. Diagnoses were analysed using ICD-10 diagnostic criteria, which means our findings can easily be compared to international studies. Studies based on Finnish healthcare register data have been shown to be satisfactory for research purposes [37,38].

LIMITATIONS

Our study has several limitations. We had no access to hospital case notes. Thus, this study does not include information on patients' comorbid psychiatric and somatic

diagnoses, medication or methods of treatment and other medically relevant data. Further studies on psychiatric comorbidity and medication among elderly inpatients are, therefore, required. One limitation was that the impact of involuntary stays versus voluntary stays on the length of hospitalization could not be analysed because of lack of that information. Finally, our study sample consisted of severe, hospitalized manifestations of the psychiatric disorders. Unfortunately, in this study we had no access to the register data of other psychiatric and geriatric healthcare wards located in the catchment area of Oulu University Hospital. It is likely that the age and diagnostic distribution in these units is different than in our study, which utilized the specialized level register data of psychogeriatric patients. This limits the ability to generalize our findings to all old people with less severe mental health problems.

CONCLUSIONS

The findings of our register-based study of hospitalized psychogeriatric inpatients brings a novel insight into current psychiatric inpatient care involving elderly patients. The ageing of the population has had an impact on many fields of society, including healthcare. Our study also illustrates the need for better means to identify those different aged elderly patients in need of psychiatric care. These elderly patient groups may need different mental health services in young-old age than in middle-old age. Elderly subjects are known to highly benefit from timely treatment. Longer delay in appropriate care can lead to greater loss of level of daily functioning and have adverse effects on the quality of life of the elderly. Our results could be used when planning mental health services for the elderly population in wellbeing service counties, as well as in the allocation of healthcare resources.

Authors

Sutinen Ossi, MD[1]
Hakko Helinä, PhD[2]
Riipinen Pirkko, MD, PhD[1]
Kantojärvi Liisa, MD, PhD[2]

[1] Department of Psychiatry, Research Unit of Clinical Medicine, University of Oulu, Finland
[2] Oulu University Hospital, Department of Psychiatry, Finland

Correspondence

Liisa Kantojärvi
Department of Psychiatry
Oulu University Hospital and University of Oulu
P.O. BOX 10,
FIN 90029 OYS, Finland

liisa.kantojarvi@oulu.fi

References

1. Gopalakrishna G, Ithmnan M, Malwitz K. Predictors of length of stay in a psychiatric hospital. Int J Psychiatry Clin Parct 2015;19:239-245.

2. Forsell Y, Winblad B. Feelings of anxiety an associates variables in a very elderly population. Int J Geriatric Psychiatry 1998;13:454-458.

3. Djernes JK. Prevalence and predictors of depression in populations of elderly: a review. Acta Psychiatr Scand 2006;113(5):372-387.

4. Almeida OP, Hankey GJ, Yeap BB, Golledge J, Norman PE, Flicker L. Mortality among people with severe mental disorders who reach old age: A longitudinal study of a community-representative sample of 37892 men. PLOS ONE 2014; 9(10)3111882.

5. Gálvez V, Ho KA, Alonzo A, Martin D, George D, Loo CK. Neuromodulation therapies for geriatric depression. Curr Psychiatry Rep 2015;17:59.

6. Colijn MA, Nitta BH, Grossberg GT. Psychosis in later life: A review and update. Harv Rev Psychiatry 2015;23:354-67.

7. Skoog I. Psychiatric epidemiology of old age: the H70 study – the NAPE Lecture 2003. Acta Psychiatr Scand 2004;109:4-18.

8. Skoog I. Psychiatric disorders in the elderly. Can J Psychiatry 2011;56:387–397.

9. Sjöberg L, Karlsson B, Atti A-R, Skoog I, Fratiglioni L, Wang H-X. Prevalence of depression: Comparisons of different depression definitions in population-based samples of older adults. J Affect Disord 2017;(221):123-131.

10. Kok RM, Reynolds CF. Management of depression in older adults: A review. JAMA 2017;317:2114-2122.

11. Wolitzky-Taylor KB, Castriotta N, Lenze EJ, Stanley MA, Craske MG. Anxiety disorders in older adults: a comprehensive review. Depress Anxiety 2010;27:190-211.

12. Bakkane Bendixen A, Engedal K. Anxiety among older psychiatric patients: a hidden comorbidity? Aging Ment Health 2016;20(11):1131-1138.

13. Reinhardt MM, Cohen CI. Late-life psychosis: diagnosis and treatment. Curr Psychiatry Rep 2015;17:1.

14. Colijn MA, Nitta BH, Grossberg GT. Psychosis in later life: A review and update. Harv Rev Psychiatry 2015;23(5):354-367.

15. Hiltunen P 1999. Psychiatric consultation in general hospital in Finland. Referrals under and over 65 to liaison psychiatrists (Doctoral dissertation, University of Oulu). Acta Universitatis Ouluensis D, Medica1999;567.

16. Ismail Z, Arenovich T, Grieve C, Sajeev G, Mamo DC et al. Predicting hospital length of stay for geriatric patients with mood disorders. Can J Psychiatry 2012;57(11):696-703.

17. OECD. Elderly population (Indicator). 2022. doi 10.1787/8d805ea1-en (Accessed on 02 November 2022).

18. The Wellbeing Services County of North Ostrobothnia. htpps://Pohde.fi.

Sutinen et al.   *A 10-year time trend analysis of elderly patients in*
psychogeriatric ward in Oulu University Hospital

120

19. De Rango F, Montesanto A, Berardelli M, Mazzei B, Mari V, et al. To grow old in Southern Italy: A comprehensive description of the old and oldest old in Calabria. Gerontlogy 2011;57:327-334.

20. Erber JT. Aging and older adulthood. 4th ed. Wiley Blackwell 2019.

21. Oulu University Hospital, division of psychiatry. Annual reports on ward of geriatric psychiatry 2012-2021.

22. Tautiluokitus ICD-10. Sosiaali- ja terveysalan tutkimus- ja kehittämiskeskus. 1995. https://urn.fi/URN:NBN:fi-fe201205085423.

23. Tilastokeskus, Statistics Finland 2022.www.stat.fi/tietokantataulukot.

24. Heikkinen R-L, Kauppinen M. Depressive symptoms in late life: a 10-year follow-up. Arch Gerontolygy and Geriatrics 2004;38:239-250.

25. Partent V, Ludwig-Béal S, Sordet-Guépet H, Popitéan L, Camus A et al. Prolonged stays in hospital acute geriatric care unites: Identification and analysis of causes. Geriatr Psychol Neuropsychiatr Vieil 2016;1:14(2):135-141.

26. Bergdahl E, Allard P, Alex L, Lundman B, Gustafson Y. Gender differences among very old. Int Psychogeriatrics 2007;19(6):1125-1140.

27. Choi S, Rozario P, Morrow-Howell N, Proctor E. Elders with first psychiatric hospitalization for depression. Int J Geriatr Psychiatry 2009;24(1):33-40.

28. Kessing LV. Depression and the risk for dementia. Curr Opin Psychiatry 2012;25:457-461.

29. Pertile R, Donisi V, Grigoletti L, Angelozzi A, Zamengo G et al. DRGs and other patient-, service- and area-level factors influencing length of stay in acute psychiatric wards: the Veneto. Veneton experience. Soc Psychiatry Psychiatric Epidemiol 2010;1-10.

30. Henderson AS, Korten AE, Levings C, Jorm AF, Christensen H et al. Psychotic symptoms in the elderly: A prospective study in a population sample. Int J Geriatr Psychiatry 1998;13:484-492.

31. Östling S, Bäckman K, Sigström R, Skoog I. Is the prevalence of psychosis in the very old decreasing? A comparison of 85-year-olds born 22 years apart. Int J Geriatr Psychiatry 2019;34:1776-1783.

32. Scahub RT, Linden M. Anxiety and anxiety disorders in the old and very old--results from the Berlin Aging Study (BASE. Compr Psychiatry 2000;41 (2 Suppl 1):48-54.

33. Beitz JM. Parkinson's disease: a review. Frontiers in Bioscience 2014; S6:56-74.

34. Blau SL, Marinho V. Anxiety disorders in old age. Curr Opin Psychiatry 2012;25:462-467.

35. Lloyd KR, Jenkins R, Mann A. Long term outcome of patients with neurotic illness in medical practice. Br Med J 1996;313;26-28.

36. Summanen M, Kosunen M, Kainu V, Cansel A, Niskanen S et al. COVID-19 hospitalisations and all-cause mortality by risk group in Finland. PLOS One 2023; 18(5): e0286142.

37. Miettunen J, Suvisaari J, Haukka J, Isohanni M. Use of register data for psychiatric epidemiology in the Nordic countries: Textbook of psychiatric epidemiology. In: Tsuang M, Tohen M, Jones P (ed) Textbook of psychiatric epidemiology. Wiley-Balckwell 2011. pp 117-131.

38. Sund R. Quality of the Finnish Hospital Discharge Register: a systematic review. Scand J Publ Health 2012;40(6):505-515.