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Changes in antipsychotic drug usage and factors affecting the use of typical drugs based on nationwide health insurance data in South Korea

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ABSTRACT

Objectives To determine changes in antipsychotic drug usage in all South Korean patients with schizophrenia in 2011–2015 and factors affecting their utilisation in 2015.

Design and setting Retrospective cohort study using health insurance claims data on patients with schizophrenia in South Korea in 2011–2015.

Participants All treated patients with schizophrenia in South Korea in 2011–2015. The number of patients with schizophrenia was 171 302 in 2011, 175 488 in 2012, 177 763 in 2013, 180 079 in 2014 and 183 427 in 2015.

Main outcome measures Changes in antipsychotic drug usage and factors affecting the use of antipsychotics.

Results Among patients with schizophrenia, there were tendencies of decreased use of antipsychotic combination therapy of typical drugs (from 11.5% to 7.5%) but increased use of combination therapy of atypical drugs (from 21.8% to 29.0%). Factors affecting the use of typical drugs were sex, age, geographical region, type of benefits/insurances and type of medical institutions. Use of typical antipsychotics was increased by age (OR=1.02, 95% CI 1.02 to 1.02). It was higher in men (OR=1.27, 95% CI 1.23 to 1.30) than that in women. It was higher in Medicaid benefiters (OR=4.49, 95% CI 4.35 to 4.64) than that in patients with health insurance. Use of typical drugs was higher among patients treated in general hospitals (OR=1.46, 95% CI 1.32 to 1.64), primary hospitals (OR=3.25, 95% CI 2.95 to 3.59), long-term care hospitals (OR=3.00, 95% CI 2.59 to 3.49) and clinics (OR=8.87, 95% CI 8.06 to 9.76) compared with that in tertiary care hospitals. Compared with metropolitan region, higher use of typical antipsychotics was seen in Gangwon (OR=1.14, 95% CI 1.05 to 1.25), Jeolla (OR=1.32, 95% CI 1.26 to 1.39) and Gyeongsang (OR=1.14, 95% CI 1.10 to 1.18) provinces.

Conclusions Results of this study confirmed changes of antipsychotic drug usage from typical to atypical antipsychotics in the treatment of schizophrenia and identified factors affecting the use of typical drugs, in contrast with current treatment trend in South Korea. These results may be used in the improvement of a medical system.

Strengths and limitations of this study

► This study included all patients treated for schizophrenia in South Korea. Therefore, these results are representative of patients with schizophrenia in South Korea.
► This study confirmed a tendency of antipsychotic drug use in patients with schizophrenia based on their medical records.
► The analysis was conducted by classifying patients into those receiving Medicaid and health insurance to exclude the effect of health insurance system. Therefore, this study showed factors underlying the prescription trend irrespective of socioeconomic status.
► Data of this study did not provide information on the severity of patients' condition. Therefore, we cannot determine changing patterns of prescription based on severity or altered dosage of antipsychotics (defined daily doses).

INTRODUCTION

Mental disorder is not limited to a specific group, region, country or society.[1] According to World Economic Forum, mental illness related costs were $8.5 billion in 2010, exceeding costs for cardiovascular disease, cancer and chronic respiratory disease. Costs associated with mental disorders are increasing rapidly. They could double by 2030.[2]

Medical and social costs associated with mental illnesses in South Koreans are very high.[3 4] In modern South Korea, 25.4% of the population had been diagnosed with a mental disorder more than once in their lives. Lifetime prevalence of schizophrenia spectrum disorders is estimated to be 0.5% among the total population.[5] Schizophrenia negatively affects a patient's life.[6] Patients with schizophrenia lack social skills[7] and display diminished cognitive functions that cause difficulty in adaptation to society and disrupt their normal social support network.[8 9] Without

proper treatment, patients have difficulty in living a normal daily life due to decline in function, relapse and worsening symptoms.[10] To minimise decline in patients' quality of life due to schizophrenia and reduce social cost, aggressive treatment at an early stage is needed.

The most important treatment for schizophrenia is the use of antipsychotics.[11] Since the advent of chlorpromazine in 1950s, many drugs have been developed. They can be divided into two categories: (1) classical antipsychotic drugs. They work by blocking dopaminergic receptor. However, they can produce involuntary movement disorder by blocking the extrapyramidal system; and (2) atypical antipsychotic drugs. They are effective for schizophrenia. However, they significantly reduce extrapyramidal symptoms by simultaneously blocking dopaminergic and serotonin receptors. The current first-line treatment of schizophrenia is atypical antipsychotics.[12] Since atypical drugs have less side effects (extrapyramidal symptom and hyperprolactinaemia) compared with typical drugs, drug compliance is high. They can lower relapse due to drug withdrawal despite their relatively high cost. Many studies have reported that atypical antipsychotic drugs are cost-effective considering both direct and indirect costs.[13–15] The practice guideline for treating patients with schizophrenia in South Korea also recommends atypical antipsychotic drug as a first-line therapy.[16] Previous research studies on antipsychotic use have only been conducted on patients who are treated in designated hospitals.[17–20] Thus, antipsychotics use in all patients with schizophrenia in South Korea are currently unknown.

In South Korea, patients are covered by Medicaid and health insurance. Approximately, 96% of South Korean population are covered by the national health insurance while the rest (4%) of the population with an annual assessment of poverty status are covered by a separate programme called Medicaid. Almost all Medicaid patients' treatment is supported by the government financially.[21] Treatment of patients with schizophrenia differs by the type of health insurance.[22] However, no study has reported the prescription of antipsychotics by health insurance in South Korea. Thus, the objective of this study was to determine changes of antipsychotic use among patients with schizophrenia in South Korea and factors affecting their usage.

METHODS
Data
This was a retrospective study using health insurance claims data provided by the Health Insurance Review and Assessment (HIRA) from January 2011 to December 2015. In South Korea, 98% of the population is covered by the national health insurance system. Thus, claims data represent the whole population treated for a specific illness with the exception of those two per cent of citizens living abroad or serving as soldiers.[23] Presently, a patient with schizophrenia is defined as a person diagnosed with code F20 based on the International Classifcation of Diseases, 10th Revision (ICD-10) disease classification

system. Drug specifications records were used to identify drugs prescribed to subjects. Among these drugs, lists of antipsychotic drugs were extracted. Based on the prescription data, drugs were classified into seven categories (typical drug monotherapy, combination therapy of two or more typical drugs, atypical drug monotherapy, combination therapy of two or more atypical drugs, combination therapy of typical and atypical drugs, monotherapy of long-acting injectable antipsychotics and combination therapy of oral antipsychotics and long-acting injectable antipsychotics). Changes in antipsychotic drug usage from 2011 to 2015 were then confirmed. Factors affecting drug use at first visit to medical institutions in 2015 were classified into two categories: typical drug use only (including the use of multiple typical drugs) and atypical drug use only (including the use of multiple atypical drugs). Region data were collected based on the location of medical institutions among 16 cities and provinces (online supplementary figure 1). Medical institutions were categorised into tertiary care hospital, general hospital, primary hospital, long-term care hospital and clinic in accordance with the South Korean classification system. These medical institutions variables are classified based on the number of beds: clinics, <30 beds; primary hospitals, 30–99 beds; long-term care hospitals, 30–99 beds, but with focus on nursing; tertiary hospitals, >99 beds, and general hospital, >99 beds. The difference between tertiary hospitals and general hospital is quality of medical service. The government evaluates general hospitals and then designates some general hospitals to tertiary hospitals based on results of evaluation. Based on receipt of Medicaid benefit, subjects were divided into Medicaid patients and health insurance patients.

Patient selection
Among HIRA claim data of 50 million patients who visited medical institutions in South Korea from 2011 to 2015, 96 618 772 medical records of patients diagnosed as F20–F29 of ICD-10 were extracted. In pooled data, the number of patients with schizophrenia with F20 as a main disease code was 888 061. Data for subjects whose age was unidentified were excluded. The number of patients with schizophrenia was 171 302 in 2011, 175 488 in 2012, 177 763 in 2013, 180 079 in 2014 and 183 427 in 2015 (figure 1). Sociodemographic information on subjects was based on information at the first diagnosis.

Statistical analyses
In this study, continuous variables are presented as average ±SD deviation while categorical variables are shown as frequency and percentage. To analyse the difference between groups prescribed with typical and atypical drugs, t-test was performed for continuous variables while χ^2 test was performed for categorical variables. Using logistic regression analysis, OR of typical drug use was measured based on demographics. A subgroup analysis was performed by Medicaid benefit to exclude the influence of the Medicaid system in South Korea. OR and 95%
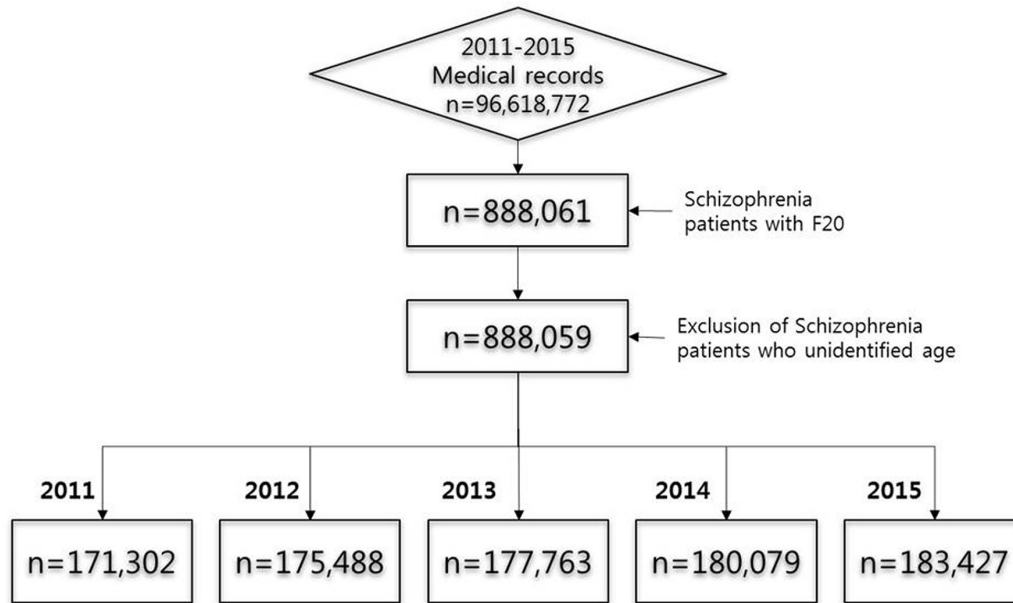
Figure 1 Subject selection flow chart.

CIs were obtained while controlling for sex, age, region, Medicaid benefit and medical institutions. SAS Enterprise Guide V.6.1 was used as all statistical analyses.

Patient involvement
No patients were involved in developing the hypothesis, the specific aims or the research questions, nor were they involved in developing plans for design or implementation of the study. No patients were involved in the interpretation of study results or write up of the manuscript. There are no plans to disseminate the results of the research to study participants or the relevant patient community.

RESULTS
Changes in prescription of antipsychotics from 2011 to 2015
The number of patients with schizophrenia was 171 302 in 2011. It was increased to 183 427 in 2015. The average age

of these patients was 46.2 years in 2011 and 48.5 years in 2015. During this period, the frequency of atypical drug monotherapy was the highest while the frequency of long-acting injectable antipsychotics was the lowest. The use of typical drugs was steadily decreased while the number of cases with combination therapy of multiple atypical drugs was continuously increased (table 1).

Sociodemographic characteristics of patients with schizophrenia taking typical or atypical drugs in 2015
Patients treated for their schizophrenia in 2015 were classified into two groups; see table 2. More typical drugs were used in men compared with women. They were also used more in older subjects. Medicaid-benefited patients, patients who were treated at primary hospitals, long-term care hospitals, clinics and patients outside the metropolitan region (with the exception of Jeju region) also used more typical drugs than atypical drugs.

Table 1 Number of patients with schizophrenia and antipsychotics prescription pattern in 2011–2015

Schizophrenia	2011 n (%)=171 302	2012 n (%)=175 488	2013 n (%)=177 763	2014 n (%)=180 079	2015 n (%)=183 427
Average age (year)	46.2	46.8	47.3	47.9	48.5
Total drugs	1 767 500	1 933 179	1 971 744	1 994 756	2 016 305
First gen.	195 147 (11.04)	197 432 (10.21)	183 554 (9.31)	165 606 (8.30)	151 860 (7.53)
1+1 combi	203 485 (11.51)	193 162 (9.99)	180 141 (9.14)	165 250 (8.28)	150 459 (7.46)
1+2 combi	348 736 (19.73)	381 038 (19.71)	397 294 (20.15)	401 483 (20.13)	408 454 (20.26)
Second gen.	595 689 (33.70)	661 154 (34.20)	663 118 (33.63)	660 788 (33.13)	656 942 (32.58)
2+2 combi	385 061 (21.79)	450 116 (23.28)	492 309 (24.97)	541 465 (27.14)	584 469 (28.99)
LAI+drug	36 279 (2.05)	40 438 (2.09)	42 236 (2.14)	44 989 (2.26)	47 968 (2.38)
LAI	3103 (0.18)	9839 (0.51)	13 092 (0.66)	15 175 (0.76)	16 153 (0.80)

Combi, Combination therapy of two or more antipsychotics drugs; LAI, Long-acting injection.

ORs of typical drug use by sociodemographic characteristics

When we analysed the use of typical antipsychotics taking sociodemographic characteristics into account, statistically significant differences were found for sex, age, geographical region, type of benefit/insurance and type of medical institutions (table 3). Men were prescribed typical antipsychotics more often than women (OR=1.27, 95% CI 1.23 to 1.30). Regarding age, OR of typical drug use was 1.02 (95% CI 1.02 to 1.02) which was high as age was increased by year. In terms of regions, three provinces (Gangwon, Jeolla and Geyongsang) displayed higher and one place (Jeju) showed lower usage of typical antipsychotics when compared with metropolitan region (table 3). OR of typical drug use in Medicaid patients was 4.49 (95% CI 4.35 to 4.64), which was higher compared with that of health insurance patients. In terms of medical institutions compared with tertiary hospitals, ORs of typical drug use in general hospitals, primary hospitals, long-term care hospitals and clinics were 1.47 (95% CI

1.32 to 1.64), 3.26 (95% CI 2.95 to 3.59), 3.00 (95% CI 2.59 to 3.49) and 8.87 (95% CI 8.06 to 9.76), respectively.

ORs of typical drug use by sociodemographic factor of patients on health insurance and Medicaid

After adjusting for sociodemographic factors, ORs of typical drug use by sex, age, region and medical institutions in patients on health insurance and Medicaid were determined. ORs of typical drug use in men compared with women were 1.23 (95% CI 1.18 to 1.27) and 1.34 (95% CI 1.28 to 1.41) in the health insurance group and the Medicaid group, respectively. Thus, typical drug use in both groups was significantly higher in men than that in women (figure 2).

In terms of OR by age in health insurance patients, compared with patients ≤19 years of age, ORs of typical drug use in patients 30–39, 40–49, 50–59, 60–69, 70–79 and ≥80 years of age were 2.06 (95% CI 1.55 to 2.72), 4.66 (95% CI 3.54 to 6.13), 7.83 (95% CI 5.95 to 10.30), 7.41

Table 2 Sociodemographic factors of patients with schizophrenia divided with regard to the type of antipsychotic used

Characteristics	Categories	Typical (n=25 579) n (%) or M±SD	Atypical (n=1 13 949) n (%) or M±SD	Total (n=1 39 528)	P values
Sex	Women	11 961 (16.77)	59 359 (83.23)	71 320 (100.0)	<0.0001
	Men	13 618 (19.97)	54 590 (80.03)	68 208 (100.0)	
Age		52.83 ±10.92	47.58 ±14.39	48.55±13.12	<0.0001
Region					
Metropolitan region	Seoul	3963 (13.82)	24 711 (86.18)	28 674 (100.0)	<0.0001
	Incheon	969 (16.60)	4867 (83.40)	5836 (100.0)	
	Gyeonggi	4420 (17.24)	21 217 (82.76)	25 637 (100.0)	
Gangwon	Gangwon	716 (17.40)	3400 (82.60)	4116 (100.0)	
Chungcheong	Daejeon	1068 (21.83)	3825 (78.17)	4893 (100.0)	
	Chungbuk	1036 (19.35)	4319 (80.65)	5355 (100.0)	
	Chungnam	1078 (19.29)	4509 (80.71)	5487 (100.0)	
Jeolla	Kwangju	647 (16.72)	3223 (83.28)	3870 (100.0)	
	Jeonbuk	1727 (29.75)	4078 (70.25)	5805 (100.0)	
	Jeonnam	1595 (22.51)	5491 (77.49)	7086 (100.0)	
Gyeongsang	Busan	2749 (23.95)	8731 (76.05)	11 480 (100.0)	
	Daegu	1268 (15.22)	7061 (84.78)	8329 (100.0)	
	Ulsan	400 (18.40)	1774 (81.60)	2174 (100.0)	
	Gyeongbuk	1980 (22.12)	6971 (77.88)	8951 (100.0)	
	Gyeongnam	1766 (17.36)	8405 (82.64)	10 171 (100.0)	
Jeju	Jeju	197 (12.60)	1367 (87.40)	1564 (100.0)	
Benefit	Medicaid	8187 (9.57)	77 353 (90.43)	85 540 (100.0)	<0.0001
	Health insurance	17 392 (32.21)	36 596 (67.79)	53 988 (100.0)	
Medical institutions	Tertiary care hospital	477 (2.94)	15 739 (97.06)	16 216 (100.0)	<0.0001
	General hospital	1563 (7.69)	18 759 (92.31)	20 322 (100.0)	
	Primary hospital	10 777 (18.05)	48 917 (81.95)	59 694 (100.0)	
	Long-term care hospital	412 (15.96)	2169 (84.04)	2581 (100.0)	
	Clinic	12 350 (30.33)	28 365 (69.67)	40 715 (100.0)	

Table 3 OR of typical drug use by sociodemographic characteristics

Characteristics	Categories	Typical	Atypical	OR (95% CI)
Sex*	Women	11 961	59 359	1.00 (reference)
	Men	13 618	54 590	1.27 (1.228 to 1.303)
Age†		52.83	47.58	1.02 (1.020 to 1.022)
Region‡	Metropolitan region	9352	50 795	1.00 (reference)
	Gangwon	716	3400	1.14 (1.045 to 1.254)
	Chungcheong	3182	12 653	1.04 (0.985 to 1.087)
	Jeolla	3969	12 792	1.32 (1.264 to 1.386)
	Gyeongsang	8163	32 942	1.14 (1.097 to 1.179)
	Jeju	197	1367	0.62 (0.530 to 0.733)
Benefit§	Health insurance	8187	77 353	1.00 (reference)
	Medicaid	17 392	36 596	4.49 (4.349 to 4.641)
Medical institutions¶	Tertiary care hospital	477	15 739	1.00 (reference)
	General hospital	1563	18 759	1.47 (1.317 to 1.635)
	Primary hospital	10 777	48 917	3.26 (2.951 to 3.590)
	Long-term care hospital	412	2169	3.00 (2.587 to 3.485)
	Clinic	12 350	28 365	8.87 (8.060 to 9.762)

*Adjusted for age, region, medical institutions and Medicaid benefit.
†Adjusted for sex, region, medical institutions and Medicaid benefit.
‡Adjusted for sex, age, medical institutions and Medicaid benefit.
§Adjusted for sex, age, region and medical institutions.
¶Adjusted for sex, age, region and Medicaid benefit.

(95% CI 5.61 to 9.78), 5.34 (95% CI 4.00 to 7.12) and 3.36 (95% CI 2.44 to 4.64), respectively. In Medicaid patients compared with patients≤19 years of age, ORs of typical drug use in patients 20–29, 30–39, 40–49, 50–59, 60–69, 70–79, and ≥80 years of age were 1.62 (95% CI 1.15 to 2.29), 2.13 (95% CI 1.54 to 2.95), 3.03 (95% CI 2.20 to 4.17), 4.00 (95% CI 2.95 to 5.30), 3.88 (95% CI 2.61 to 4.78), 2.60 (95% CI 2.00 to 3.12) and 1.83 (95% CI 1.44 to 2.64), respectively (figure 3).

In terms of OR of typical drug use in health insurance patients by region, compared with metropolitan region,

ORs in Gangwon, Jeolla and Gyeongsang provinces were 1.19 (95% CI 1.03 to 1.39), 1.23 (95% CI 1.14 to 1.33) and 1.20 (95% CI 1.14 to 1.27), respectively. The OR of 0.57 (95% CI 0.44 to 0.73) in Jeju was quite low. ORs of typical drug use in Medicaid patients in Chungcheong, Jeolla and Gyeongsang provinces were 1.09 (95% CI 1.02 to 1.16), 1.35 (95% CI1.26 to 1.43) and 1.10 (95% CI 1.05 to 1.15), respectively, compared with that in metropolitan region. It was 0.67 (95% CI 0.54 to 0.83) in Jeju (figure 4).

In terms of OR of typical drug use in health insurance patients by medical institutions, compared with
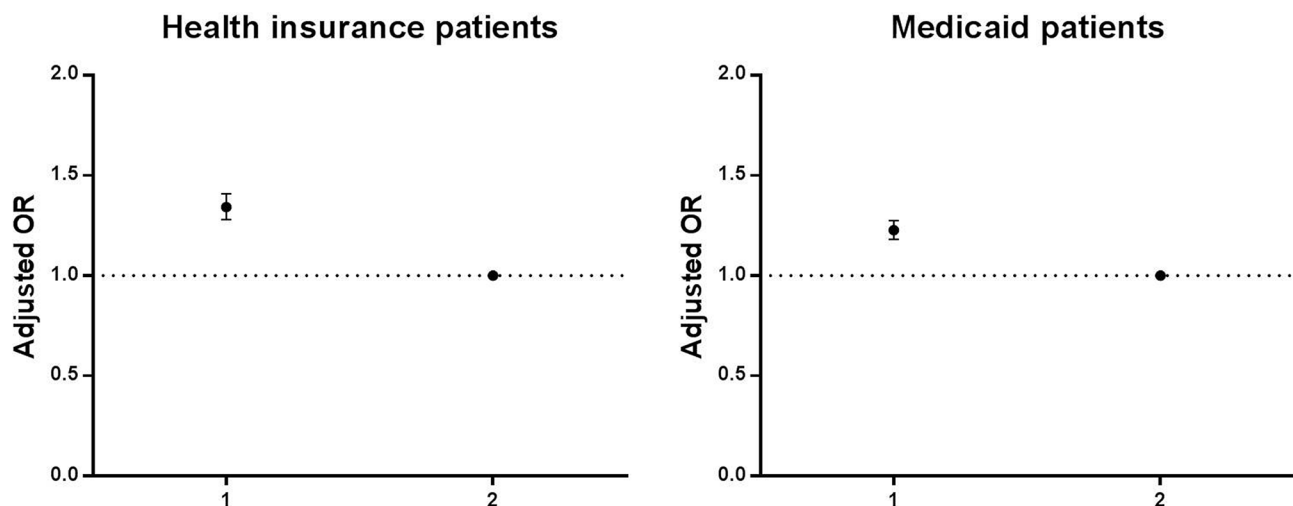

Figure 2 Typical drug use by sex in patients divided by the type of health insurance coverage. 1: Men, 2: Women. Adjusted for age, region and medical institutions.
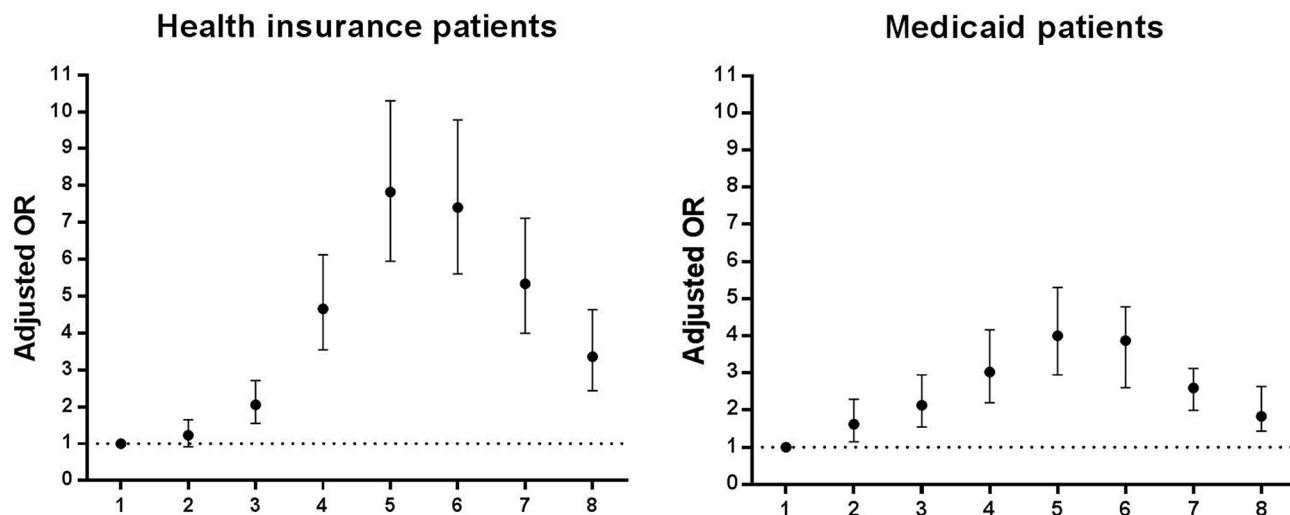
Health insurance patients

Medicaid patients

Figure 3 Typical drug use by age in patients divided by the type of health insurance coverage. 1: ≤19 years, 2: 20–29 years, 3: 30–39 years, 4: 40–49 years, 5: 50–59 years, 6: 60–69 years, 7: 70–79 years and 8: ≥80 years. Adjusted for sex, region and medical institutions.

tertiary care hospitals, ORs in general hospitals, primary hospitals, long-term care hospitals and clinics were 1.35 (95% CI 1.18 to 1.55), 2.95 (95% CI 2.62 to 3.31), 2.00 (95% CI 1.54 to 2.59) and 8.66 (95% CI 7.76 to 9.67), respectively. In Medicaid patients, compared with tertiary care hospital, ORs in general hospitals, primary hospitals, long-term care hospitals and clinics were 1.77 (95% CI 1.44 to 2.17), 3.94 (95% CI 3.24 to 4.80), 4.14 (95% CI 3.27 to 5.24) and 10.22 (95% CI 8.41 to 12.43), respectively (figure 5).

DISCUSSION

This study was conducted on patients with schizophrenia in South Korea from 2011 to 2015 using HIRA database to investigate changes in antipsychotic use in South Korea and statistically analyse the impact of demographic factors on typical antipsychotic use.

The number of patients diagnosed with schizophrenia in South Korea was increased from 171 302 in 2011 to 183 427 in 2015. Such increase may have been due to decline in mortality of patients with schizophrenia. It has been reported that the death rate of patients with schizophrenia is increased continuously compared with the general population, peaking in 1995 followed by subsequent decline.[24] Thus, the increase shown in this study likely reflects recent decreased death rates in this patient group. The average age of patients with schizophrenia included in this study was increased from 46.2 years in 2011 to 48.5 years in 2015, coinciding with the decline in death rate.

The use of typical drugs in patients with schizophrenia was decreased from 2011 to 2015. Meanwhile, the use of combination therapy of two or more atypical drugs has increased. Increase in atypical antipsychotic use has been
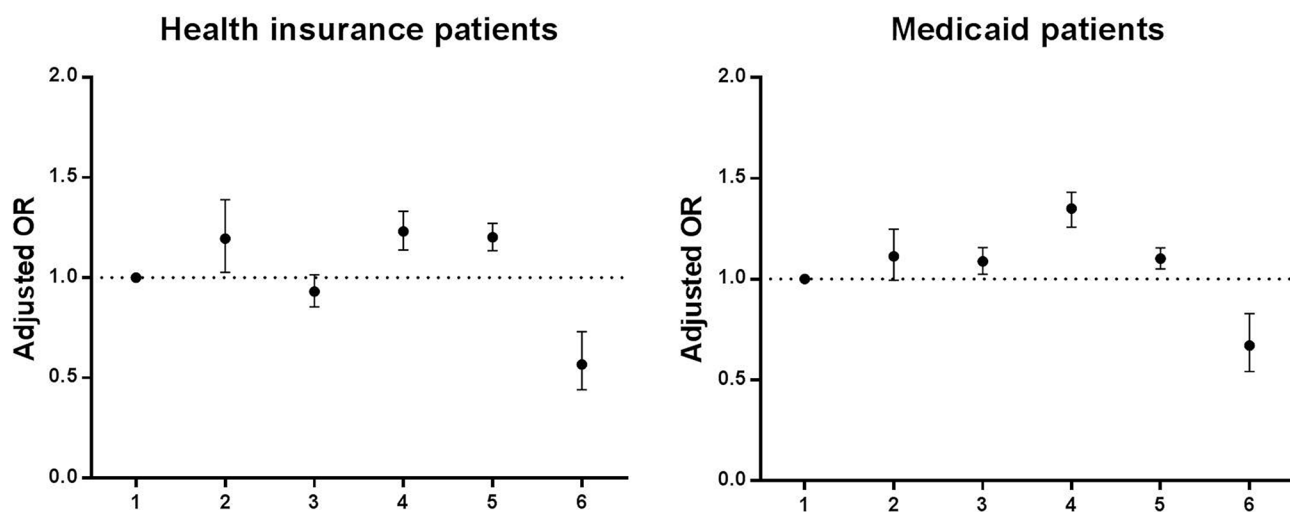
Health insurance patients

Medicaid patients

Figure 4 Typical drug use by region in patients divided by the type of health insurance coverage. 1: Metropolitan region, 2: Gangwon province, 3: Chungcheong province, 4: Jeolla province, 5: Gyeongsang province and 6: Jeju island. Adjusted for sex, age and medical institutions.
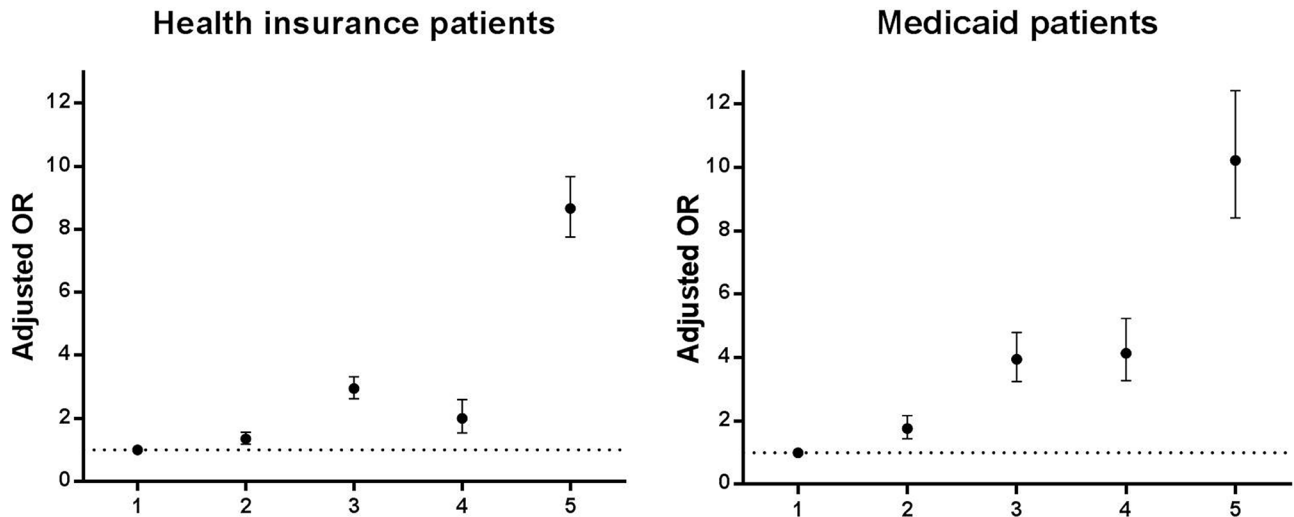
Figure 5 Typical drug use by medical institutions in patients divided by the type of health insurance coverage. 1: Tertiary care hospital, 2: General hospital, 3: Primary hospital, 4: Long-term care hospital, and 5: Clinic. Adjusted for sex, age and region.

reported in many countries.[25][26] A unique feature in the pattern of atypical drug use was the increased frequency of combination therapy containing two or more atypical drugs, although there was no big change in the use of atypical antipsychotic monotherapy. Pickar *et al* have reported an increase in multidrug therapy combining two or more antipsychotics for patients with schizophrenia.[27] This pattern might have resulted in the improvement of symptoms and efficacy.[28][29] Other studies conducted in South Korea have also shown that combination therapies of two or more atypical drugs have the highest frequency among prescription patterns involving antipsychotics.[30]

The significantly higher use of typical antipsychotics in men than in women might be attributed to side effects of antipsychotics. Antipsychotics are known to increase prolactin level which may cause amenorrhoea that is especially higher in patients treated with typical drugs.[31] Therefore, women who are at risk of amenorrhoea clinically might be prescribed typical antipsychotics more often than men.

In the present study, the use of typical antipsychotics was increased with age, peaking in the age group of 50–60 years with subsequent decline thereafter. In South Korea, typical drugs were introduced in 1990s. However, the use of atypical drugs was recommended as a first-line treatment for schizophrenia in 2006.[16] In other words, patients with schizophrenia usually received typical drugs before 2006, indicating that patients older than 30–40 years might have been exposed to them. A change in drug therapy is indicated when patients show partial or no response to mainstream treatment.[32] Thus, if patients who were previously treated with typical drugs have no reason to switch medications, they are likely to continue treatment with typical drugs. However, the number of typical drug prescriptions was decreased at 60–70 years of age. This suggests that the disease might have caused a functional decline, relapse and worsening of symptoms with increasing age.[33] Increased age and worsening

symptoms may prompt changes in atypical drug usage or use of multiple drugs.

Currently, the pattern of OR of typical drug use in patients with schizophrenia varies by geographical region. Compared with metropolitan regions, increased use of typical drugs was seen in Gangwon province (OR=1.14), Jeolla province (OR=1.32) and Gyeongsang province (OR=1.14) while a decreased use was found in Jeju island (OR=0.623). Clinical experience and preferences of medical doctors can also affect drug prescription pattern.[34] This might be a possible explanation for such geographical differences observed in this study.

The use of typical antipsychotics was significantly higher in Medicaid patients compared with that in patients receiving health insurance (OR=4.49). Typical drug use was also significantly higher in general hospitals (OR=1.46), primary hospitals (OR=3.25), long-term care hospitals (OR=3.00) and clinics (OR=8.87) compared with tertiary care hospitals. Especially, the OR of typical drug use in clinics was ninefold higher than that in a tertiary care hospital setting. This pattern might be attributed to the current South Korean medical and health insurance systems. In the South Korean medical system, the ratio of private medical institutions is about 94%.[35] In the health insurance system, the medical cost per day is fixed for Medicaid patients with schizophrenia regardless of the therapy provided.[36] When the price is converted to cost per day, costs for inpatient's and outpatient's treatment are 2770 won (about US$2.4) and 50 000 won (about US$44.1), respectively.[37] In this system, medical institutions are required to use low-cost drugs in order to realise profits. Use of high-cost drugs or expensive labour may shrink profit margins. For the average treatment cost of Medicaid patients in South Korea, only about 65% of the cost is covered by health insurance. This indicates that low-cost therapy is provided to Medicaid patients.[22] As medical expenses are directly related to profit, such tendency is especially prominent in clinics. However, it

was hard to conclude that our result was only affected by the fixed-cost payment system as suggested in previous studies.[35] When we analysed Medicaid patients and health insurance patients separately, a similar prescription pattern occurred in both groups following a geographic pattern. This suggests that the experience and preferences of clinicians at different medical institutions might have affected the prescription pattern as well.[34 38]

This study has several limitations. First, HIRA data did not provide the actual status of patients with schizophrenia. For example, HIRA data do not include the severity of the disease. However, drug prescription patterns in schizophrenia outpatients differ according to the severity of the disease.[39] Therefore, clinical factors influencing antipsychotic prescription patterns in schizophrenia were not comprehensively analysed. Second, in this study, factors affecting the use of typical drugs were not analysed, including prescription period, prescription changes or dosage of antipsychotics. Although we analysed factors affecting the use of antipsychotics in patients with schizophrenia visiting medical institutions in 2015 for the first time, further research should consider these limitations.

Despite these limitations, our study has a number of strengths. Using HIRA data, this study confirmed changes in antipsychotic usage in all patients in South Korea with schizophrenia and factors affecting their usage. Another strength is that a number of sociodemographic factors such as sex, age, geographical region, type of benefit/insurance and type of medical institutions known to influence prescription pattern are taken into account. These findings can be used as evidence to improve the medical system and strengthen continuing education programmes for the treatment of patients with schizophrenia.

CONCLUSIONS

In this study, HIRA data were analysed to identify changes in antipsychotic usage and factors affecting the drug use in patients with schizophrenia in South Korea. In terms of drug prescription, a decrease in typical drug use and increase in atypical drug use were observed. Factors that significantly affected the use of typical antipsychotics were sex, age, geographical region, type of benefit/insurance and type of medical institutions. Results of this study can be used as evidence to improve the medical system, strengthen continuing education and set future directions for the treatment of patients with schizophrenia.

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