

Characteristics of No-Show
in Dental Clinics

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Characteristics of No-Show in Dental Clinics

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Abstract

Purpose: No-show is a common occurrence that results in a significant loss to healthcare providers. This study aims to assess characteristics of no-show in urban and rural dental clinics.

Materials and methods: In a rural dental clinic in Chungnam and an urban dental clinic in Seoul, characteristics of patients who did appear and did not (no-show). With enrollment between 1 July 2013 and 30 June 2014, of the 3,085 urban dental clinic data and the 13,227 cases of a rural dental clinic data were analyzed. Variables examined include patient gender, age, their appointment time of day, appointment day of week, appointment month of year, first or follow-up appointment, annual visitation number, and rain(snow) on the appointment day. Data were analyzed using chi-square test and multivariate logistic regression.

Results: The no-show rates were 28.8% for the urban dental clinic and 17.8% for the rural dental clinic. The results of chi-square test show that there was a significant difference in the no-show of appointment depending on: age, appointment time of day, new patient/follow-up, doctor's gender, annual visitation number, history of appointment no-show in urban dental clinic. Besides in rural dental clinic, age, appointment day, treatment type, annual visitation number, history of appointment no-show were significant different.

The results of logistic regression analysis showed that in urban dental clinic, the appointment month does have significant effect in no-show of

appointment in June. Both new patient and female doctor had significant effect in no-show of appointment. Annual visitation number showed to have significant effect in no-show of appointment and over 5 visits. And no history of no-show was significant effect in no-show of appointment. In rural dental clinic, gender and in age range of 40-59, over 60 were significant effect in appointment no-show. And July, August and December were significant effect in appointment no-show. Wednesday and Saturday also showed to give significant effect in appointment no-show. Treatment type also showed to give significant effect in appointment no-show in prosthodontics, insurance treatment. New patient and annual visitation number showed to have significant effect in no-show of appointment in 2-5, and in over five times. Both no history of no-show, and rain(snow) showed to have significant effect in no-show of appointment.

Conclusions: No-show rates interfere with dental clinic management. There are different no-show characteristics in urban and rural, so we need profitable strategy for management.

Key words: No-shows, missed appointment, appeared, dental clinic, urban and rural

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1. Introduction

Missed appointments (referred to as 'no-shows') reduce practice efficiency, utilization of resources, and learning opportunities for students, and potentially affect patient health and other patients who need appointments (Lehmann, 2007). It has been thought that the measures to reduce the hospital no-show are significant to Customer Relationship Management (CRM) activities to keep the previous patient levels (Shin, 2005). Adherence to scheduled appointments, in contrast to many other health behaviors, is an interpersonal behavior with ramifications to the patient-provider relationship. Thus, understanding interpersonal styles based on attachment theory may provide a useful framework for comprehending patterns of health care utilization (Ciechanowski, 2006).

Studies on no-show from various medical specialties have used many different parameters, such as settings, populations, and data collection and analysis methods, and have produced differing results. No-show rates range from 2 to 30% with higher rates in psychiatric settings and hospital-based clinics in urban areas. Although there are reports of successful intervention strategies, no general consensus has emerged (Lehmann, 2007). However, no-shows cause significant impact on the revenue, cost and resource utilization for almost all-healthcare system. For instance, they can reduce the efficiency of resources of the hospital and decrease the level of care provided to patients. The hospital needs a lot of staffs in the period of many patients attended, but many no-show

periods need small staffs. Therefore, no-shows have significantly affected not only the hospital operational performance, such as capacity management and work process but also the patient flow management as well.

Dahlgren and Whitehead (1991) said that the main determinants of health are general socioeconomic, cultural and environmental conditions. Age, sex and constitutional factors effect on individual lifestyle factors, social and community networks. The no-shows in dental clinic are a major cause of inefficiency and lead to poor control of dental health, wasted health care money, and ineffective use of provider time. Thus, if those determinants of health apply on dental clinic patients, the result may be similar. Different age, sex, even though individual life style, such as the area of patient live, caused no-show or appeared.

Scheduling service operations has been the subject of scholarly investigation for some years (Easton & Goodale, 2005). Appointment scheduling has been examined in the research literature for some decades (Bailey, 1952; Ho & Lau, 1992; Klassen & Rohleder, 1996). Other authors have contributed to the literature on service-operation no-shows from a variety of disciplines and perspectives, including medical practice, health care administration, operations management, marketing, and transportation planning. Little work has been reported, however, on the use of overbooking to mitigate the negative impact of no-shows in appointment-oriented services such as clinical health care (LaGanga, 2007).

Social determinants of health are the important factors affecting diseases which include: early life, social gradient, workplace, unemployment, diet, transportation, addiction, social isolation and support (Marmot *et al.*, 2006). One of those, workplace is the important factor affecting dental clinic appointments in this study. People have different jobs and life patterns in urban and rural. There are many health care disparities between urban and rural people and problems of urban and rural community.

This study was motivated by comparing the urban and rural dental clinic no-shows. They lived at different social environment and unlike accessing to dental health services. Efforts to promote social equity in health are therefore aimed at creating opportunities and removing barriers to achieving the health potential of all people. It involves the fair distribution of resources needed for health, fair access to the opportunities available, and fairness in the support offered to people when ill. The outcome of these efforts would be a gradual reduction of all systematic differences in health between different socioeconomic groups (Whitehead & Dahlgren, 2006).

One study was based on a previous study that investigated the actual condition of health oriented consumption and analyzed factors related to health oriented consumption (Baek *et al.*, 2006). Consumers with more wealth, who were married, who practiced more health oriented behaviors, and who considered real effects of the products on health used more health oriented products and services. Following the above study, I

suppose that the behaviors of people when using health services are similar to that of dental treatment. The positive attitudes toward health were expected to use more health services in the future.

In this study, the variables by determinants of health service that were collected from both urban and rural dental clinic and analyzed to explore who the patients were not showing to the appointments at urban and rural dental clinics in Republic of Korea. The purpose of this study was to assess how different demographic, facility and appointment characteristics are associated with no-show at dental clinics, and whether they differ by location (e.g. urban vs. rural). Furthermore, considering to the characteristics of dental no-shows, the dental clinics are able to make appropriate human resource strategies.

2. Materials and Methods

2.1 Subjects recruitment

Subjects' data were collected from two dental clinics in different locations, Seoul and Seosan, Republic of Korea. Seoul is the capital and largest metropolis of Republic of Korea. The Seoul Capital Area, which includes the surrounding Incheon metropolis and Gyeonggi province, is the world's second largest metropolitan area with over 25.6 million people. On the other hand, Seosan, South Chungcheong province of Republic of Korea, is located at the west coast of the country. It has a population of 170,433 according to the 2014 census, and is considered as rural.

The study design was a prospective cohort study, with enrollment between 1 July 2013 and 30 June 2014. Combined with some frequently used parameters and the parameters that are expected to be particularly relevant in different locations such as urban dental clinic and rural dental clinic were collected. Overall, 3,085 cases of an urban dental clinic data were analyzed and 13,227 cases of a rural dental clinic data were analyzed for this study.

2.2. Design and setting

For no-show characteristics comparisons, all appointment data, including gender, age, appointment time of day, appointment day of week, appointment month of year, first or follow-up appointment, annual visitation number, and rain (or snow) on the appointment day were collected. Treatment types were classified as implant, orthodontics, prosthodontics and insurance treatment. Those variables refer to the Swiss University outpatient study by Lehmann, *et al* (2007). Although they described their patients by time of day, age, month of birth, gender, first or follow-up appointment, citizenship and so on, in this study, additional variables, such as treatment type, doctor's gender and history of no-show were used.

For all no-shows and controls, the 11 variables below were assessed (classified into between two and twelve levels), and the number of patients was determined for each classification level in both region groups.

2.2.1. Variables of vital statistics: patient gender and age

The vital characteristics were two categories of gender (two levels: male or female), and four levels of age (four levels: ≤ 19 , 20-39, 40-59, ≥ 60 years old).

2.2.2. Appointment variables

For investigating the no-show characteristics in dental clinic, the appointment time of day four levels (four levels: the 2-3h time periods 9:00-11:00, 11:00-14:00, 14:00-16:00 and 16:00-19:00h), the appointment day of the week by 6 levels (six levels: Monday-Saturday, Sunday was off), and the appointment months of the year by 12 levels (twelve levels: January-December), were classified.

2.2.3. Variables reflecting personal history

Next, the dental treatment types by 4 levels (four levels: implant, orthodontics, prosthodontics and insurance treatment types) are categorized. Implant and orthodontics groups were high cost levels, prosthodontics including treat caries and insurance treatment groups were low cost levels. Insurance treatment types were included root canal, extraction, caries and so on. The type of appointment was classified first examination or follow-up appointment (two levels: new or follow-up). In the interest of patient prefer to male doctor or female doctor, two levels by gender of doctor (two levels: male doctor or female doctor) were categorized. It seemed to important thing the appointment times and history. By the appointment times in a year 3 levels sorted (three levels: ≤ 1 , 2-5, > 5 appointment times in a year). And no-show before (two levels: yes or none). Finally, in order to patient no-show affect to

weather, rain and snow or no rain (or snow) (two levels: yes or none) were classified. Weather information was obtained from Korea meteorological administration (KMA) records for the period 1 July 2013 through 30 June 2014.

The only appointment events analyzed were appeared and no-shows. Cancelled appointments were not considered to be missed appointments. The odds ratio (OR) of a no-show are reported.

2.2.4. Statistical analysis

Data were analyzed using chi-squared test and multivariate logistic regression. All analyses were done using the SPSS ver.21.

3. Results

3.1. Total appointments of urban and rural dental clinic

Across two study clinics, 3,085 patients scheduled for appointments of an urban dental clinic and 13,227 patients of a rural dental clinic from July 2013 to June 2014 were analyzed (Table 1). Overall, the 2,095 (71.2%) of total appointments are appeared and 890 (28.8%) no-shows in urban dental clinic. This dental clinic starts to treatment service on July 2013. It is located in Gangnam-gu, Seoul, South Korea. This new dental clinic was advertisement by internet and blog. In the vicinity of the clinic, there are many houses and companies. Of the 10,876 (82.2%) of total appointments are appeared and 2,351 (17.8%) no-shows in rural dental clinic. This dental clinic opened August 2007 and located in Seosan, the west coast province of South Korea. This clinic has brand power in Seosan.

The appointments of rural dental clinic were more 4 times than urban dental clinic appointment's number. And rural dental clinic no-show rate was lower than urban dental clinic, as you can see the Table 1.

Table 1. Total appointments of urban and rural dental clinic

Appointments	Urban		Rural	
	N	%	N	%
appeared	2,195	71.2	10,876	82.2
no-show	890	28.8	2,351	17.8
Total	3,085	100.0	13,227	100.0

3.2. General characteristics of study subjects in urban and rural dental clinics

The general characteristics of study subjects in urban and rural dental clinic study are presented in Table 2. Patients were distributed into quartiles by gender, male patients was 1,732 (56.1%), female patients was 1,353 (43.9%) in urban dental clinic and in rural, female was 7,095 (53.6%), male was 6,132 (46.4%) cases. Percentage of female patients in rural clinic was higher than that of urban dental clinic.

By age: below 19 years, 20 to 39 years, 40 to 59 years, and above 60 years. By age, 20-39 age was 1,771 (57.4%), 40-59 age was 883 (28.6%), above 60 age was 234 (7.6%), below 19 was 197 (6.4%) in urban dental clinic. Most of these clinic patients were young workers. The number of rural dental clinic, by age, 40-59 age was 4,535 (34.3%), 20-39 age was 3,360 (25.4%), above 60 ages was 3,020 (22.8%), and below 19 was 2,312 (17.5%). Most of these clinic patients were 40-59 aged people. This is different that urban dental clinic 20-39 aged people were high.

Table 2 shows that by the treatment types, prosthodontics was 1,198 (38.8%), insurance treatment was 903 (29.3%), orthodontics patients was 801 (26%), implant patients was 183 (5.9%). Urban dental clinic patient treated caries, root canal, resin, inlay and crowns. And also, in rural dental clinic by the treatment types, implant was 4,684 (35.4%), orthodontics was 4,048 (30.6%), prosthodontics was 2,442 (18.5%), insurance treatment was 2,053 (15.5%). Rural dental clinic patient treated high cost implant and orthodontics more than urban dental clinic.

Table 2. General characteristics of study subjects in urban and rural dental clinics

Variable	Item	Urban		Rural	
		N	%	N	%
Gender	Male	1,732	56.1	6,132	46.4
	Female	1,353	43.9	7,095	53.6
Age	≤19	197	6.4	2,312	17.5
	20-39	1,771	57.4	3,360	25.4
	40-59	883	28.6	4,535	34.3
	≥60	234	7.6	3,020	22.8
Appointments Time of day (hours)	09:00-11:00	701	22.7	5,934	44.9
	11:00-14:00	746	24.2	706	5.3
	14:00-16:00	701	22.7	4,659	35.2
	16:00-19:00	937	30.4	1,928	14.6
Appointments Day of the week	Monday	698	22.6	2,910	22.0
	Tuesday	680	22.0	2,081	15.7
	Wednesday	497	16.1	2,759	20.9
	Thursday	403	13.1	2,175	16.4
	Friday	451	14.6	2,061	15.6
	Saturday	356	11.5	1,241	9.4
Appointments Month of the year	January	222	7.2	1,107	8.4
	February	257	8.3	1,227	9.3
	March	254	8.2	1,177	8.9
	April	195	6.3	1,075	8.1
	May	266	8.6	1,115	8.4
	June	331	10.7	1,152	8.7
	July	95	3.1	1,154	8.7
	August	338	11.0	1,199	9.1
	September	274	8.9	906	6.8
	October	317	10.3	1,037	7.8
	November	278	9.0	1,008	7.6
	December	258	8.4	1,070	8.1

Table 2. General characteristics of study subjects in urban and rural dental clinic (continued)

Variable	Item	Urban		Rural	
		N	%	N	%
Treatment types	Implant	183	5.9	4,684	35.4
	Orthodontics	801	26.0	4,048	30.6
	Prosthodontics	1,198	38.8	2,442	18.5
	Insurance treatment	903	29.3	2,053	15.5
Type of appointment	Follow-up	2,916	94.5	12,886	97.4
	New	169	5.5	341	2.6
Gender of Doctor	Male doctor	1,758	57.0	9,657	73.0
	Female doctor	1,327	43.0	3,570	27.0
Appointment times in a year	≤1	679	22.0	2,923	22.1
	2-5	1,171	38.0	5,256	39.7
	>5	1,235	40.0	5,048	38.2
No-show before	Yes	1,701	55.1	4,092	30.9
	None	1,384	44.9	9,135	69.1
Rain or snow	Yes	874	28.3	3,855	29.1
	None	2,211	71.7	9,372	70.9
Total		3,085	100.0	13,227	100.0

3.3. Bivariate associations of no-shows in urban and rural dental clinics

Chi-squared test was carried out to find out if there are significant difference in appeared groups and no-show groups in urban and rural dental clinics depending on: age, gender, appointment time, day, month, treatment type, new·follow-up patient, gender of the doctor, annual number of visitation, history of appointment no-show, and the depending on rain (or snow) of the day of appointment. Bivariate associations of no-show rates in urban and rural dental clinics results were shown in Table 3.

Table 3. Bivariate associations of no-shows in urban and rural dental clinics

Variable	Urban			Rural		
	appeared	no-shows	$\chi^2(P)$	appeared	no-shows	$\chi^2(P)$
Gender						
Male	1252 (72.3%)	480 (27.7%)	2.481 (0.115)	5063 (82.6%)	1069 (17.4%)	0.910 (0.340)
Female	943 (69.7%)	410 (30.3%)		5813 (81.9%)	1282 (18.1%)	
Age						
≤19	147 (74.6%)	50 (25.4%)	12.086 (0.007)	1874 (81.1%)	438 (18.9%)	19.521 (<0.001)
20_39	1217 (68.7%)	554 (31.3%)		2707 (80.6%)	653 (19.4%)	
40-59	655 (74.2%)	228 (25.8%)		3743 (82.5%)	792 (17.5%)	
≥60	176 (75.2%)	58 (24.8%)		2552 (84.5%)	468 (15.5%)	
Appointment Time of the day						
09:00-11:00	507 (72.3%)	194 (27.7%)	9.662 (0.002)	4903 (82.6%)	1031 (17.4%)	3.109 (0.375)
11:00-14:00	559 (74.9%)	187 (25.1%)		569 (80.6%)	137 (19.4%)	
14:00-16:00	485 (69.2%)	216 (30.8%)		3808 (81.7%)	851 (18.3%)	
16:00-19:00	644 (68.7%)	293 (31.3%)		1596 (82.8%)	332 (17.2%)	
Appointment Day of the week						
Monday	487 (69.8%)	211 (30.2%)	8.596 (0.126)	2461 (84.6%)	449 (15.4%)	21.700 (0.001)
Tuesday	493 (72.5%)	187 (27.5%)		1728 (83%)	353 (17%)	
Wednesday	335 (67.4%)	162 (32.6%)		2256 (81.8%)	503 (18.2%)	
Thursday	287 (71.2%)	116 (28.8%)		1769 (81.3%)	406 (18.7%)	
Friday	340 (75.4%)	111 (24.6%)		1678 (81.4%)	383 (18.6%)	
Saturday	253 (71.1%)	103 (28.9%)		984 (79.3%)	257 (20.7%)	

Table 3. Bivariate associations of no-shows in urban and rural dental clinics (continued)

Variable	Urban			Rural		
	appeared	no-shows	$\chi^2(P)$	appeared	no-shows	$\chi^2(P)$
Appointment Month of year						
January	157 (70.7%)	65 (29.3%)		904 (81.7%)	203 (18.3%)	
February	180 (70%)	77 (30%)		1008 (82.2%)	219 (17.8%)	
March	195 (76.8%)	59 (23.2%)		977 (83%)	200 (17%)	
April	137 (70.3%)	58 (29.7%)		905 (84.2%)	170 (15.8%)	
May	196 (73.7%)	70 (26.3%)		903 (81%)	212 (19%)	
June	224 (67.7%)	107 (32.3%)	17.176 (0.103)	918 (79.7%)	234 (20.3%)	14.668 (0.198)
July	76 (80%)	19 (20%)		959 (83.1%)	195 (16.9%)	
August	242 (71.6%)	96 (28.4%)		986 (82.2%)	213 (17.8%)	
September	187 (68.2%)	87 (31.8%)		738 (81.5%)	168 (18.5%)	
October	238 (75.1%)	79 (24.9%)		842 (81.2%)	195 (18.8%)	
November	188 (67.6%)	90 (32.4%)		835 (82.8%)	173 (17.2%)	
December	175 (67.8%)	83 (32.2%)		901 (84.2%)	169 (15.8%)	
Treatment types						
Implant	140 (76.5%)	43 (23.5%)		3924 (83.8%)	760 (16.2%)	
Orthodontics	591 (73.8%)	210 (26.2%)	7.541 (0.057)	3374 (83.3%)	674 (16.7%)	130.071 (<0.001)
Prosthodontics	832 (69.4%)	366 (30.6%)		2070 (84.8%)	372 (15.2%)	
Insurance treatment	632 (70%)	271 (30%)		1508 (73.5%)	545 (26.5%)	

Table 3. Bivariate associations of no-shows in urban and rural dental clinics (continued)

Variable	Urban			Rural		
	appeared	no-shows	$\chi^2(P)$	appeared	no-shows	$\chi^2(P)$
Type of appointment						
Follow-up	2,042 (70%)	874 (30%)	32.721 (<0.001)	10,609 (82.3%)	2,277 (17.7%)	3.693 (0.055)
New	153 (90.5%)	16 (9.5%)		267 (78.3%)	74 (21.7%)	
Gender of doctor						
Male doctor	1,291 (73.4%)	467 (26.6%)	10.396 (0.001)	7,952 (82.3%)	1,705 (17.7%)	0.345 (0.557)
Female doctor	904 (68.1%)	423 (31.9%)		2,924 (81.9%)	646 (18.1%)	
Appointment times in a year						
≤1	417 (61.4%)	262 (38.6%)	41.081 (<0.001)	1,935 (66.2%)	988 (33.8%)	670.229 (0.001)
2-5	855 (73%)	316 (27%)		4,497 (85.6%)	759 (14.4%)	
>5	923 (74.7%)	312 (25.3%)		4,444 (88%)	604 (12%)	
No-show before						
Yes	1,121 (65.9%)	580 (34.1%)	50.880 (<0.001)	3,143 (76.8%)	949 (23.2%)	118.977 (<0.001)
None	1,074 (77.6%)	310 (22.4%)		7,733 (84.7%)	1,402 (15.3%)	
Rain or snow						
Yes	629 (72%)	245 (28%)	0.397 (0.280)	3,139 (81.4%)	716 (18.6%)	2.377 (0.123)
None	1,566 (70.8%)	645 (29.2%)		7,737 (82.6%)	1,635 (17.4%)	

As shown in Table 3, there was a significant difference in the no-show of appointment depending on: age, appointment time of day, new-follow-up, doctor's gender, annual visitation number, history of appointment no-show in urban dental clinic. Besides in rural dental clinic, age, appointment day, treatment type, annual visitation number, history of appointment no-show were significant different.

Appointment no-show rate was high in the order of: 20-39, 40-59, under 19 and over the age of 60 in urban dental clinic. Age range showed a significant effect ($P=0.007$) chi-squared statistics revealed significantly more no-show cases 20-39 years (31.3%), and fewer no-show cases in the age ranges of ≥ 60 years (24.8%, respectively). Rural dental clinic's appointment age range showed a significant effect ($P<0.001$) chi-squared statistics revealed significantly more no-show cases 20-39 years (19.4%). Rural dental clinic no-show rate was high in the order of: 20-39, under 19, 40-50, and over the age of 60. The two dental clinics' same age range 20 to 39 patients showed high no-show rate.

Appointment time of the day showed significant effect only in urban dental clinic. Appointment time urban dental clinic no-show rate was high in the order of: 16:00-19:00, 14:00-16:00, 09:00-11:00, and 11:00-14:00. (31.3% of all patients were no-shows at 16:00-19:00, only 25.1% at 11:00-14:00; Chi-squared $P=0.002$).

Treatment types were significant different only rural dental clinic. Depending on the treatment type, insurance treatment's appointment

no-show rate (26.5%, Chi-squared $P<0.001$) turned out to be higher than implant, orthodontics and prosthodontics in rural dental clinic. This is similar urban dental clinic that low cost treatment no-show were higher than high cost treatment, like as implant and orthodontics.

Type of appointment was the most significant variable in urban dental clinic ($P<0.001$): 90.5% of the appeared had new appointment vs only 9.5% of no-show. In rural dental clinic was not significant difference, the new patient no-shows (21.7%) were higher than follow-up (17.7%). This was different result in two dental clinics.

Gender of doctor showed a significant effect ($P<0.001$) in urban dental clinic. Depending on the gender of doctor, no-show rate of female doctor (31.9%) was higher than male doctor (26.6%). The table 3 shows that in rural dental clinic the female doctor no-show (18.1%) was higher than male doctor (17.7%). The dental patients of female doctor were more likely to no-show.

Depending on the annual visitation number, appointment no-show rate was high in the order of urban dental clinic: under 1 (38.6%), 2-5 (27%), over 5 times (25.3%). Depending on the number of visitation per year in rural dental clinic, no-show rate of less than one visitation was higher than two to five visitations, and over five visitations. Appointment times in a year was significant different in urban dental clinic (Chi-squared $P<0.001$) and also rural dental clinic (Chi-squared $P<0.001$).

The history of no-show showed a significant effect ($P<0.001$) in urban

dental clinic and rural dental clinic ($P<0.001$). Patients with history of no-show (no show before 34.1%) turned out to have higher no-show rate than patients with no history of appointment no-show (22.4%). This is same depending on the history of no-show, patients with history of no-show (23.2%) turned out to have higher no-show rate than patients with no history of appointment no-show (15.3%). Overall, no-show before patients has a potential to no-show again.

Therefore, in urban dental clinic, the appointment month of the year, appointment day of the week, gender of patients, treatment types, rain and snow on the appointment day did not show significant difference on the no-show of the appointment. In rural dental clinic, the appointment month, time, gender of patients, new-follow-up patients, doctor's gender, rain (or snow) on the appointment day showed no significant influence on no-show behavior.

3.4. Factors affecting the no-shows of appointment in urban and rural dental clinics

Multivariate analysis by logistic regression analysis was conducted by using gender, age, appointment time, day, month, and treatment type, new·follow-up patient, doctor's gender, annual visitation number, history of no-show, and rain (or snow) on the appointment day as independent variables in order to investigate the factors affecting the no-show of appointment. Multivariate analysis by logistic regression analysis results of the appointment no-show rate in urban and rural dental clinics were shown in Table 4.

Table 4. Factors affecting the odds of no-show appointment in urban and rural dental clinics

Variable	Urban			Rural		
	<i>p</i> -value	OR	95%C.I.	<i>p</i> -value	OR	95%C.I.
Gender						
Male		1.000			1.000	
Female	0.551	1.054	0.887-1.251	0.068	1.092	0.993-1.201
Age						
≤19		1.000			1.000	
20_39	0.101	1.361	0.942-1.965	0.379	1.070	0.920-1.245
40-59	0.577	1.120	0.753-1.665	0.049	0.842	0.709-0.999
≥60	0.905	1.030	0.632-1.679	0.002	0.733	0.604-0.891
Appointment Time of day						
09:00-11:00		1.000			1.000	
11:00-14:00	0.235	0.859	0.668-1.104	0.528	0.933	0.754-1.156
14:00-16:00	0.250	1.165	0.899-1.509	0.422	1.046	0.937-1.169
16:00-19:00	0.164	1.194	0.930-1.533	0.675	0.967	0.829-1.129
Appointment Day of the week						
Monday		1.000			1.000	
Tuesday	0.347	0.888	0.692-1.138	0.461	1.063	0.904-1.249
Wednesday	0.992	0.999	0.764-1.305	0.005	1.234	1.066-1.428
Thursday	0.156	0.809	0.604-1.084	0.036	1.182	1.011-1.382
Friday	0.133	0.797	0.592-1.072	0.071	1.158	0.987-1.358
Saturday	0.182	1.256	0.899-1.755	0.001	1.381	1.135-1.679

Table 4. Factors affecting the odds of no-show appointment in urban and rural dental clinics (continued)

Variable	Urban			Rural		
	<i>p</i> -value	OR	95%C.I.	<i>p</i> -value	OR	95%C.I.
Appointment Month of the year						
January		1.000			1.000	
February	0.627	1.109	0.732-1.680	0.529	0.931	0.745-1.163
March	0.342	0.812	0.528-1.248	0.158	0.848	0.675-1.066
April	0.535	1.153	0.736-1.805	0.240	0.868	0.686-1.099
May	0.986	1.004	0.645-1.563	0.853	1.022	0.814-1.282
June	0.034	1.572	1.036-2.386	0.799	1.029	0.823-1.287
July	0.485	0.796	0.420-1.510	<0.001	0.447	0.351-0.568
August	0.705	1.083	0.718-1.632	0.002	0.697	0.555-0.875
September	0.313	1.239	0.817-1.877	0.239	0.865	0.680-1.101
October	0.613	0.898	0.591-1.364	0.349	0.896	0.711-1.128
November	0.297	1.240	0.828-1.858	0.100	0.819	0.645-1.039
December	0.385	1.199	0.796-1.806	0.007	0.724	0.572-0.917
Treatment types						
Implant		1.000			1.000	
Orthodontics	0.924	0.979	0.638-1.504	0.059	0.856	0.728-1.006
Prosthodontics	0.968	0.991	0.655-1.500	0.023	0.839	0.721-0.977
Insurance treatment	0.781	1.061	0.699-1.611	<0.001	1.387	1.200-1.603

Table 4. Factors affecting the odds of no-show appointment in urban and rural dental clinics (continued)

Variable	Urban			Rural		
	<i>p</i> -value	OR	95%C.I.	<i>p</i> -value	OR	95%C.I.
Type of appointment						
Follow-up		1.000			1.000	
New	<0.001	0.129	0.074-0.225	<0.001	0.458	0.345-0.607
Gender of doctor						
Male doctor		1.000			1.000	
Female doctor	0.042	1.294	1.009-1.659	0.480	0.958	0.850-1.080
Appointment times in a year						
≤1		1.000			1.000	
2-5	<0.001	0.311	0.246-0.393	<0.001	0.249	0.220-0.281
>5	<0.001	0.203	0.155-0.266	<0.001	0.162	0.141-0.187
No-show before						
Yes		1.000			1.000	
None	<0.001	0.381	0.311-0.465	<0.001	0.420	0.377-0.467
Rain or snow						
Yes		1.000			1.000	
None	0.267	1.117	0.919-1.357	0.020	0.878	0.788-0.980

Multivariate analysis by logistic regression analysis for age range controls in the age range of ≤ 19 years of rural dental clinic showed a significant effect in the ranges of 40 to 59 (0.842 ($P < 0.05$)) and above 60 years (0.733 ($P < 0.01$)).

Appointment day of the week in rural dental clinic also showed to give significant effect in appointment no-show with OR value of Wednesday as 1.234 ($P = 0.005$), and Saturday's OR value as 1.381 ($P = 0.001$). According to table 3, rural dental clinic Saturday's no-shows was high (20.7%), this was significant.

Appointment month of the year showed a significant effect in two dental clinics. The result of multivariate analysis by logistic regression analysis showed that appointment month does have significant effect in no-show of appointment with OR value of 1.572 in June ($P = 0.034$). The result of rural dental clinic analysis showed that appointment month has significant effect on the appointment no-show with OR value of 0.447 ($P < 0.001$) in July, OR value of 0.697 ($P = 0.002$) in August, and OR value of 0.724 ($P = 0.007$) in December.

Treatment types showed to give significant effect only in rural dental clinic, no-show with OR value of 0.839 ($P < 0.05$) in prosthodontics, OR value of 1.387 ($P < 0.001$) in insurance treatment. The insurance treatment group had the highest no-show rate (26.5%, $P < 0.05$). Implant and orthodontics were least likely to no-show, whereas prosthodontics and insurance treatment were most likely to no-show.

Both dental clinics' type of appointment had significant factor affecting no-show of appointment with new patient's OR value of 0.129 ($P<0.001$), rural dental clinic OR value was 0.458 ($P<0.001$) which is a significant value.

By gender of doctor, urban dental clinic female doctor had significant effect in no-show of appointment with OR value of 1.294 ($P<0.05$) respectively.

Annual visitation numbers showed have significant effect in no-show of two dental clinics. Urban dental clinic had OR value of 2 to 5 visits as 0.311 ($P<0.001$), and 0.203 ($P<0.001$) as OR value of over 5 visits. Rural dental clinic had OR value of 0.249 ($P<0.001$) in 2 to 5, and OR value of 0.162 ($P<0.001$) in over five times.

OR value of no-show before of urban dental clinic was 0.381 which meant significant effect in no-show of appointment ($P<0.001$). OR value of 0.420 ($P<0.001$) of no-show before of rural dental clinic was also significant effect. Therefore, no-show before patient is very important to no-show rate in dental clinics.

Rain or snow showed to have significant effect in no-show of appointment of rural dental clinic with OR value of 0.878 ($P<0.001$) respectively.

In addition to, in urban dental clinic, the gender, the variables of age range, day of the week as well as time, treatment types of the appointment, and rain and snow showed no significant effect. In rural dental clinic, the variables of gender, appointment time, doctor's gender

showed no significant effect on the no-show of appointment.

4. Discussions

4.1. Discussions on the results

This study revealed that in different region dental clinic no-show characteristics. Eleven variables significantly distinguished no-show patients from controls. This study's no-show rate of 28.8% in urban dental clinic and 17.8% in rural dental clinic was within the reported range of 2-30%. This is also similar to a previous study that suggests that low rates have mainly been observed in rural or small town and higher rates in urban clinics with populations of a lower socio-economic level (Lehmann, 2007).

While the patients in urban works for company, the patients in rural work for agriculture, fishing and something like that. So rural patients no show rate was the highest on June (20.3%), the rice planting season. On the other hand, urban patients no-show rate is high on November and December, the year-end. Therefore, the hospital can make a different plan to staff recruit in this season.

Post hoc chi-squared statistics for age range in significant effect of no-show in urban and rural clinics. Same range of 20-39 years patient no-show rate was high (urban 31.3%, rural 19.4%). The no-show rates in the patient's general characteristics were higher in the younger patients. The age effect confirmed several studies where younger patients missed appointments more often than older patients. This study

results was similar.

The strongest significance found concerned the higher no-show rate for appointment history. According to the appointment history of the patient, no-show before patient were higher than attended patients (urban 34.1%, rural 23.2%). Namely no-show patients have the potential to no-show again.

This study also found that appointment times in a year has significant effect. Urban and rural appointments of blow 1 appointment time were high (urban 38.6%, rural 33.8%).

The determinant reason for coming dental clinic was important. Within the framework of the health policy process, it was characterized by other features. The policy decisions rarely take place at a single point in time and can be protracted over months or even years. It is difficult to discern when a specific decision was made (Exworthy, 2008). Personal sickness behavior, after acknowledging health issues, is affected by various factors, and many researches are being conducted on theoretical models to predict these factors. For each life transitional period, the possibility factors and necessity factors mainly affected the middle-aged group and similar trends were shown in use behavior. For the old-aged group, the predisposing factor, possibility factors, and necessity factors were found to be equally affecting factors (Kim, 2012).

Rain or snow was effected the no-show rate 1.04 times (Shin, 2005), but in this study urban dental clinic's rain or snow yes no-show rate was lower than none.

Therefore, the relationship between the use of medical institutions and the lifestyle that has big influence on the level of dental health should be studied in the future even though it has not been researched so far.

Furthermore, patients missing appointment most commonly reported forgetting and miscommunications as there reasons to no-show (Lewis, 2013). And Shin (2005) found that no-show rates were higher when he did not send the SMS messages to the patients than when he did. In this study, I could not organized the specific reasons of the dental clinic no-show. Future studies are needed to determine the most effective method to improve attendance to dental clinic appointment.

4.2. Study limitation

A limitation of this study was the data collected only one dental clinic of urban and rural in Republic of Korea. It is possible that the results would differ if the larger sample of the regions were captured. However, different province clinic patients characteristics were found to best differentiate between the two regions.

Another limitation of this study was that it did not investigate the reasons of no-show in dental clinics. For example, Kim *et al.* (2013) suggested potential reasons of prematurely discharge among inpatients, such as non-favorable treatment outcome, staying in intensive care unit, and so on. Although not investigated in this particular study, the no-show rate was likely to depend on a number of factors that may not have been evaluated in this article, including the local environment, the culture of different region and nation.

Moreover, the percentage of missing data was a function of the parameters and not of the patient groups, further weighing in against a potential bias. The process of scheduling an appointment and actually keeping it involves many factors that could result in no-show.

In spite of these limitations, this study is an important empirical study for evaluation of the influence of human resource management in private dental clinics.

5. Conclusions

In this study, the dental clinic patients of different regions showed not only same but also different no-show characteristics. Patient and appointment types at risk for no-show behavior are characterized in our patient by female gender, younger age, female doctor, no-show before, and below one appointment time in a year. These characteristics partially differ from in other regions and countries. These results indicate that local specific factors might be considered more weight for potential interventions aiming at successful controls of personnel management.

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국문요약

치과의원에서의 예약 미이행 환자의 특성

목적: 이 연구는 병원과 환자 모두에게 많은 영향을 미치고 있는 예약 비내원 환자에 대한 것으로, 서울과 지방에 있는 두 개 치과의원의 외래환자의 데이터를 분석하여 그 특성을 파악하고 이에 따른 치과 스텝 운영 등 경영전략에 적용할 수 있도록 하기 위함이다.

재료 및 방법: 2013년 7월부터 2014년 6월까지 1년 동안 두 개 치과의원의 내원 환자 데이터를 기반으로 서울 소재 치과의 내원환자 3,085건과 지방 소재 치과의 내원환자 13,227건을 표본으로 추출하였다. 예약 이행 집단과 미이행 집단의 성별, 연령별, 예약 시간과 요일, 월별 특성을 비롯해 진료내용별, 신·구환 여부, 진료 의사의 성별, 예약 건수, 예약 미이행 경험여부, 그리고 날씨를 독립변수로 하고 유의한 차이가 있는지 파악하기 위해 카이제곱 검정과 로지스틱 회귀분석을 실시하였다.

결과: 카이제곱 검정 결과, 서울의 치과에서는 예약 시간, 연령, 신·구환여부, 진료의사 성별, 연간 방문횟수, 예약 미이행 경험여부에 따라 예약 이행 여부에 유의한 차이가 있는 것으로 나타났다. 지방의 치과에서는 예약 요일, 연령, 진료내용, 연간 방문횟수, 예약 미이행 경험여부에 따라 예약 이행 여부에 유의한 차이가 있는 것으로 나타났다.

로지스틱 회귀분석 결과에서는, 서울의 치과에서는 6월과, 신환의 경우가 예약 미이행에 유의한 영향을 미치는 것으로 나타났고, 진료의사가 여자인 경우와 연간 방문횟수에서는 2회-5회, 5회 초과인 경우가 예약 미이행에 유

의한 영향을 미치는 것으로 나타났다. 예약 미이행 경험이 없는 경우 또한 유의한 영향을 미쳤다. 지방 치과에서는 7, 8, 12월이 예약 미이행에 유의한 영향을 미치는 것으로 나타났고, 예약 요일에서는 수요일과, 토요일이, 연령 별로는 40세 이상 59세 이하, 60세 이상이 예약 미이행에 유의한 영향을 미치는 것으로 나타났다. 진료내용에서는 Prosthodontics과 Insurance treatment가, 신환의 경우가, 예약 횟수에서는 2회-5회, 5회 초과가 예약 미이행에 유의한 영향을 미치는 것으로 나타났다. 또한 미이행 경험이 없는 경우, 비(눈)가 내리지 않은 날도 예약 미이행에 유의한 영향을 미치는 것으로 나타났다.

결론: 본 연구에서 얻어진 결과를 기초로 치과의원의 예약 비내원 환자의 이탈률이 높은 환자 그룹을 집중 관리하여 이탈을 방지할 수 있을 뿐만 아니라, 스텝 관리 등 병원 경영 운영에 있어 올바른 전략을 세울 수 있을 것으로 보인다.