



Original Article

Analysis of emergency dental revisits in Taiwan (1999–2012) from Taiwanese National Health Insurance Research Database (NHIRD)



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KEYWORDS

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Abstract *Background/purpose:* Inadequate diagnosis, treatment, and palliative care provided in the emergency department could let the patients revisit shortly after being seen. The aim of this study was to evaluate the emergency dental revisits by using Taiwanese National Health Insurance Research Database (NHIRD).

Materials and methods: The Dental dataset from NHIRD was used to analyze the demographic characteristics of emergency dental revisits in Taiwanese population from 1999 to 2012. In addition, the conditions of emergency dental revisits were also identified based on the International Classification of Diseases, Ninth Revision (ICD-9).

Results: Total 169,437 individuals had sought for emergency dental treatment from 1999 to 2012. In addition, 9624 individuals (5.68%) had repeated emergency dental visits within 1 year. The top 3 dental conditions were diseases of pulp and periapical tissues (ICD-9: 522), gingival and periodontal diseases (ICD-9: 523), and diseases of the oral soft tissues, excluding lesions specific for gingiva and tongue (ICD-9: 528). Males paid emergency dental revisits more than twice a year outnumber female counterparts (aOR = 1.252, 95% CI: 1.116–1.404). The higher odds ratio for emergency dental revisits over twice a year were found in 0–6 years, 35–49 years, 50–69 years, and ≥ 70 years subgroup as compared the reference of 20–34 years group. However, there were no significant differences for the stratification by year, day, region, and payroll bracket.

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Conclusion: Taken together, this data demonstrated the current situation of emergency dental revisits in Taiwan. It would raise the important issue about how to reduce the unnecessary repeated emergency visits.

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Introduction

Recently, we reported that there has been a substantial increase in the emergency dental visits from 1997–2013.¹ There were a considerable proportion of non-traumatic dental conditions such as pulpitis, cellulitis, aggressive periodontitis, and dental caries. The top 3 traumatic conditions were open wound of internal structures of mouth, open wound of face, and loss of teeth due to trauma. However, little is known about the situation of emergency dental revisits in Taiwan.

Emergency revisits may reflect the natural progression of a disease, the quality of care received during the initial visit, or the quality of the underlying healthcare system.^{2,3} Usually, emergency visits only offer the temporizing treatment mainly for the symptomatic relief.^{4,5} Emergency revisit could be one of the measurements of quality of medical care in the emergency department.

Taiwan now is a developed country with an advancing National Health Insurance (NHI) system in the world. No study has examined the factors associated with emergency dental revisits in Taiwan. The purpose of this study was to analyze the emergency dental revisits by using Taiwanese National Health Insurance Research Database (NHIRD). The demographics such as year, day, age, sex, payroll bracket, geographical region, and the most dental conditions for emergency dental revisits were analyzed from 1999 to 2012.

Materials and methods

Data source

The Dental dataset (DN) was used for this retrospective study. DN consists of the claim datasets for reimbursement of dental care service in NHI program from 1997 to 2013. This databank is an excellent research resource for dental policy, diseases burden, and interactions in dentistry.^{1,6–8} This study was approved by the Ethics Review Board at the Chung Shan Medical University Hospital.

Patient identification and measurements

The International Classification of Diseases, Ninth Revision, (ICD-9) codes was used for the disease diagnosis. The case type “12” is the identified as emergency dental visit in DN. Those with a history of emergency dental visit in 1998 and 2013 were excluded. Then, emergency dental visits were divided into non-revisit and revisit groups. The revisit group was further stratified by the repeated times. The

measurements of demographic characteristics were according to the study of Huang et al.¹

Statistical analysis

The characteristics of emergency dental revisits within 1 year were estimated by subgroups including year, day, sex, age group, region, and payroll bracket. A p-value less than 0.05 was set to declare statistical significance. The odd ratio for emergency dental revisits \geq two times from 1999 to 2012 were adjusted by year, day, sex, age group, region, and payroll bracket. All statistical analyses were performed with the SAS version 9.4 (SAS Institute Inc., Cary, North Carolina, USA).

Results

The annual number of emergency dental visits from 1998 to 2013 is shown in Fig. 1. The peak of annual number of emergency dental visits was 13,509 in 2002. After exclusion of the individuals in 1998 and 2013, 169,437 identified emergency dental visitors were recruited. In addition, 9624 individuals (5.68%) had sought for emergency dental revisits within 1 year. Fig. 2 revealed the time intervals between first emergency dental revisits and next revisits within 1 year. Most of the emergency dental revisits were found within 7 days. The peak of emergency dental revisits is 24 h about 14.28% (1374/9624).

As shown in Table 1, the leading causes of emergency dental revisits were listed by the rank. The diseases of pulp and periapical tissues (ICD-9: 522), gingival and periodontal diseases (ICD-9: 523), diseases of the oral soft tissues excluding lesions specific for gingiva and tongue (ICD-9: 528), and 521 diseases of hard tissues of teeth (ICD-9: 521) were the top 4 diagnoses of the emergency dental revisits.

The characteristics of repeated case of emergency dental revisits are shown in Table 2. Compared to emergency dental revisits more than twice a year, most patients paid emergency dental revisit once a year stratified by day, gender, age, insurance amount, and regions ($p < 0.001$).

The results of odd ratios of patients who paid emergency dental revisits more than twice a year were shown in Table 3. The male group had higher emergency dental revisits more than twice a year than female group (aOR = 1.252, 95% C.I.: 1.116–1.404). Compared to 20–34 y/o group, \geq 70 y/o group had higher higher emergency dental revisits more than twice a year (aOR = 2.087, 95% C.I.: 1.696–2.569), followed by 50–69 y/o group (aOR = 1.828, 95% C.I.: 1.532–2.181), 0–6 y/o group (aRR = 1.683, 95% C.I.: 1.351–2.096), and 35–49 y/o group (aOR = 1.586, 95%

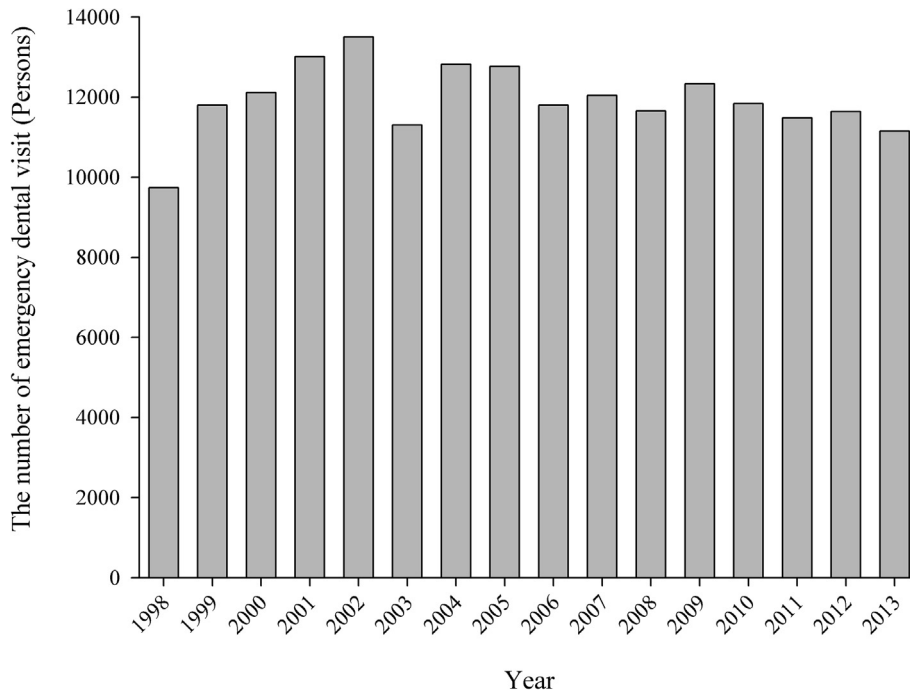


Figure 1 The distribution of emergency dental visits from 1998 to 2013.

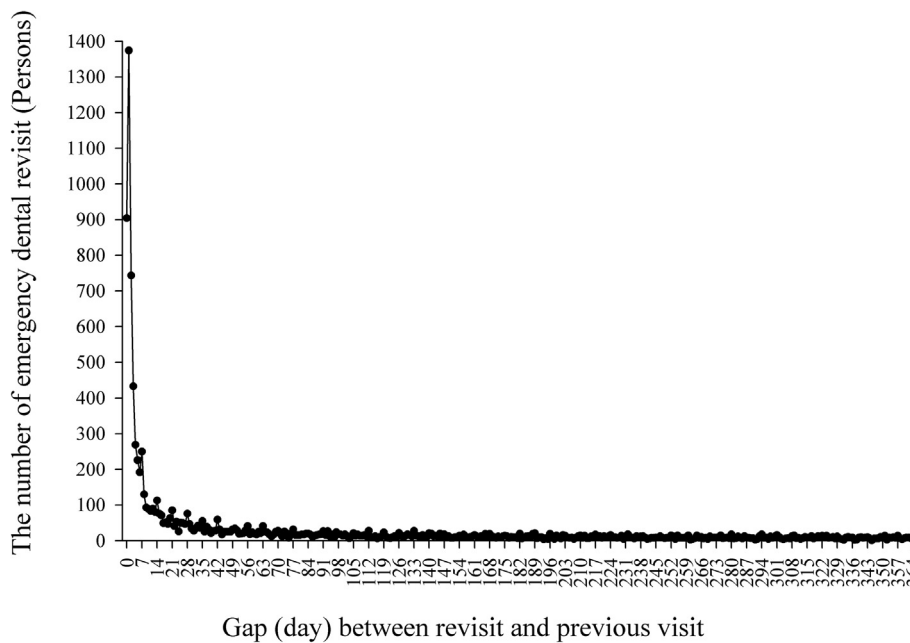


Figure 2 The distribution of emergency dental revisits from 1999 to 2012.

C.I.: 1.336–1.884). However, there are no significant statistical differences stratified by year, day, insurance amount, and regions.

Discussion

To the best of our knowledge, this is the first nationwide survey for the emergency dental revisits in Taiwan from 1999 to 2012. About 5.68% emergency dental visitors sought

for repeated emergency dental visits. Most of them were found within 7 days. Darling et al.⁹ found that among the emergency dental visitors, 17% patients paid emergency dental visits multiples times in In Iowa in 2012. Recently, Ranade et al.¹⁰ reported that about 21% were non-traumatic dental condition emergency department revisits within a 30-day period in Massachusetts during 2013. Dental care insurance in Taiwan is almost 100% coverage excluding non-health problem. This may be the reason why the

Table 1 Top 20 diagnoses with frequent emergency dental revisits.

	Total	1 time	≥2 times
ICD-9 codes	9624	7955 (82.66%)	1669 (17.34%)
522 Diseases of pulp and periapical tissues	2695	2244 (83.27%)	451 (16.73%)
523 Gingival and periodontal diseases	2119	1835 (86.60%)	284 (13.40%)
528 Diseases of the oral soft tissues, excluding lesions specific for gingiva and tongue	1744	1543 (88.47%)	201 (11.53%)
521 Diseases of hard tissues of teeth	629	482 (76.63%)	147 (23.37%)
525 Other diseases and conditions of the teeth and supporting structures	456	397 (87.06%)	59 (12.94%)
145 Malignant neoplasm of other and unspecified parts of mouth	353	176 (49.86%)	177 (50.14%)
873 Other open wound of head	303	284 (93.73%)	19 (6.27%)
524 Dentofacial anomalies, including malocclusion	287	202 (70.38%)	85 (29.62%)
520 Disorders of tooth development and eruption	131	114 (87.02%)	17 (12.98%)
141 Malignant neoplasm of tongue	130	59 (45.38%)	71 (54.62%)
682 Other cellulitis and abscess	100	91 (91.00%)	9 (9.00%)
830 Dislocation of jaw	92	70 (76.09%)	22 (23.91%)
526 Diseases of the jaws	88	73 (82.95%)	15 (17.05%)
143 Malignant neoplasm of gum	78	39 (50.00%)	39 (50.00%)
998 Other complications of procedures	75	66 (88.00%)	9 (12.00%)
V67 Follow-up examination	40	37 (92.50%)	3 (7.50%)
959 Injury, other and unspecified	31	28 (90.32%)	3 (9.68%)
802 Fracture of face bones	26	25 (96.15%)	1 (3.85%)
140 Malignant neoplasm of lip	21	16 (76.19%)	5 (23.81%)

Table 2 Characteristics of emergency dental revisits within 1 year.

	1 time	≥2 times	p value
N	7955 (82.66%)	1669 (17.34%)	
Year			0.5801
1999–2003	2809 (83.13%)	570 (16.87%)	
2004–2008	2840 (82.18%)	616 (17.82%)	
2009–2013	2306 (82.68%)	483 (17.32%)	
Day			<0.0001
Weekdays	4335 (80.06%)	1080 (19.94%)	
Weekends	3620 (86.01%)	589 (13.99%)	
Gender			<0.0001
Female	3098 (85.04%)	545 (14.96%)	
Male	4857 (81.21%)	1124 (18.79%)	
Age			<0.0001
0–6 years	653 (81.22%)	151 (18.78%)	
7–11 years	288 (85.97%)	47 (14.03%)	
12–19 years	508 (87.14%)	75 (12.86%)	
20–34 years	2475 (87.80%)	344 (12.20%)	
35–49 years	1915 (81.04%)	448 (18.96%)	
50–69 years	1521 (78.48%)	417 (21.52%)	
≥70 years	595 (76.09%)	187 (23.91%)	
Insurance amount			<0.0001
Dependent	3411 (84.96%)	604 (15.04%)	
0–18000 Taiwan \$	1994 (81.82%)	443 (18.18%)	
18,000–36000 Taiwan \$	1866 (79.51%)	481 (20.49%)	
36,000–54000 Taiwan \$	477 (82.53%)	101 (17.47%)	
≥54,000 Taiwan \$	207 (83.81%)	40 (16.19%)	
Region			<0.0001
Taipei	3374 (84.37%)	625 (15.63%)	
North	353 (85.27%)	61 (14.73%)	
Central	1575 (78.55%)	430 (21.45%)	
South	673 (84.76%)	121 (15.24%)	
Kaohsiung-Pingtung	1324 (82.18%)	287 (17.82%)	
East	225 (87.55%)	32 (12.45%)	
Unknown	431 (79.23%)	113 (20.77%)	

Table 3 The odd ratio of emergency dental revisits ≥ 2 times within 1 year.

	cOR (95% C.I.)	aOR (95% C.I.)
Year		
1999–2003	Reference	Reference
2004–2008	1.069 (0.943–1.212)	1.041 (0.916–1.183)
2009–2013	1.032 (0.904–1.179)	0.964 (0.841–1.105)
Day		
Weekdays	Reference	Reference
Weekends	0.794 (0.761–0.827)	0.666 (0.596–0.744)
Gender		
Female	Reference	Reference
Male	1.146 (1.098–1.195)	1.252 (1.116–1.404)
Age		
0–6 years	1.664 (1.349–2.052)	1.683 (1.351–2.096)
7–11 years	1.174 (0.846–1.63)	1.184 (0.847–1.656)
12–19 years	1.062 (0.813–1.388)	1.062 (0.808–1.396)
20–34 years	Reference	Reference
35–49 years	1.683 (1.445–1.961)	1.586 (1.336–1.884)
50–69 years	1.973 (1.687–2.306)	1.828 (1.532–2.181)
≥ 70 years	2.261 (1.853–2.76)	2.087 (1.696–2.569)
Insurance amount		
Dependent	Reference	Reference
0–18000 Taiwan \$	1.255 (1.097–1.435)	1.007 (0.854–1.188)
18,000–36000 Taiwan \$	1.456 (1.275–1.662)	1.095 (0.921–1.302)
36,000–54000 Taiwan \$	1.196 (0.949–1.507)	0.941 (0.724–1.222)
$\geq 54,000$ Taiwan \$	1.091 (0.769–1.548)	0.812 (0.558–1.182)
Region		
Taipei	Reference	Reference
North	0.933 (0.702–1.24)	0.907 (0.680–1.209)
Central	1.474 (1.286–1.69)	1.324 (1.151–1.524)
South	0.971 (0.786–1.199)	0.959 (0.774–1.189)
Kaohsiung-Pingtung	1.17 (1.004–1.364)	1.120 (0.958–1.309)
East	0.768 (0.526–1.124)	0.743 (0.506–1.092)
Unknown	1.415 (1.131–1.771)	1.382 (1.100–1.736)

aOR: adjusted odd ratio.

95% CI: 95% confidence interval.

relative lower emergency dental revisits in Taiwan as compared with US.

One indicator of quality of health care is the emergency department revisit. In this study, we first reported that the most emergency dental revisits were within 7 days. The peak of emergency dental revisits is within 24 h up to 14.28%. Acute revisits are most often defined as visits within 24–72 h.¹¹ In this study, the top 1 diagnosis of emergency dental revisits is diseases of pulp and periapical tissue. It may reasonable to assume why relative higher acute emergency dental revisits in Taiwan. In addition, the quality of endodontic care still leaves a lot to be desired.

In the present study, males were found to pay more frequent emergency dental revisits than females. It is not surprised that the male are usually unaware of oral health. The elder groups and children under 6 had the higher emergency dental revisits. It is reasonable to assume these groups are the underprivileged who need medical and dental care most. Interestingly, there are no significant statistical variations stratified by year, day, insurance amount, and regions in this study. The reasons may be explained as follows. Since March 1, 1995, Taiwan has

launched a single-payer NHI program and almost 100% of the whole population had benefited from the system in 2014.¹² This program provided ubiquitous and unrestricted health service to every people. People have easy access to medical and dental cares. Therefore, the systematic-level difference should be very minimal in Taiwan.

From the results of this study, top 3 dental conditions were diseases of pulp and periapical tissues, gingival and periodontal diseases, and diseases of the oral soft tissues, excluding lesions specific for gingiva and tongue. These criteria are belonging to non-traumatic dental conditions. These could be due to ill-equipped to manage non-traumatic dental conditions in emergency department. The staffs typically might be limited training to diagnose and treat dental problems. Most patients receive only palliative care such as the prescriptions for antibiotics and/or analgesics.¹³

In this study, the malignant neoplasm of oral cavity (ICD: 145, 141, 143, and 140) were also the top 20 dental conditions for emergency dental revisits. These findings are quite unique non-traumatic dental conditions in the world. These could be the high prevalence of oral potentially

malignant disorders^{6,7} and oral malignant transformation rate in Taiwan.^{14,15} How to establish the comprehensive dental care chain would be an important issue for the policy decision makers.

To the best of our knowledge, the present study offers the first considerable understanding of demographics and conditions of emergency dental revisits in Taiwan. From this big data analysis, it could exhibit salient and meaningful findings of emergency dental revisits. However, there are some limitations in this study. First, some data is probably incomplete or missing from NHIRD such as geographic regions in Table 2. Second, it was hard to identify these emergency dental revisits on the same hospital or not. Third, the regular dental care in Taiwan is quite convenient. The attitude and behavior of these people with repeated emergency dental visit is are required to further analysis. Fourth, the NHIRD DN did not provide any data after 2013. The results may not be extrapolated to most current situation.

In this study, we present the patient profile of emergency dental revisits in Taiwan. We also provide the most common dental conditions seeking for emergency dental revisits. However, non-traumatic emergency dental revisits are preventable. Therefore, there is a need for improving our current understanding of this phenomenon.

Conflicts of interest

None declared.

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