Research Journal of Recent Sciences _____ ISSN 2277-2502
Vol. **2(7),** 19-23, July **(2013)** *Res.J.Recent Sci.*

Provision of High-cost Complete Denture Service through Universal Healthcare Coverage: Post Implementation Analysis in Western Thailand

Chanapong Rojanaworarit[1], Sathirakorn Pongpanich[1*], Supawat Rungsuriyawiboon and Utsana Tonmukayakul
[1]Colleage of Public Health Sciences, Chulalongkorn University, Bangkok, THAILAND
[2]Faculty of Economics, Thammasat University, Pathumthani, THAILAND
[3]Deakin Health Economics, Deakin University, AUSTRALIA

Available online at: www.isca.in
Received 17th February 2013, revised 1st March 2013, accepted 2nd April 2013

Abstract

This cross-sectional study explored service provision and reimbursement situation of high-cost complete denture service delivery under Universal Healthcare Coverage scheme of 37 district hospitals located in western Thailand in fiscal year 2010. This study analyzed determinants associated with no high-cost dental prostheses provision to identify barriers to efficient service delivery. In fiscal year 2010, up to 827 patients received complete denture services which accounted for 3,145,015 THBs reimbursed expense to the National Health Security Office. Median of reimbursement was 74,800 THBs and the reimbursement ranged from 3,280 THBs to 357,896 THBs, excluding a hospital with no reimbursement. Median of labour productivity ratios was 7 cases per dentist and the highest ratio was 16.7 cases per dentist. Univariate and multivariate logistic regression to estimate crude and adjusted association between interested parameters i.e. hospital sizes, numbers of dentists, and degrees of ruralitycould not be undertaken due to insufficient outcome of no service provision. Graphical analysis using box-and whisker diagrams to explore relationship between labour input and service output depicted only primary relationship. Thus further investigation using more advanced analytical techniques of efficiency analysis and total productivity analysis was suggested to comprehensively identify hindrances of high-cost complete denture service delivery problem.

Keywords: High-cost care, complete denture, universal coverage, health financing, service productivity.

Introduction

This study is a part of the series of situation analysis of high-cost complete denture service delivery under the Universal Health Coverage Scheme (UC) in Thailand in fiscal year 2010. Budget for provision of the high-cost dental prostheses was included in global budget together with other high-cost medical equipment and interventions. It is not until the National Dental Fund was established in fiscal year 2011 that definite budget of the program was specifically estimated[1,2]. The estimated ceiling reimbursement value for each set of the high-cost complete denture provided couldbe as high as 4,400 THBs which was almost doubled the UC per capita funding of 2,401.33 THBs[1,3]. Excessive provision of high-cost dental prostheses could result in budget overrun. Therefore situation analysis of recent provision of the high-cost complete dentureand related reimbursement would provide key information for further budgeting and planning of public dental health service provision.

This study aimed to provide landscape of high-cost complete denture service provision, related service reimbursement, and service productivity of dentists of district hospitals in western Thailand. Relationship between interested covariates and the outcome of no service delivery through the program was also explored.

Methodology

This study analyzed cross-sectional parameters of the high-cost complete denture service delivery under UC in the western region of Thailand in fiscal year 2010. The fiscal year 2010 was selected for analysis due to availability of validated information retrievable from the database constructed through the use of new internet-based E-claim system of the Bureau of Claim Administration, National Health Security Office. The internet-assisted claim system became fully functional since this fiscal year of 2010. There were 37 district hospitals with affiliated dentists in western Thailand included in this situational analysis. Study variables included hospital size indicated by number of inpatient beds, number of dentists in each dental unit, degree of rurality (urban-like area, rural area, and very rural area), number of high-cost complete denture service recipients, and value of service reimbursement.

The degree of rurality was stratified upon the lists of hospitals in rural areas of Thailand with shortage of health professionals as indicated for fiscal year 2009-2010[4]. Information regarding hospital size and number of dentists for each hospital were received from Bureau of Dental Health, Ministry of Public Health. Reimbursed expenses and number of high-cost complete denture service recipients were provided by the Bureau of Claim Administration, National Health Security Office.

Descriptive statistics was analyzed using Microsoft Excel. Univariate and multivariate regression using SPSS package version 17 were employed to test a hypothesis regarding factors associated with no high-cost complete denture service delivery through the program. The outcome of no service delivery through the program was defined as having no claim made to the Bureau of Claim Administration. Box-and-whisker diagram was used to demonstrate relationship between labor input–represented by number of dentists in each dental unit–and the service output shown by corresponding number of recipients or patients. The graphical presentation was used to examine correlation between these two variables whether the finding followed an economic law of diminishing marginal returns. The relationship between labor productivity ratio–number of the high-cost complete denture patients served per dentist–in each hospital, and factors of hospital sizes and degrees of rurality were also illustrated by box-and-whisker diagrams.

Results and Discussion

In fiscal year 2010, there were 36 out of 37 district hospitals in western Thailand delivered the high-cost complete denture service to 827 edentulous patients. Total reimbursement value in this region was 3,145,015 THBs and the reimbursement ranged from the minimum of 3,280 to the maximum of 357,896 THBs with median reimbursement of 74,800 THBs. Only one small (30-bed) hospital did not have any evidence of claim for service reimbursement. Small hospitals provided more than half of the total high-cost complete denture service provision indicated by percentages in numbers of complete denture service recipients and reimbursed expenses as illustrated in table 1. Medium (60-bed) hospitals contributed for a quarter of the total complete denture services. When service delivery was considered from an aspect of labor input, only one hospital with 2 dentists did not have any claim for service reimbursement. Such absence of service provision through the program might be due to engagement with other dental treatments rather than providing dental prostheses; which requires specialized skills, long chair time, and multiple appointments. However, the other 14 hospitals with 1-2 dentists could deliver the complete denture service to approximately one third of the total service recipients in this region and this extent of service delivery was comparable with the hospitals having 3-4 affiliated dentists. Hospitals with 3-4 dentists served about 44.4% of the total complete denture service delivery in this region. Findings showed that dental units with 5-8dentists were out performed by smaller dental units with 1-4 dentists in terms of number of cases and service reimbursement value. Most of the district hospitals in western Thailand (72.2%) were located in urban-like areas, while the rest of the dental providers were equally scattered in rural and very rural areas. It should be noted that only one hospital with no service reimbursement was situated in urban-like area.

Since there was only one hospital with no service delivery through the program, univariate and multivariate regression analyses could not be rationally undertaken. However, relationship between labor input and service output could be graphically displayed by means of box-and whisker diagram. Figure 1 illustrated fluctuation trend of between these two variables. An outlier and an extreme outlier could be apparently observed in the groups of hospitals with 2 and 5 dentists, respectively. The trend of relationship between these two variables did not conform well to the economic law of diminishing marginal returns of production; which states that when a certain production input is added more and more to a production process while all other inputs stay unchanged, at a certain point, such addition of input would yield less marginal product than the previous extent of such input [5,6]. However, it was well illustrated from the trend identified here that adding more and more dentists did not necessarily increase service output. Optimal scale of operation is thus an important issue to be considered in improvement of service deliver efficiency.

The labour performance indicated by labor productivity ratio or production output yielded per one unit of labor input is a measure of partial productivity measure. The ratio also implied workload regarding the high-cost complete denture service per one dentist. This information would assist dentist to make decision whether to deliver more complete denture service or spend chair time to other dental services. Regarding labour productivity analysis, median of labour productivity ratios was 7 cases per dentist. Among hospitals with delivery of this service, the highest ratio was 16.7 (60-bed hospital with 3 dentists in an urban-like area) while the lowest ratio was 0.3 (30-bed hospital with 3 dentists in a very rural area). Figure 2 clearly illustrated that productivity ratios did not relate to hospital sizes because there was no considerable variation among median productivity ratios and interquartile ranges among groups of different hospital sizes.

Figure 3 depictedlabour productivity ratios in three different degrees of rurality. Decreasing trend of productivity ratios was expected to see in the group of hospitals situated in very rural areas because of several difficulties related to hardship in the areas. However, the findings showed discrepancy of the trend. Median productivity ratios were higher in urban-like and very rural areas compared to those in rural area. This finding implied that affiliated dentists in a number of hospitals in urban-like areas were as productive in providing the high-cost complete denture service as those working in very rural area hospitals. In the group of hospitals in urban-like areas, productivity ratios largely ranged with a remarkable outlier while productivity ratios of the rural and very rural areas groups were less dispersed. An exceptional outlier in the group of hospitals located in very rural areas should be remarked.

However, the low labor productivity ratios should not be misinterpreted as inefficient in overall dental service provision. The findings considered only one dental service output from a broad spectrum of dental public health service which includes oral health preventive interventions, simple dental treatments, and other complicated dental services.

Table-1
Characteristics of district hospitals in western Thailand regarding high-cost complete denture service under UC in fiscal year 2010

Categories	District hospitals with affiliated dentists			Complete denture service recipients (n=827)	Reimbursed expenses (Total= 3,145,015 THBs)
	No service delivery through the program (n=1)	With service delivery through the program (n=36)	Total (n=37)		
Hospital sizes(beds)					
10	0	3 (8.1%)ǂ	3 (8.1%)ǂ	53 (6.4%)ǂ	203,040 (6.5%)ǂ
30	1 (4.3%)*	23 (95.7) * (62.2%)ǂ	23 (62.2%)ǂ	482 (58.3%)ǂ	1,805,615 (57.4%)ǂ
60	0	9 (24.3%)ǂ	9 (24.3%)ǂ	210 (25.4%)ǂ	812,812 (25.8%)ǂ
90	0	2 (5.4%)ǂ	2 (5.4%)ǂ	82 (9.9%)ǂ	323,548 (10.3%)ǂ
Dentists in each hospital (persons)					
1-2	1 (6.7%)*	14 (93.3%)* (38.9%)ǂ	15 (40.5%)ǂ	253 (30.6%)ǂ	981,664 (31.2%)ǂ
3-4	0	16 (44.4%)ǂ	16 (43.2%)ǂ	327 (39.5%)ǂ	1,248,547 (39.7%)ǂ
5-6	0	5 (13.9%)ǂ	5 (13.5%)ǂ	205 (24.8%)ǂ	754,556 (24.0%)ǂ
7-8	0	1 (2.8%)ǂ	1 (2.7%)ǂ	42 (5.1%)ǂ	160,248 (5.1%)ǂ
Degrees of rurality					
Urban-like	1 (3.7%)*	26 (96.3%)* (72.2%)ǂ	27 (73.0%)ǂ	672 (81.3%)ǂ	2,537,855 (80.7%)ǂ
Rural	0	5 (13.9%)ǂ	5 (13.5%)	69 (8.3%)	267,280 (8.5%)ǂ
Very rural	0	5 (13.9%)ǂ	5 (13.5%)ǂ	86 (10.4%)ǂ	339,880 (10.8%)ǂ

*Percentage by row, ǂ Percentage by column

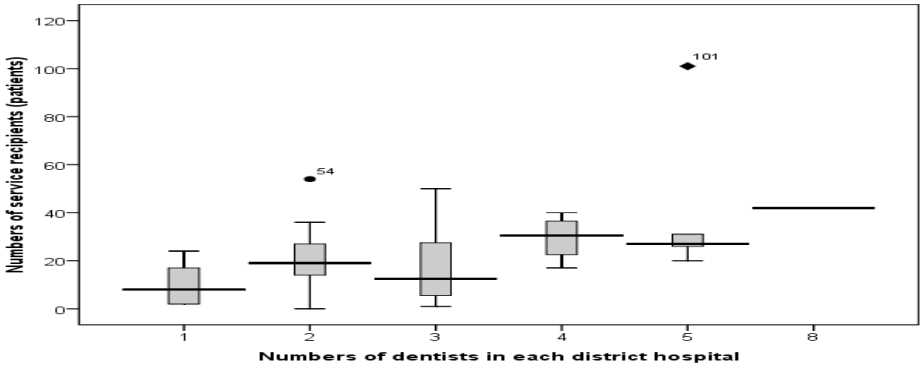

Figure-1
Numbers of service recipients served by 37 district hospitals with different numbers of dentists in western Thailand in fiscal year 2010
Remark: Outliers (●) and extreme outliers (♦) are labeled with numbers of service recipients

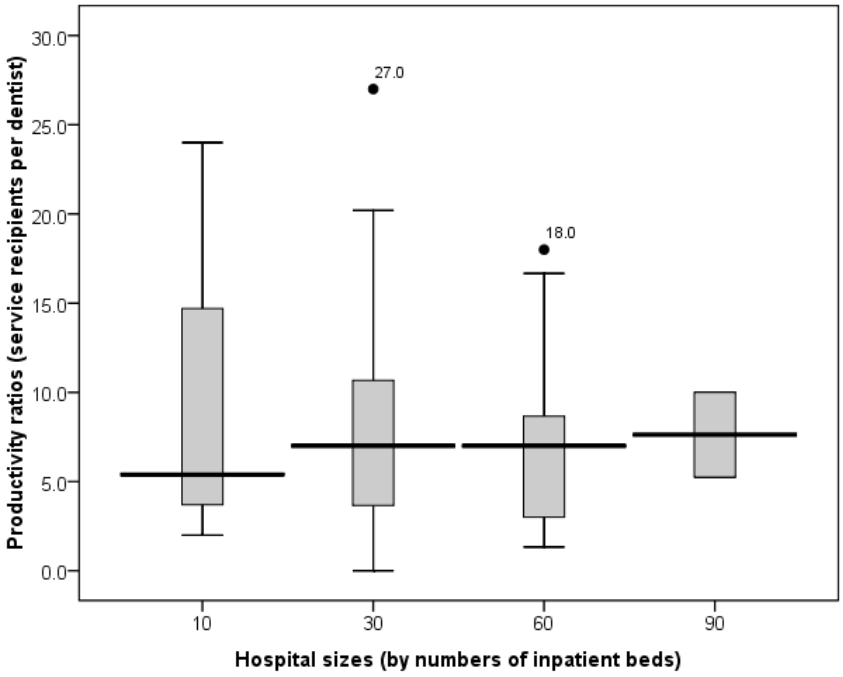

Figure-2
Labour productivity ratios of high-cost complete denture service provided by 37 district hospitals with different hospital sizes in western Thailand in fiscal year 2010
Remark: Outliers (●) are labeled with productivity ratios

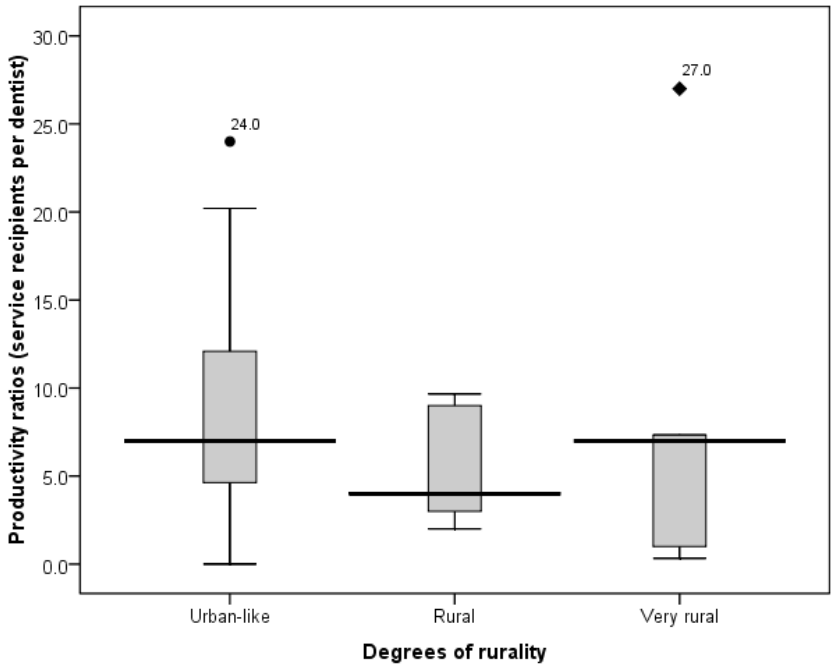

Figure-3
Labor productivity ratios of high-cost complete denture service provided by 37 district hospitals situated in areas with different degrees of rurality in western Thailand in fiscal year 2010
Remark: Outliers (●) and extreme outliers (♦) are labeled with productivity ratios

Conclusion

Information about high-cost complete denture service provision and reimbursed expenses in fiscal year 2010 would be important for better budgeting and expense control by the National Dental Fund in the following years. Although analysis of labor productivity ratio demonstrateda picture of dentists' workload in providing the complete denture services, low productivity ratios in this context of analysis should not be misinterpreted as low capability of the dental professionals in overall dental service delivery. According to the limitation of available data, the determinants of no service provision were unable to be identified. Qualitative approach is highly recommended to investigate factors underlying no complete denture service provision, and other problematic aspects of service management. Efficiency analysis using more advanced analytical methods, such as Data Envelopment Analysis (DEA), are also recommended to provide useful implications on resource allocation related to the high-cost dental prosthetic service.

Acknowledgement

This research article is a part of doctoral dissertation by Chanapong Rojanaworarit, who has received financial support for his doctoral degree study from the H.M King Bhumibol Adulayadej's 72nd Birthday Scholarship, Chulalongkorn University, Thailand. This research has received research funding from The 90th Anniversary ofChulalongkorn University Fund (Ratchadaphiseksomphot Endowment Fund).

References

1. Bureau of Claim Administration, Manual of claim for health service expenses, Thailand: National Health Security Office **(2012)**

2. Eungpoonsawat W., Weerasrethakul K., Siriwattanapisan S., Limpanyalert A. and Lamduan W., National Dental Fund: a changing point for solving dental public health problems, *Bulletin of Thai Dental Council,* **15(Nov.-Dec.)**, 8-10 **(2010)**

3. National Health Security Office, Manual for national health security fund administration: fiscal year 2010, book 1, Thailand: National Health Security Office, **(2010)**

4. Ministry of Public Health, Official correspondence: list of district hospitals in rural areas with shortage of health professionals in fiscal years 2009-2010, Thailand: Ministry of Public Health, **(2009)**

5. Samuelson P. and Nordhaus W., Microeconomics, (17th ed.), Boston, MA: McGraw-Hill **(2001)**

6. Coelli T., Rao D., O'Donnell C., and Battese G., An introduction to efficiency and productivity analysis, (2nd ed.), New York: Springer **(2005)**