Dental Journal
Majalah Kedokteran Gigi
Vol. 42. No. 4 October–December 2009

Research Report

Dental health economics and diagnosis related groups/casemix in Indonesian dentistry

Ronnie Rivany
Department of Health Administration and Policy
Faculty of Public Health, University of Indonesia
Jakarta - Indonesia

ABSTRACT

Background: *Dental Health Economics is a branch of transdiciplinary science that refers to the Economic and Public Health science. On the other hand, in other developed countries, Diagnosis Related Groups (DRG's) /Casemix has been used as a basic in creating the same perception between providers, patients and insurance companies in many aspects such as health planning, healthcare financing and quality assurance.* ***Purpose:*** *The objective of this review is to propose a new paradigm of economics to be applied in Indonesian Dentistry.* ***Reviews:*** *The Dental Health Economics should be considered as an important aspect in Indonesian Dentistry, which is used to determine the dental treatment fee based on unit cost, cost containment, and cost recovery rate analysis. Referring to Australian Refined Diagnosis Related Group, health care industry in Indonesia has starting to try a more structured way in grouping disease pattern in order to come up with more precise health care services to their patients. The on going development of Indonesian DRG's is meant to confirm the disease pattern and partition.* ***Conclusion:*** *The development of Indonesian DRG's concept, especially the Dental & Oral Disorders, needs a new paradigm, so the practitioners and academics could group and calculate the unit cost from each dental treatment according to the Indonesian DRG version (INA-DRG's).*

Key words: *dental cost analysis, Diagnosis Related Groups (DRG's) and casemix, Australian Refined-DRG, INA- DRG's*

Correspondence: Ronnie Rivany, c/o: Bagian Administrasi Kebijakan Kesehatan, Fakultas Kesehatan Masyarakat Universitas Indonesia. Gedung F, Lt. 1 Kampus FKM UI Depok. E-mail: ronnie_rivany@yahoo.com.

INTRODUCTION

Pricing in Indonesian Dentistry, either on private clinics or dental hospital, is generally done without calculating the cost analysis first. Benchmark against competitor's tariff is used as the main reference without noticing how much the actual cost of production in dental and oral healthcare. Cost analysis to produce unit cost, cost containment, and cost recovery rate analysis to estimate profit and loss is still an academic theory in economics that is not yet applied in Indonesian Dentistry. On the other hand, there are a few undeveloped concepts such as: the making of Clinical Pathway that is more comprehensive than the Dentistry Medical Standard which will be used for quality assurance. The other concept is the grouping of the Dental & Oral Disorders which becomes part of Major Diagnostic Categories (MDC) 03 Diseases and Disorders of the ear, nose, oral and throat from the Australian Refined Diagnostic Related Groups (AR DRG's), where there is no specific MDC. There is still no grouping pattern and cost of treatment per Indonesian DRG, specifically on Dental & Oral Disorders.

In Hospital Economics, micro economy is applied on the tools used to calculate the costs that will calculate the unit cost, pricing of a health care service that the hospital would provide, or the selection of several alternatives presented in the investment of medical equipment based on the results of a Cost Benefit Analysis for benefits that will be reaped.[1] Pharmaconomics is aimed more on which drugs would be more effective and efficient (Cost Effectiveness Analysis) in an intervention procedure in the pharmaceutical field, plus the output which is expected to improve the quality of life or cure the patient.

However, the characteristics of the dental & oral health care commodity differ from other healthcare commodities (Table 1). The table showed the very principal characteristic

Table 1. Characteristics of dental & oral healthcare commodities[2]

Characteristic	Normal Product	Dental
Commodity	Tangible	In-tangible
Consumer Knowledge	Good	Poor
Decision to buy/utilize	Consumer	Consumer + Provider
Supply induced demand	No	Yes
Decision quantity & quality	Consumer	Provider
Payer	Consumer	Consumer + 3rd party
Evaluator	Consumer	Provider
Time to buy	Predict	Un-predict
Non product/medic component	No	Yes

differences between normal product and dental product, which are commodity, consumer knowledge, supply induced demand and time to buy. On the other hand, the economic sciences applied in the dental & oral health is almost similar to the hospital, where it is used to: calculate the effective and efficient cost in selecting the dental healthcare equipment for private and institutionalized practices; analyzing the dental cost per cost unit that will be used for pricing; and also calculate the cost recovery rate to see whether the price for the products have been favorable or not.

The objective of this review is to propose a new paradigm of economics to be applied in Indonesian Dentistry, where the Indonesian DRG's development tries to have its own characteristic according to tropical disease pattern and its treatment. On the other side, Health Economics is the application of economic science in the Public Health,[3,4] which pioneered the application on other health care sectors, such as Hospital Economics for its application in the hospital,[5] Pharmaconomics in the pharmaceutical field,[6] and also in dental and oral health care, which is called Dental Health Economics.

Dental cost analysis

Pricing a service or health care should take these variables into consideration:[1,3] the unit cost, ability to pay and willingness to pay, benchmarking, policies, elasticity and the desired margin. Theoretically, the cost calculation, usually called cost analysis, to get the unit cost of a product or procedure is based on two approaches, distribution and activity. The cost analysis based on distribution is Simple Distribution Method, Step-down Distribution Method, Double Distribution Method and Multiple Distribution Method. As the Indonesian Medical Care Standard for Dentistry has been issued by Ministry of Health Republic of Indonesia in year 2002, the cost analysis for dentistry should be based on the activities or Activity Based Costing (ABC).

Technically, ABC method calculates the direct and indirect costs of a service/health care or a resource used by a patient/consumer because of an activity.[7] What should be recorded in this method is the identification of the activities from the admission, the medical procedure provided, until the patient returns home or is released. Technically, the activities in the medical care aspect that called the Clinical Pathway are included in the medical care standard, only when the activities include administration aspects and others supporting medical aspects.[8,9]

The Clinical Pathway is an "integrated health care planning concept that includes all the steps the patient goes through based on the medical care standards, nursing care standards, and other health staff standards that are evidence based with measurable results and within a certain amount of time during the hospital visit." Technically, the Clinical Pathway includes the admission stage, which involves administrative staff; diagnostic stage, involving other health personnel; pretherapy-therapy procedures; follow up; and discharge of the patient when patient is cured, (Figure 1). The problem is that the details in the Dentistry Medical Standards for examination, ancillary

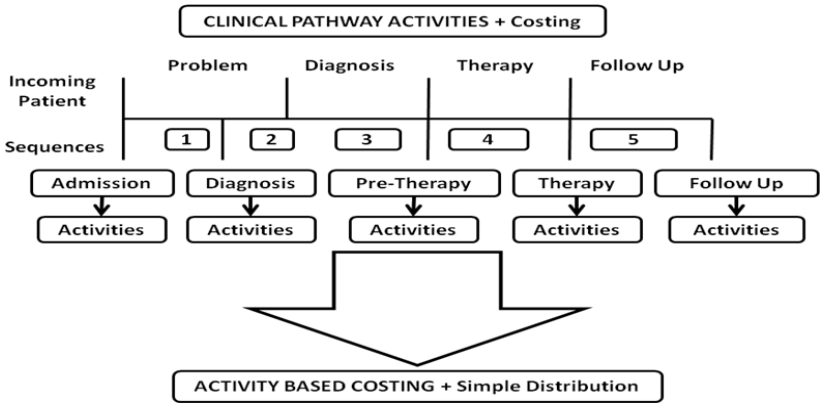

Figure 1. The relations between clinical pathway and costing.[9]

examinations, consultation and therapy/medical care procedures are not clear, so it may vary at the private and institutional practices.

According to the basic concepts of the Clinical Pathway that systematically combines the Standard Operating Procedure, Medical Care Standard, its administration and nursing aspects from the moment the patient enters the clinic until he/she is cured; the category of procedures must be approved according to its Clinical Pathway. For example: the activities of cavity cleaning is included in diagnostics or pre therapy. An agreement must be reached based on the current procedures/activities. The type of procedures in the Conservation Dentistry Department of Faculty of Dentistry must be determined, so that there would only be five stages of Clinical Pathway, i.e.: admission, diagnostic, pre therapy, therapy, follow up, and discharge. Similar analogy should be implemented for Oral Surgery Department and others. This is what the academics, professional organizations or the Indonesian Dental Association and other related organizations must be aware of. All activities or procedures in the Clinical Pathway must be approved first by all the stakeholders, then a cost analysis using the ABC method can be performed.

Based on the activity stages that demonstrate the cost analysis calculation using the ABC method, Table 2 illustrates the output of a cost analysis for the Conservative Department of "X" specialist dental clinic.[10] The output, which is very specific according to the process flow in the clinic, is showing the difference of the unit cost's calculation result from the different of Cost Recovery Rate for each services.

Cost analysis per unit is very powerful, because cost containment can be achieved and also taking into consideration the existing cost structures. The cost recovery rate also can be calculated, and therefore enabling us to see which service is more profitable and what is the differences in the revenue from the production amount multiplied by the price and the unit cost. The basic concept is CRR = 100%, so if the CRR < 100% it is a loss, and if the CRR > 100% it is called a profit, so it can recover its own costs.[11] In Table 2, it was only a coincidence that there are activities with a CRR exceeding 100%, because the pricing was not based on cost analysis.

Diagnosis related groups (DRG's) and casemix

In modern countries, the cost of a procedure/treatment of a related disease group/Diagnosis Related Group (DRG's) and its case mix with its complications and co morbidities usually already have a national cost range with certain standard deviations.[8,12] Based on the standard cost for the disease group, it helps the patient to estimate the cost size they need to prepare if they become ill, and also helps the insurance company for claiming both: their clients and the providers/hospitals.

The disease grouping is based on the International Classification of Disease (ICD) from the WHO that consists of 21 chapters of common diseases, which now has been revised for the tenth time as well as the International Classification of Disease volume 10 (ICD X), that is used as the guidelines in the medical procedures.

Australian DRG

The WHO's International Classification of Disease X (ICD-X) was issued several years ago. The diseases were classified based on general anatomy and function of body organs.[12] Australia has endeavored to re-classify the diseases into a 23 category classification, which called Major Diagnostic Categories (MDC)[13] as shown in Table 3.

In Australian version (Australian DRG), out of their 23 Major Diagnostic Categories, Australia then classify it into 661 Diagnostic Related Group and coding it into the following format: A DD S, with the alphabet A stands for Pre Major Diagnostic Categories - Diagnosis Related Groups (MDC number nul), and so on until it displays lines of alphabet starting with MDC number one (MDC 01) with the alphabet B for Disease and disorders of the

Table 2. Cost analysis calculation using the activity based costing method in Conservation Department of "X" Specialist Clinic10

No	Type of Activity	TO	Price (IDR)	UC (IDR)	TC (TO × UC) (IDR)	TR (IDR)	CRR (TR/TC × 100%)
1	Plastic Restoration Class		150.000				
	Resin dentures	405		201,717.40	81,695,545.29	60,750,000	74%
	Amalgam II class mod	28		180,943.97	5,066,431.18	4,200,000	83%
2	Endo Care Class		200.000				
	Visit I	369		250,129.55	92,214,427.27	73,733,333	80%
	Visit II	369		227,896.69	84,017,913.83	73,733,333	88%
	Visit III	369		204,575.67	75,420,231.86	73,733,333	98%
3	Non Plastic Restoration Class		600.000				
	On lay	94		379,960.66	35,716,301.58	56,400,000	158%
	Inlay	17		379,960.66	6,459,331.14	10,200,000	158%
4	Consultation	26	60.000	66,677.48	1,733,614.59	1,560,000	90%
5	Polishing	71	50.000	44,807.70	3,181,346.35	3,550,000	112%

TO = Total output: UC = Unit Cost; TC = Total Cost; TR = Total Revenue; CRR = Cost Recovery Rate

nervous system. The alphabet DD for DRG's partition which Range 01–39 for Surgical Partition, Range 40–59 for Other Partition, Range 60–99 for Medical Partition. The alphabet S indicated for split indicator which A for highest resources DRG, and B for second highest resources which caused by the presence of complications and co-morbidity (Casemix).

Here, the Australian Refined DRG, the Dental and Oral Disorders are included in MDC 03, the classification for diseases and disorders of the ear, nose, oral and throat that may have surgical, medical, and other procedures. The list is alphabetical and therefore the Dental and Oral Disorders are under the letter D with numbers 01–39 for surgical procedures, 40–59 for other procedures, and 60–99 for medical procedures. In this group, extraction and restoration procedures (others partition) are catalogued in MDC 03. D 40 Z, while more medical procedures (non-extractions and restorations) are in group D 67 Z. Based on the AR-DRG, the cost weight for those two groups is illustrated in Table 4.

The average cost for dental and oral disorders group (MDC 03. DRG D 40 Z) is 1,392 A$. 1,018 A$ in direct cost and 374 A$ in indirect costs/overhead. Therefore, the cost for any extraction and restoration procedures of any dentist in Australia is based on the amount set nationally. While the costs for MDC 03. DRG D 67 Z with medical non-extraction and restoration procedures is 1,359 A$. 1,005 A$ in direct costs and 355 A$ in indirect costs/overhead. The questions are: is it possible to classify the diseases into separate groups based on the functional organ, such as MDC 02 that only includes the diseases and disorders of the eyes, and what is the cost analysis for each DRG for the Indonesian version of dental and oral disorders.

DISCUSSION

Indonesia, as a developing nation, should also begin to establish a planning, payment/funding, and quality assurance pattern such as the DRGs and case mix in other developed countries. The Ministry of Health, as the organization that is responsible for this country's health has collaborated with Hospital Universiti Kebangsaan Malaysia to adopt the Malaysian case mix system, and is now in the process of socializing the pricing list for various government hospitals. The question is how did they apply the Clinical Pathway as a quality assurance measure before the pricing.

Table 3. Major diagnostic categories–Australian version[13]

No.	Category
1	Diseases and disorders of the nervous system
2	Diseases and disorders of the eye
3	Diseases and disorders of the ear, nose, and throat
4	Diseases and disorders of the respiratory system
5	Diseases and disorders of the circulatory system
6	Diseases and disorders of the digestive system
7	Diseases and disorders of hepatobiliary system and pancreas
8	Diseases and disorders of the musculoskeletal system and connective tissue
9	Diseases and disorders of the skin, subcutaneous tissue, and breast
10	Endocrine, nutritional, and metabolic diseases and disorders
11	Diseases and disorders of the kidney and the urinary tract
12	Diseases and disorders of the male reproductive
13	Diseases and disorders of the female reproductive system
14	Pregnancy, child birth, and the puerperium
15	Newborn and other neonates with conditions originating in the perinatal period
16	Diseases and disorders of blood and blood forming organs and immunological disorders
17	Myeloproliferative disease and disorder, and poorly differentiated neoplasm
18	Infectious and parasitic disease (systemic or unspecified sites)
19	Mental diseases and disorders
20	Alcohol/drug use and alcohol/drug-induced organic mental disorders
21	Injuries, poisoning, and toxic effects of drugs
22	Burns
23	Factors influencing health status and other contact with health service

Table 4. MDC 03 Cost weight diseases and disorders of the ear, nose, oral and throat[13]

DRG	Direct Cost	Indirect Cost/Overhead	Total Cost
D 40 Z	1,018	374	1,392
D 67 Z	1,004	355	1,359

Another conceptual framework is the development of an Indonesian DRG (INA DRG) by Rivany.[14] The objective of this act is to develop an Indonesian classification for the in-patient diseases, whatever the Clinical Pathway template, the calculation of the cost of treatment and socialize it to all the stakeholders in the nation, without disregarding the basic idea.

In specific, there are several goals of the Academic Terminology and Concept of INA-DRG. The first goal is to confirm whether the in-patient healthcare patterns with surgical/others/medical procedures and its co morbidities and complications in Indonesian hospitals can be adjusted to or follow the in-patient disease patterns of other countries. The second is to identify all the activities and utilization (evidence based) related to in-patient healthcare with surgical/others/ medical procedures with its co morbidities and complications from the admission, diagnostics, pretherapy/therapy, and follow up as the basis for the Clinical Pathway. The third is to establish an INA-DRG based Clinical Pathway with the related professional organizations for evidence based in-patient healthcare patterns with surgical/others/medical procedures and its co morbidities and complications in Indonesian hospitals. The fourth is to identify all the direct and indirect costs in the INA-DRG based on Clinical Pathway of evidence based in-patient healthcare patterns with surgical/others/medical procedures and its co morbidities and complications in Indonesian hospital. The fifth is to perform a cost analysis of all healthcare packages for in-patient healthcare patterns with surgical/others/medical procedures and its co morbidities and complications based on the established Clinical Pathway where the cost analysis using Activity Based Costing method for the direct costs and Simple Distribution method for the indirect costs. The last goal is to perform a calculation sensitivity test on the costs for healthcare packages by creating a simulation of the cost of treatment without including the salary and drugs, to avoid double counting if it is completely funded by the government.

Technically, the outline of the concept is found on the Thinking Pattern of the Indonesian Diagnostic Related Group (INA-DRG), with Confirmation and Cost Analysis as the basic. The two conceptual framework are illustrated in Figure 2 and 3.

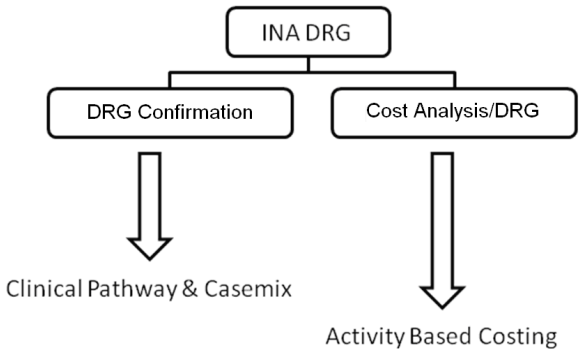

Figure 2. INA-DRG conceptual framework (1).[9]

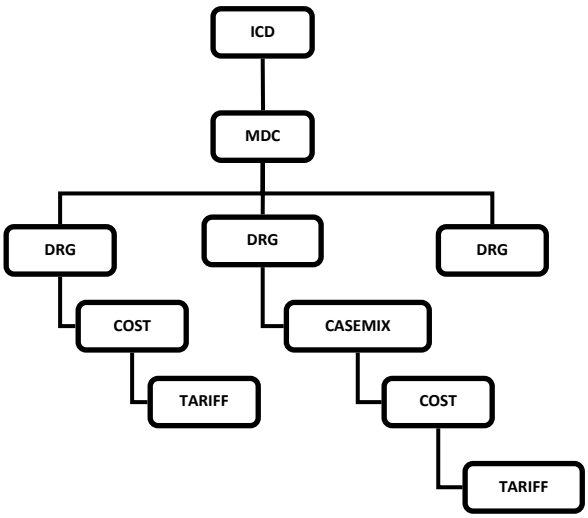

Figure 3. INA-DRG conceptual framework (2).[9]
ICD: International Classification of Disease;
MDC: Major Diagnostic Categories;
DRG: Diagnosis Related Groups.

In the first conceptual framework (Figure 2), the INA-DRG Terminology and Academic Concept has to confirm and perform a cost analysis of the actual unit cost to obtain the current cost based on the Clinical Pathway issued for the cost of treatment at the hospital. The unit cost is calculated using the Activity Based Costing method and Simple Distribution method, where the cost for in-patient care is a function of utilization and unit cost as shown in Figure 3.

In the second conceptual framework (Figure 3), the idea is to obtain the actual costs of various procedures, drugs, and medical equipment based on the Clinical Pathway received by the patient, whereas the factors that influence the utilization are the main diagnosis based on ICD X, the characteristics of the patient, and the case mix. Pricing can be determined after the cost is analyzed, and may or may not have a margin, depending on the vision and mission of each hospital.

Assuming that the Clinical Pathway and unit cost is an independent variable of cost of treatment per diagnosis based on the degree of the disease (with or without co morbidities and/or complications), the main diagnostic aspect, case mix (complicating and ancillary diseases), characteristics of the patient (age and gender), length of stay, utilization of medical/non-medical procedures, drugs and medical equipment play a large role in the cost analysis for cost unit per procedure.

Keep in mind that creating the INA-DRG requires money, time, manpower, and facilities. Australia spent 5-10 years and more than 40 million A$ to develop their DRG in 1996.

For any current academics, especially with a medicine or dentistry backgrounds, the first problem that must be solved is preparing the Clinical Pathway of the various Medical Care Standards. It can be established by their own professional organizations. With this Clinical Pathway, the cost analysis per disease can be calculated, and at least be used nationwide as preparation for healthcare pricing later on.

Referring to the scarceness of Dental Health Economics based researches compared to those based on Health Economics alone, it is showed that Clinical Pathway and Cost of Treatment in Indonesian Dentistry is actually possible to be made and apply, and so is the grouping of disease pattern of the Dental and Oral Disorders, which is not necessarily the same as DRG D 40 Z & D 67 Z from MDC 03 Australian DRG. The main idea that comes from the lesson learned above is that on Australian DRG the grouping of the disease pattern of the Dental and Oral Disorders is part of MDC 03 on the category of Diseases and Disorders of the Ear, Nose and Throat, which probably needs to be taken into consideration first by the practitioners and academics in Indonesian Dentistry.

It is concluded that the development of Indonesian DRG's concept, especially the Dental & Oral Disorders, needs a new paradigm, so the practitioners and academics could group and calculate the unit cost from each dental treatment according to the Indonesian DRG version (INA-DRG's).

REFERENCES

1. Feldstein PJ. Health care economics. 2nd ed Canada: A Willey Medical Publication, John Willey & Sons Inc; 1983. p. 109.
2. Sorkin AL. Health economics: An introduction. Canada: Lexington Books, D.C Heath & Company; 1975. p. 114.
3. World Health Organization (Geneva). Hospital economics. Geneva: Journal of Health Economics 1992; 1: 12.
4. Bootman JL, Townsend RJ, McGhan WF. Principles of pharmacoeconomics. 2nd ed. Cincinati: Harvey Whitney Books Company; 1996. p. 146.
5. Tuominen R. Health economics in dentistry. California: MedED Inc; 1994. p. 29.
6. Drummond MF, Stoddart GL, Torrance GW. Methods for the economics evaluation of health care programs. New York: Oxford University Press; 1987. p. 98.
7. Brimson JA, Antos J. Activity based management for service industries: Government entities and non profit organizations. Canada: John Wiley & Sons Inc; 1994. p. 163.
8. Ministry of Health Republic of Indonesia. Clinical pathway. Jakarta: Health Care Services Directorate; 2005. p. 4.
9. Rivany R. Relation of clinical pathway with diagnosis related groups: INA Version [paper]. Depok: Faculty of Public Health, University of Indonesia; 2006. p. 12.
10. Soenardi TA. Pricing analysis of dental conservation in "X" clinic. Thesis. Depok: Faculty of Public Health, University of Indonesia; 2002. p. 58.
11. Hindle. Casemix and financial management. New York: McGraw and Hill; 1997. p. 65.
12. Rivany R. Casemix: Micro Economic Reformation on Indonesia Healthcare Industry. Dissertation. Depok: Faculty of Public Health, University of Indonesia; 1998. p. 108.
13. Australian Casemix Clinical Committee. Australian refined diagnosis related groups. Canberra: Australia; 2006. p. 8.
14. Intellectual Property Rights. Indonesian Diagnosis Related Groups (INA DRG's) concept. Jakarta: Directorate General of Intellectual Property Rights, Department of Law and Human Rights of the Republic of Indonesia 2008. p. 1.