

## Case Payment and the Adoption of New Technology: An Empirical Study of Cataract Surgery in Taiwan

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**Background:** Case payment for cataract surgery with Government Employee Insurance (GEI) was implemented at Chang Gung Memorial Hospital (CGMH) in March 1994, and fee-for-service (FFS) was retained for cataract inpatients with or without other health insurance. We examined the impact of this change in the reimbursement policy from FFS to case payment on the health care provider's practice behavior towards a new emerging technology, using cataract surgery as an example.

**Methods:** Secondary data analysis was performed using 1 year of CGMH data before (period 1, from March 1993 to February 1994) and after (period 2, from March 1994 to February 1995) implementing the new policy. Inpatient records for cataract surgery using either extracapsular cataract extraction (ECCE, the old technology) or phacoemulsification (Phaco, the new technology) were included. Logistic regression models were employed to assess how case payment affected the health care provider's adoption of new technology.

**Results:** The percentage of cases treated using the new Phaco technology grew from period 1 (6.6%) to period 2 (23.6%) among all 4 study groups, despite Phaco being more expensive than ECCE. More importantly, the increment ratio of Phaco use from periods 1 to 2 was the smallest for GEI patients (3.26-fold) when compared with the other 3 groups (4.16-5.29-fold).

**Conclusions:** Both new technology and cost containment strategies should be taken into account when setting up a reimbursement policy.

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**Key words:** extracapsular cataract extraction, phacoemulsification, case payment, adoption of new technology.

Case payment in Taiwan is similar to a diagnosis-related group-based prospective payment system (DRG/PPS). Under the case payment reimbursement system, a hospital is paid a predetermined fixed amount for each patient admitted with a particular diagnosis or procedure. Case payment was employed by the insurer (the Bureau of National Health

Insurance, Taiwan, ROC) as a tool to contain the fast-growing health expenditures for inpatient care.

National Health Insurance (NHI), a compulsory health insurance system covering most residents in Taiwan, was implemented on March 1, 1995. Before implementation of the NHI, there were 3 major types of health insurance: Labor Insurance (LI),

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Government Employee Insurance (GEI), and Farmer Insurance (FI) which covered 40.1%, 8.5%, and 8.2% of the total population, respectively. In addition, 2.3% of the population was covered by military insurance and 0.7% by other insurance plans. About 40% of the population had no health insurance, mainly children, the elderly, and unemployed female adults at the end of 1994.<sup>(1)</sup>

Cataracts are one of the most common diseases among the elderly. Blindness due to cataracts has been estimated to affect 14-18 million people globally, particularly in developing countries.<sup>(2,3)</sup> Surgery is the only effective treatment for cataracts and is the most common procedure among US Medicare beneficiaries. The annual number of cataract extractions was over 1 million and cost US\$3.4 billion per year in the US.<sup>(4,5)</sup> A study found that in Taiwan 60% of people aged 50-60 years had senile cataracts, 80% aged 60-70 had them, and 90% aged over 70 had them.<sup>(6)</sup>

The techniques of cataract surgery have dramatically changed over time: from couching, intracapsular techniques to the currently most practiced extracapsular procedure.<sup>(7)</sup> At the present time, intracapsular cataract extraction (ICCE) is seldom performed. Most refinement efforts of cataract surgery have been directed towards extracapsular procedures. Based on the size of the incision, extracapsular techniques can be classified into 2 main categories: extracapsular cataract extraction (ECCE) and phacoemulsification (Phaco). ECCE consists of surgery performed with a standard-size incision. The new technology of Phaco provides the capability for small-incision cataract surgery. A series of surveys by Leaming<sup>(8-10)</sup> showed that the recent trend in extracapsular surgical techniques has been toward an increase in a preference for small-incision Phaco techniques. In 1985, 88% of American Society of Cataract and Refractive Surgery (ASCRS) members preferred planned ECCEs, with only 12% reporting a preference for the Phaco procedure. In 1990, 48% preferred planned ECCE and 52% preferred Phaco. As of 1992, only 21% of ASCRS members preferred standard-incision ECCE procedures, while 79% reported a preference for Phaco techniques.<sup>(8-10)</sup>

Due to the nature of the Phaco procedure which emulsifies the opaque lens, it has better clinical characteristics when compared with ECCE: a smaller incision size (3-5 mm for Phaco vs. 8-10 mm for

ECCE); suturing after the operation not always being necessary; a lower incidence of astigmatism; a more-rapid and better recovery of a patient's vision; and a shorter hospital stay.<sup>(11-13)</sup> However, the cost for the Phaco procedure is higher than for ECCE because the equipment and materials used in the Phaco procedure are more expensive. Opportunity costs for physician training are higher with Phaco than ECCE. Physicians have to practice more to become competent in performing the Phaco technique than for ECCE.

Before March 1994, fee-for-services (FFS) was used to reimburse inpatient services regardless of the patient's health insurance status. Uninsured patients' medical fees were charged according to the study hospital's fee schedule, and GEI patients received 10% off. Medical fees of LI and FI patients were charged according to the LI uniform fee schedule.

From March 1994 to February 1995, the study hospital was contracted with GEI to reimburse any cataract surgery by case payment for all inpatient services. A fixed amount (NT\$28,500, represented by the symbol  $X$ ) was reimbursed to all GEI patients hospitalized with cataract surgery, irrespective of the ECCE or Phaco technique. If the total claimed fee based on FFS was less than 110% of  $X$ , the hospital was reimbursed  $X$  amount. The cost outliers were defined as cases with total fees (TFs) exceeding 110% of  $X$ , and the portion exceeding 110% was reimbursed only at a margin of 60% of the fee. Claim fees ( $C$ ) can be expressed by the formula:  $C=X+0.6 \times (TF-1.1X)$ . During the same period, other insurers and noninsured continued to use FFS to reimburse for cataract surgery.

Some researchers found that physicians may change their behaviors in response to changes in reimbursement mechanisms and/or financial incentives.<sup>(14-16)</sup> With FFS, physicians responded to the decreased rate of services by increasing the intensity and/or volume of patient services to compensate for the loss, and to make themselves financially better off.<sup>(15)</sup> In contrast, under the PPS, physicians do less in order to share the surplus from withholding at the end of a period in an HMO setting with such financial incentives.<sup>(17)</sup> Physicians who have a financial interest in diagnostic centers do more referrals than physicians who do not.<sup>(16)</sup> Healthcare providers (including physicians and hospitals) behave differently when the payment policy changes from FFS to

PPS, which places hospitals at financial risk. Regarding the adoption of new technology, concern immediately shifts from overadoption to underadoption if payment policy changes from FFS to PPS.<sup>(18)</sup> Some investigations on the Medicare DRG payment policy found that high-tech intensive but costly technology, such as magnetic resonance imaging (MRI), extracorporeal shock wave lithotripsy (ESWL), and implant of a cardiac defibrillator, tended to be underpaid. Hospitals may lose on high-tech intensive-related DRGs, and this has caused serious concerns.<sup>(19-21)</sup> However, the ultimate effect of the Medicare PPS/DRG reimbursement policy on technology diffusion has seldom been reported.

The first Phaco technique was performed in June 1992 in CGMH. For the patient's benefit, it became obvious that the new Phaco procedure was better but more expensive than ECCE. How did the reimbursement policy of case payment affect the adoption of this new technology? It is important to study the impact of a reimbursement policy change on providers' behaviors toward the new technique, because both costs and quality of health care are a concern. Our 1-year data before (period 1, from March 1993 to February 1994) and after (period 2, from March 1994 to February 1995) case payment was implemented in GEI patients provide an excellent opportunity to study whether case payment affected the adoption of a new technology using cataract surgery as an example.

## METHODS

Secondary data analysis was performed on data provided by CGMH. CGMH is a non-profit tertiary teaching hospital with a total of 6800 acute beds. There are CGMHs located in Keelung, Linkou, Taipei, and Kaohsiung. Linkou and Taipei are considered 1 branch due to the managerial framework of CGMH. CGMH provided approximately 9% of acute care in Taiwan under the NHI in 2000. In Taiwan, most physicians who work in hospitals are paid a fixed salary plus a bonus, or according to the volume of practice of the physician, the so-called physician fee (PF). CGMH uses the PF to pay the physicians. However, insurers reimburse the hospitals, not physicians, for providing health care to their beneficiaries.

CGMH has maintained many comprehensive databases for inpatients since the 1980s. Included in

the disease classification database are patient date of birth, gender, health insurance status, education, principal and other diagnoses, principal and other procedures, type of anesthesia, and dates of admission and discharge. Fees for the physician, room and board, clinical tests, treatment, procedures, and drugs were included in the inpatient order database. Note that data in the inpatient order database were the expenses based on CGMH's fee schedule, not the fee claimed to the insurers. For consistent comparison of resource utilization among the 4 insurance groups, all costs computed in the study were based on the hospital fee schedule. Thus, no problem should arise when comparing fees among different insurance groups or difference payment systems. Two databases (disease classification and inpatient orders) were merged according to a patient's medical number. CGMH has professional medical chart abstractors who are responsible for coding medical information, such as principal diagnosis and procedure, and other diagnoses and procedures, for the disease classification database. To maintain data quality, recoding of a random sample of inpatient records is performed once a month by a different medical chart abstractor. As cataract extraction is a well-defined procedure and does not normally have other complicating diagnoses, the quality of data used in this study should not be a problem.

We included records of inpatients aged 30 years or older with a principal diagnosis of senile cataracts (ICD-9-CM code 366.10) who underwent unilateral cataract operation in the study hospital (including the 3 branches) during the study period. Because a very small percentage of cataract surgery was conducted using the ICCE technique, only those using ECCE (ICD-9-CM code 13.59) or Phaco (ICD-9-CM code 13.41) with intraocular lens insertion (ICD-9-CM code 13.71) during the operation were included in the final analysis. Keelung CGMH comprised 12.5% records for period 1 and 12.9% for period 2, Linkou and Taipei CGMH comprised 54.2% for period 1 and 52.6% for period 2, and Kaohsiung comprised 33.4% for period 1 and 34.5% for period 2.

Data are presented as the mean  $\pm$  standard deviation (SD). Comparisons among groups were made using t-test, analysis of variance (ANOVA), or Chi-square tests where appropriate. Two multiple logistic regressions were performed separately for each period in order to examine the effect of health insur-

ance on the use of Phaco after adjusting for other important variables, which was found to be significant in the univariate analysis. Comparing the odds ratios (ORs) of various health insurance groups between the 2 periods allowed us to see changes in the use of Phaco within the same health insurance group. An interaction term between the period and health insurance was added in another multiple logistic regression to examine whether the ORs for the same health insurance group were consistent in the 2 periods. If the interaction was significant, the main effects (period and health insurance) and their interaction were recoded into a single new insurance-period group to capture the change in Phaco use for the same health insurance group in the 2 periods. SAS/Win 6.10 was used in this study. All *p* values presented are two-sided, and the significance level was 0.05.

## RESULTS

During the study period, a total of 8386 inpatients underwent cataract surgery in the study hospitals. This study includes 8355 cases, excluding 16 cases using ICCE for the operation, 14 cases with total fees of less than NT\$15,000 (the minimum charge for the surgery), and the one case with a total fee of NT\$203,610 (an outlier). 8355 cases were included in this study. Table 1 compares the demographic and comorbidity characteristics between the ECCE and Phaco patients by the 2 study periods. Patients with health insurance exceeded 82%, more than 65% were 65 years of age and older, and 60% were female. Ocular diseases other than cataracts were seen in 15% of the sample. Local anesthesia was used for the majority of procedures, and only 1.7% underwent general anesthesia for the surgery. ECCE was the primary surgery used in both periods

**Table 1.** Demographic and Comorbidity Characteristics of Cataract Inpatients by Period and Surgery Type

	Period 1 (Mar. 93-Feb. 94)		<i>p</i>	Period 2 (Mar. 94-Feb. 95)		<i>p</i>
	ECCE (N = 4194)	Phaco (N = 298)		ECCE (N = 2953)	Phaco (N = 910)	
Health insurance <sup>2</sup>			< 0.0001			< 0.0001
None	826 ( 94.4%)	44 ( 5.1%)		449 (80.3%)	110 (19.7%)	
GEI	632 ( 90.5%)	66 ( 9.5%)		533 (75.6%)	172 (24.4%)	
FI	1786 ( 95.5%)	85 ( 4.5%)		1214 (80.2%)	300 (19.8%)	
LI	950 ( 90.2%)	103 ( 9.8%)		757 (69.8%)	328 (30.2%)	
Age (years)			< 0.0001			< 0.0001
30-44	57 ( 73.1%)	21 (26.9%)		37 (43.0%)	49 (57.0%)	
45-64	1313 ( 92.3%)	110 ( 7.7%)		967 (74.0%)	339 (26.0%)	
65-74	1767 ( 93.4%)	125 ( 6.6%)		1239 (77.2%)	367 (22.9%)	
75+	1057 ( 96.2%)	42 ( 3.8%)		710 (82.1%)	155 (17.9%)	
Gender			0.9033			0.9927
Male	1702 ( 93.3%)	122 ( 6.7%)		1146 (76.5%)	353 (23.6%)	
Female	2492 ( 93.4%)	176 ( 6.6%)		1807 (76.4%)	557 (23.6%)	
No. of ocular comorbid conditions			0.0079			< 0.0001
None	3587 ( 92.9%)	274 ( 7.1%)		2417 (74.5%)	826 (25.5%)	
1	563 ( 96.1%)	23 ( 3.9%)		494 (86.1%)	80 (13.9%)	
2+	44 ( 97.8%)	1 ( 2.2%)		42 (91.3%)	4 ( 8.7%)	
No. of non-ocular comorbid conditions			0.2271			0.0002
None	4017 ( 93.3%)	290 ( 6.7%)		2716 (75.7%)	873 (24.3%)	
1	142 ( 94.7%)	8 ( 5.3%)		187 (85.4%)	32 (14.6%)	
2+	35 (100.0%)	0 ( 0%)		50 (90.9%)	5 ( 9.1%)	

**Abbreviations:** ECCE: extracapsular cataract extraction; Phaco, phacoemulsification; GEI: Government Employee Insurance; FI: Farmer Insurance; LI: Labor Insurance.

and for the 4 insurance groups. Phaco increased significantly from 6.6% in period 1 to 23.6% in period 2 ( $p < 0.0001$ ). Patients with GEI or LI were more likely than the uninsured or those with FI to have undergone the Phaco procedure in both periods. Younger patients were more likely to have undergone the Phaco procedure. There was no difference in Phaco use between male and female patients. Patients with a fewer number of ocular or non-ocular comorbid conditions were more likely to have undergone the Phaco procedure.

Phaco was more expensive than ECCE for cataract surgery. The mean total fees for the Phaco procedure were NT\$39,090  $\pm$  9479 (SD) and NT\$42,060  $\pm$  7299 in periods 1 and 2, respectively, higher than those of the ECCE procedure (NT\$32,040  $\pm$  7304 and NT\$32,940  $\pm$  9913, respectively) (both  $p < 0.0001$ ). The average length of stay (LOS) was shorter for Phaco patients than ECCE patients (3.43  $\pm$  1.50 vs. 3.75  $\pm$  1.79 days for period 1, and 3.08  $\pm$  1.45 vs. 3.70  $\pm$  2.20 days for period 2, both  $p < 0.0001$ ).

In period 1, about 10% of patients with GEI or LI underwent Phaco, more frequent than those with FI or with no insurance (5%). In period 2, the percentage undergoing Phaco substantially increased for all of health insurance groups, but the increment varied among different groups. Patients with LI had the highest increments of Phaco (10% in period 1 to 30% in period 2, a 20% increment), followed by the FI (15.3% increment), GEI (14.9% increment), and uninsured (14.6% increment) groups. Note that Phaco usage was similar and higher for those with GEI or LI in period 1, but was more frequently used in the LI group than the GEI group in period 2. Other than the change in Phaco use among the 4 health insurance groups differing in the 2 periods, age and the numbers of ocular and non-comorbid conditions showed some changes in Phaco use between the 2 periods. For instance, the youngest group (30-44 years old) had the highest increase (30.1%) in Phaco usage from periods 1 to 2, whereas the oldest group (75+ years old) had the smallest increment (14.1%). Patients with no ocular comorbidity had a higher increment (18.4%) of Phaco usage from period 1 to 2, higher than those with 1 (10%) and those with 2 or more ocular comorbid conditions (6.5%). Similarly, a higher increment (17.6%) of Phaco usage was seen in patients with no non-ocular comorbidity (Table 1).

Was this related to the case payment used in GEI or other factors which changed in GEI between the 2 periods? To examine the relative effect of health insurance status on the use of Phaco, 2 multiple logistic regressions with forward selection were separately applied for the 2 periods (model I). For both periods, age was the most important variable associated with Phaco use, followed by the number of ocular comorbid conditions, with the health insurance status the least important variable in model I (Table 2). The effects of age and the number of comorbid conditions were significant in periods 1 and 2, but the odds ratio for GEI for Phaco use in period 1 was significant (OR, 1.80; 95% CI, 1.21-2.68) which became insignificant in period 2 (OR, 1.28; 95% CI, 0.97-1.68).

To understand how the incremental ratio of Phaco use changed in the 2 periods and varied among the different health insurance groups, we need to consider 2 variables, age and the number of ocular comorbid conditions (important variables in determining Phaco use in each period). Our investigation found that patients with LI were younger than patients with GEI and FI, and the uninsured group ( $p < 0.0001$ ). Such an age composition did not substantially change between the 2 periods. Ocular comorbidity was also similar in the 4 health insurance groups for both periods 1 and 2 (data not shown).

Data in the 2 periods were combined, and a multiple logistic regression was conducted again adding period along with other independent variables to examine their relative effects on Phaco use. The interaction between health insurance and period was significant ( $p < 0.0001$ ) in the model (details not shown), indicating that Phaco use within the same health insurance group in the 2 periods was not the same, consistent with our model I results. In order to capture the change in Phaco use in the 2 periods within the same health insurance group, the 2 main effects of period and health insurance and the interaction term were recoded into a single new insurance-period group (model II). This insurance-period group was the most important variable determining Phaco use ( $p < 0.0001$ ), followed by age and the number of ocular comorbid conditions (Table 2). Using the uninsured group in period 1 as a reference group, FI in period 1 showed no significantly different OR, whereas the other insurance-period groups

**Table 2.** Significant Variables Determining Phacoemulsification Use in Cataract Inpatients Using Multiple Logistic Regression, with 2 Separate Periods (Model I) and a Combined Insurance-Period (Model II)

Variable order	Improvement X <sup>2</sup>	df	p	OR	95% CI
<b>Model I</b>					
Period 1					
Age (years)	49.94	3	< 0.0001		
30-44				1.00	Reference
45-64				0.25	0.15-0.44
65-74				0.25	0.14-0.44
75+				0.14	0.08-0.27
# Ocular comorbidity	10.52	1	< 0.0001	0.57	0.38-0.85
Health Insurance	22.98	3	< 0.0001		
None				1.00	Reference
GEI				1.80	1.21-2.68
Farmer				0.85	0.58-1.23
Labor				1.48	0.98-2.26
Period 2					
Age (years)	64.8	3	< 0.0001		
30-44				1.00	Reference
45-64				0.29	0.19-0.46
65-74				0.27	0.17-0.44
75+				0.21	0.13-0.35
# Ocular comorbidity	46.76	1	< 0.0001	0.48	0.39-0.61
Health Insurance	14.75	3	< 0.0001		
None				1.00	Reference
GEI				1.28	0.97-1.68
Farmer				0.98	0.76-1.25
Labor				1.41	1.07-1.87
<b>Model II</b>					
Insurance <sup>1</sup> -Period	578.15	7	< 0.0001		
Uninsured-period 1				1.00	Reference
Uninsured-period 2				4.72	3.26-6.83
GEI-period 1				1.83	1.23-2.73
GEI-period 2				5.98	4.21-8.50
FI-period 1				0.86	0.59-1.26
FI-period 2				4.57	3.28-6.36
LI-period 1				1.56	1.06-2.30
LI-period 2				6.51	4.59-9.23
Age (years)	68.82	3	< 0.0001		
30-44				1.00	Reference
45-64				0.28	0.19-0.39
65-74				0.26	0.18-0.37
75+				0.19	0.13-0.28
# Ocular comorbidity	54.34	1	< 0.0001	0.50	0.41-0.61

**Abbreviations:** GEI: Government Employee Insurance; FI: Farmer Insurance; LI: Labor Insurance.

had significantly higher ORs (ranging from 1.56 to 6.51) of Phaco use. It is easier to see the increment ratio of Phaco use in the 2 periods for each health

insurance group using its own health insurance group in period 1 as a reference. The OR of Phaco use in period 2 increased 4.7-fold for the uninsured, 3.26-

fold (5.98/1.83) for the GEI group, 5.29-fold (4.57/0.86) for the FI group, and 4.16-fold (6.51/1.56) for the LI group, compared to its own respective group in period 1. Notice that the OR for the GEI group had the smallest increase in the 2 periods compared to the other health insurance groups.

## DISCUSSION

Cataracts, an age-related disease, are very common among the elderly. According to unpublished data prepared by the Bureau of National Health Insurance (BNHI), there were more than 220,000 cataract surgeries performed in 1996 in Taiwan. Although our study included data only from a non-profit tertiary teaching hospital, the age and gender distributions found in our study were consistent with other reports.<sup>(14,22,23)</sup> On average, the total fee for the Phaco technique was higher than that for ECCE based on the FFS payment scheme, but the average length of stay with the Phaco procedure was shorter than that with the ECCE procedure in both periods 1 and 2. Better care quality is commonly seen when new techniques are introduced. Younger and less-complicated patients having a high likelihood of undergoing the Phaco technique may be explained by the fact that physicians tend to adopt a new technology on less-risky cases for safe practice and to become experienced.

The severity of ocular comorbidity (classified into 4 groups of none, mild, moderate, and severe by an ophthalmologist) was speculated to be an important variable determining the use of Phaco. Univariate analysis showed that patients with less-severe disease were more likely to undergo the Phaco procedure, but this became less important in the logistic regression when the number of ocular comorbid conditions were added (data not shown). Such a multicollinearity problem between these 2 variables is reasonable, and therefore only the result of the number of comorbid conditions is shown. On the other hand, lens opacity and visual acuity have been reported as being the most important factors determining which type of cataract surgery should be used.<sup>(24)</sup> As information of lens opacity and visual acuity were not available in the CGMH inpatient disease classification database, along with no medical charts, we could not study the effect of lens opacity and visual acuity on Phaco use. Generally speaking,

lens opacity is positively associated with age,<sup>(25)</sup> and it is reasonable to find that age was the most important variable associated with Phaco use in both periods (model I). Since age was included in both models I and II, our main finding of the increment ratio of Phaco use in the 2 periods for each health insurance group should not be overly jeopardized.

An ophthalmologists' surgical skill may affect the type of surgery being used. Unfortunately, physician information such as seniority, graduate school attended, etc. was included neither in the disease classification database nor in the order database. Unable to look at the physician behavior on the effect of Phaco use may limit the validity of our findings. Further study including physician factors is suggested.

In the case payment reimbursement mechanism of the GEI, the insurer shifts the financial risk to the hospital regardless of how much cost is incurred for cataract surgery. Although Phaco provided better care quality than ECCE and was more costly, both techniques were reimbursed by case payment at a fixed amount for GEI cataract patients. Our data showed that the use of Phaco significantly increased among all 4 insurance groups from periods 1 to 2. The percentage of Phaco use in the GEI group still increased even though case payment created a financial loss for patients given the Phaco procedure.

Table 2 illustrates the different ratio of the increment differed among the 4 groups. Compared to the other 3 insurance groups, the percentage of Phaco use among GEI patients significantly increased between the 2 periods, but the odds ratio showed the smallest increase. These findings imply that the case payment reimbursement scheme had an impact on providers' behavior, slowing down the rate of increase in Phaco use with GEI cataract patients. This means that doctors considered more seriously the health insurance status of patients in period 2 than in period 1. In other words, if GEI cataract patients were reimbursed by FFS rather than case payment in period 2, then more GEI patients would have had Phaco procedures.

Since the fixed rate to reimburse cataract surgery was the same for both procedures for GEI patients, why would the patients still chose the more experience Phaco procedure. There may be some reasons for it. First, doctors may have wanted to learn and practice the new Phaco technique. Second,

patients requested it, and/or doctors wanted to provide better-quality services to patients when he or she thought a patient was suitable for undergoing Phaco. This is supported by our findings that patients of a younger age or with no complicating ocular comorbidity were more likely to have undergone the Phaco procedure. Third, doctors who compensated for their volume by FFS were not sufficiently sensitive to the cost of Phaco incurred by the hospital. Fourth, the volume of Phaco surgery was much lower than that of ECCE, so the financial loss caused by Phaco used on GEI patients was probably cross-subsidized by ECCE patients and by the other 3 insurance groups.

### Conclusions

Our findings suggest that if the insurer used the case payment reimbursement mechanism to control healthcare costs, it should have taken new but more-expensive technology into account in order not to compromise the quality of patient care. A fair reimbursement mechanism is an important factor for new technology adoption in healthcare organizations.

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# 論病例計酬與新技術引進：台灣白內障手術的實證研究

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**背景：**長庚紀念醫院於1994年3月與公保簽訂白內障手術住院病患採論病例計酬 (case payment)，而有其他保險或自費病患仍用論量計酬 (fee-for-service)。因此，本研究以白內障手術為例，探討醫療費用支付方式由論量計酬轉變為論病例計酬時，對於醫療服務提供者運用新技術行為的影響。

**方法：**我們用長庚紀念醫院從1993年3月到1995年2月，以囊外摘除術 (ECCE—舊技術) 或超音波乳化術 (phacoemulsification—新技術) 進行白內障手術的住院病患資料進行二手資料分析。以邏輯斯迴歸分析不同期 (1993.03~1994.02—階段1 vs. 1994.03~1995.02—階段2)、不同保險身分別 (公保、勞保、農保與自費) 之白內障手術病患，使用不同手術方法進行白內障摘除之病患個案數變化情形。

**結果：**不論何種保險身分別的病患，白內障開刀新技術比例持續增加 (階段1為6.6%上升至階段2的23.6%)，即使超音波乳化術的醫療費用遠高於囊外摘除術。更重要的是，公保病患的白內障開刀新技術比例的成長 (3.26倍) 卻是最慢的。公保給付白內障手術由論量計酬改為論病例計酬，而醫療服務提供者為回應這種支付方式的改變，而減緩使用超音波乳化術來治療具有公保身分別之病患。

**結論：**由於醫療費用支付方式會誘導醫師改變其醫療行為，因此在建立新的醫療費用支付政策時，應該將醫療新技術與成本控制做一併的考量。  
(長庚醫誌 2004;27:327-36)

**關鍵字：**囊外摘除術，超音波乳化術，論病例計酬，新技術引進。

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