

Cost-Effectiveness Analysis of Manual Small Incision Cataract Surgery (MSICS) and Phacoemulsification (PE)

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Background: Cataract is the most common cause of blindness, responsible for 50 to 80% of all blindness in South-East Asia. Method of cataract surgery that has cost-effective, low technology procedure and a low complication rate in the shortest amount of time is needed. This study provides the useful resources comparing clinical outcomes and cost of phacoemulsification (PE) and manual small incision cataract surgery (MSICS) based on hospital perspective.

Objective: To compare the costs and effectiveness of two-cataract-surgery methods, MSICS and PE, using the hospital's perspective.

Setting: Department of Ophthalmology, Phrapoklao hospital, Thailand.

Material and Method: This study was prospective and comparative. Data was collected from medical charts and through patient interviews using data collection forms. Labor, material and capital cost were recorded for both surgical methods. The effectiveness was measured in visual acuity (VA), astigmatism and complications occurring at 90 days after surgery.

Results: The average total cost was 10,043.81bath/case for MSICS and 11,590.72bath/case for PE. After 90 days after surgery, the average VA of MSICS and PE groups were 0.83 ± 0.225 (0.10-1.00) and 0.76 ± 0.268 (0.06-1.00). There was no statistically significant difference in both groups. The average astigmatism at 90 days after surgery was 1.01 ± 0.733 (0.00-3.50) D and 0.99 ± 0.713 (0.00-4.25) D for MSICS and PE method. The average change in astigmatism was 0.15 and 0.20 D for the MSICS and PE groups. The intraoperative complication was vitreous loss (1.40%) in the PE group. The postoperative complication was corneal edema (5.60%) in the MSICS group. There was no statistically significant difference in the number of postoperative complications in both groups ($p = 0.16$).

Conclusion: The effectiveness of MSICS and PE methods was not significantly different, but PE method had higher costs. Therefore, MSICS has better cost-effectiveness than PE thus, MSICS should be a preferred cataract surgery method to PE method, based on the hospital's perspective.

Keywords: Manual small incision cataract surgery, Phacoemulsification, Cost-effectiveness analysis

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Eye problems are one of the major health problems in the world. Among countries in the South-East Asia region, there were 45 million blind and 1.5 million blind children during 1998-2000⁽¹⁾. In 2000, the total cost of blindness in this region (e.g., productivity loss, education and rehabilitation) was about US\$ 5.6 billion annually, thus this cost burden was added to the already poor economies of these countries⁽¹⁾. At the present trend of interventions, it is estimated that this number will double by the

year 2020. Cataract is the most common cause of blindness, responsible for 50-80% of all blindness in this region⁽¹⁾. In Thailand, there are many popular cataract surgery methods such as extracapsular cataract extraction (ECCE) with intraocular lens implantation and phacoemulsification (PE). The number of cataract patients is higher than any other eye diseases. Modern PE machines are expensive to purchase and maintain, have relatively high disposable costs, and require extensive surgical training. For more advanced and mature cataracts, performing PE becomes more difficult. A high volume, cost-effective, low technology procedure that can treat the blindness cataract with a low complication rate in the shortest amount of time is needed. The manual small incision

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cataract surgery (MSICS) has been recently performed in the developed countries^(2,3). This technique uses the same instrument as ECCE with small incision (around 5-6 mm.) by cutting the hard nucleus into parts and removing through a scleral tunnel and implanting the intraocular lens^(2,3). MSICS has lower complications compared with ECCE^(2,4). Furthermore, MSICS not only provides good clinical outcomes but also has lower cost since the PE machine is not needed⁽²⁻⁴⁾.

The research studying only on clinical outcome is still not enough for solving this situation, since healthcare cost has been a very important factor effecting developing countries. Cost-effectiveness analysis may be the best tool for providing information on decision-making for healthcare providers and policy makers. In addition, no study has been conducted using data on cost and effectiveness of PE and MSICS in Thailand. Therefore, the present study provides the useful resources comparing clinical outcomes and cost of PE and MSICS based on hospital perspective. Furthermore, it presents a cost-effectiveness model in order to help provide basic information to assist the decision-makers in preventing blindness in Thailand.

General objective

To compare the costs and effectiveness of PE and MSICS of cataract patients at Phrapoklao Hospital.

Material and Method

The authors performed a prospective, no randomization study for cataract patients. The sample selection was based on a convenient method. MSICS method results in a 5 to 6 mm scleral tunnel incision by cutting the hard nucleus into parts and removing through the incision, for the intraocular lens implantation^(2,3). PE method results in a 2 to 3 mm incision and extended incision to 5 mm for PMMA IOLs implantation and the wound was sutured with 1 or 2 stitches. Data were obtained from Phrapoklao Hospital, Chuntaburee province in 2005 and 2006. Effectiveness for each patient was recorded at the first day of surgery until 90 days after surgery. This data were collected from medical charts and patients' interview using data collection forms. Costs were extracted from the hospital in the fiscal year 2005 and converted to 2006 Thai Baht by consumer price index. All outpatients who were given a diagnosis of cataract at Phrapoklao Hospital and gave informed

consent for cataract surgery were recruited according to the inclusion and exclusion criteria.

Inclusion criteria

Cataract patients without other ophthalmic diseases gave informed consent, aged above 40 years.

All patients have a grading nuclear cataract (NUC) 1, 2 (WHO Cataract grading)⁽⁵⁾.

Exclusion criteria

Patients have a need combined surgical procedure and other eye disorders capable of compromising vision (amblyopia, glaucoma, diabetic retinopathy, or macular degeneration).

All patients have a grading nuclear cataract NUC 3, 9 (WHO Cataract grading)⁽⁵⁾.

The sample size was based on the average VA after surgery by PE method and MSICS method. The one tailed sample size was 19 patients. Assuming 10% loss follow-up, the sample size of the present study was 21 patients in each group.

All demographic characteristics of cataract patients were obtained from a questionnaire. Types of health insurance were classified as universal coverage (UC), social security scheme (SSS), civil's servant medical benefit scheme (CSMBS), out of pocket and other types. Visual acuity and astigmatism were measured before surgery and nucleus grading patients were classified into four levels. Based on hospital perspective, costs data included labor, material and capital costs collected from Phrapoklao Hospital that include out patient department (OPD), two wards and a surgery room. The cost of patient care and complications were calculated from measurements of time per patient in contact with staff and equipment, in patient department (IPD) cost from hospitalization day for each group and at surgery unit cost calculated by average time per operation. All costs in 2005 and converted to 2006 Baht value by consumer price index. After selection of patients, patients received either PE or MSICS performed at Phrapoklao Hospital in 2005 and 2006. Effectiveness was measured at 1, 2, 7, 14, 28, and 90 days after surgery as follows: visual acuity (VA), astigmatism, complications. Based on the data obtained, the cost-effectiveness analysis was developed to compare two methods of surgery. Furthermore, sensitivity analysis was used to test the robustness of the analysis.

When one operation is more effective, but more expensive than the other, in these cases, the incremental cost effectiveness ratio (ICER) is widely

used as a measure of cost-effectiveness. That means additional cost would occur when choosing the less effective one instead of the more effective one for achieving 1 unit of effectiveness.

For incremental cost effectiveness ratio (ICER):

$$ICER = \frac{\text{Cost 1} - \text{Cost 0}}{\text{Effectiveness 1} - \text{Effectiveness 0}}$$

1 = The more effective intervention, more expensive.

0 = The less effective intervention, less expensive.

Data analysis

Data were converted to Microsoft Excel 2005, and analyzed by Statistical Package for Social Sciences (SPSS) version 11.5. The results of the present study have been analyzed according to the intention to treat.

Descriptive statistics: the percentage and mean

- The description of age, gender, type of health insurance, and nucleus grading.

Quantitative variables: t-test

- A comparison of age between two surgery methods.

- A comparison of time of operating between two surgery methods.

- A comparison of time in operation room between two surgery methods.

- A comparison of time admitted before surgery between two surgery methods.

- A comparison of time admitted after surgery between two surgery methods.

- A comparison of clinical outcomes (VA, astigmatism and number of complications) between two surgery methods at day 1, 2, 7, 14, 28, and 90 after surgery.

Results

In the present study, 36 cataract patients received MSICS, and 69 patients had PE at Phrapoklao Hospital, Chuntaburee province, Thailand. According to the difference in pre-operative visual acuity (VA) and nucleus grading from the convenience sample selection, for adjusting the confounders from that selection method, then the patients in two groups were classified and re-selected based on the VA measurement, and nucleus grading, as if patients cannot read on chart or nucleus grade NUC 3 or NUC 9 were excluded. The demographic characteristics of patient population of comparable groups were not statistically significantly different in any baseline characteristics as in Table 1.

Economic evaluation

Costs of cataract surgery based on hospital perspective were divided into three parts (*i.e.*, labor (L), material (M) and capital (C) costs). Costs were

Table 1. Demographic characteristics of patient population

Demographics	MSICS statistic values (n = 36)	PE statistic values (n = 69)	p-value
Mean age (year) (SD) (range)	67.69 (± 10.89) (43.10-88.72)	68.35 (± 8.31) (40.47-90.57)	0.73
Female gender (%)	18 (50.00)	42 (60.90)	0.29
Province			
Chuntaburee (%)	34 (94.40)	68 (98.60)	0.32
Other (%)	2 (5.6)	1 (1.40)	
Type of health insurance			
UC (%)	9 (25.00)	12 (17.40)	0.36
CSMBS (%)	7 (19.40)	9 (13.00)	0.91
SSS (%)	0 (0)	2 (2.90)	0.16
Self pay (%)	0 (0)	0 (0)	
Other (%)	20 (55.60)	46 (66.70)	0.27
Gold (%)	19 (52.80)	46 (66.70)	
Lion (%)	1 (2.80)	0 (0)	
Mean VA (SD) (range)	0.07 (± 0.033) (0.02-0.10)	0.08 (± 0.028) (0.02-0.10)	0.36
Mean astigmatism (SD) (range)	1.16 (± 1.06) (0.13-5.00)	1.19 (± 0.96) (0.00-5.25)	0.87
Left eye operation (%)	15 (41.70)	38 (55.10)	0.19

* UC = universal coverage; SSS = social security scheme; CSMBS = civil's servant medical benefit scheme

calculated based on the data of the fiscal year 2005. All costs were adjusted to 2006 Baht value by using consumer price index⁽⁶⁾.

The labor costs

These costs consisted of salary, overtime pay, welfare, medical fee, training fee and other fee for an individual person. The average labor cost/case of OPD, IPD, and surgery team was calculated among five ophthalmologists and other healthcare personnel for each department, the calculation is shown in Table 2.

Material costs

Material costs were defined as the costs of materials and public utility used at OPD, EENT ward, Kasemsan ward and Tepparat eye surgery room. In addition, it included the medical supplies used in the operation unit and the home medicine for cataract patients after surgery. The calculation of material costs was weighted by the number of cataract patients at OPD, surgery room, and hospitalization days at IPD as shown in Table 3.

The capital costs

The capital costs in Phrapokkiao Hospital were defined as the deterioration cost for the medical devices, and the buildings where OPD, EENT ward, Kasemsan ward, and Tepparat eye surgery room were located in year 2005 as shown in Table 4.

The total costs/cases were 9,940.07 and 11,454.15 Baht/case for MSICS and PE methods, respectively. After adjusting to the 2006 Baht value by using Consumer Price Index (CPI), the total cost/case for MSICS and PE methods were 10,043.81 and 11,590.72 Baht/case.

Effectiveness in cataract surgery

There was no statistically significant difference in VA before surgery and at 1, 2, 7, 14 and 90 days after surgery between the two methods. However, there was statistically significant difference in VA only at 28 days after surgery ($p = 0.02$) as shown in Table 5. The additional VA (average VA at 90 days after surgery-average VA before surgery) between of MSICS and PE were 0.76, and 0.66, respectively. There was no statistically significant difference in additional VA between the two methods as shown in Table 6.

There was no statistically significant difference in astigmatism before surgery and at 7, 14, 28 and 90 days after surgery between the two methods.

Table 2. The total labor costs/case of cataract surgery

Item	Total labor costs/case (Baht)	
	MSICS	PE
OPD	58.25	58.25
IPD	647.41	649.57
Surgery room	352.47	368.71
Total	1,058.14	1,076.54

Table 3. Total material costs/case

Item	Total material costs/case (Baht)	
	MSICS	PE
OPD	40.88	40.88
IPD	1,516.14	1,521.20
Surgery room	4,715.63	4,840.34
Total home medicine	361.11	223.12
Total	6,633.76	6,625.53

Table 4. The total capital costs/case

Department	The total capital cost/case (Baht)	
	MSICS	PE
OPD	13.90	13.90
IPD	-	-
Surgery room	2,234.38	3,738.19
Total	2,248.17	3,752.08

However, there was statistically significant difference in astigmatism at 1 and 2 days after surgery. When the authors compared astigmatism between before surgery and 90 days after surgery, astigmatism decreased 0.15 D and 0.20 D for MSICS and PE group as shown in Table 7.

The intra-operative complication occurred on PE as vitreous loss (1.40%) and postoperative complication occurred in MSICS as two corneal edemas (5.60%). There was no statistically significant difference in number of intra-operative complications and postoperative complications between PE and MSICS methods as shown in Table 8. The intraoperative complication as vitreous loss need to cut vitreous out, the anterior vitrectomy was used, the cost of this medical device was 1,216 Baht, when calculated based

on occurrence in the present study it took cost 17.02 Baht and for postoperative complications there were no additional costs as those complications were self-healing and recovered within seven days after surgery.

Table 5. The average visual acuity before surgery and at 1, 2, 7, 14, 28 and 90 days after surgery

Measurement day	Average VA		p-value
	MSICS (n = 36)	PE (n = 69)	
Before surgery	0.07	0.08	0.36
1	0.53	0.45	0.19
2	0.59	0.53	0.32
7	0.77	0.68	0.10
14	0.79	0.70	0.09
28	0.84	0.71	0.02
90	0.83	0.74	0.10

Table 6. The average additional visual acuity at 1, 2, 7, 14, 28 and 90 days after surgery

Measurement day	Average additional VA		p-value
	MSICS (n = 36)	PHACO (n = 69)	
1	0.46	0.37	0.16
2	0.52	0.46	0.27
7	0.70	0.60	0.08
14	0.71	0.62	0.06
28	0.76	0.63	0.01
90	0.76	0.66	0.08

Table 7. The average astigmatism before surgery and at 1, 2, 7, 14, 28 and 90 day after surgery

Measurement day	Average astigmatism (K1-K2, Diopter (D))		p-value
	MSICS (n = 36)	PE (n = 69)	
Before surgery	1.16	1.19	0.87
1	1.39	2.36	0.002
2	1.61	2.25	0.04
7	1.35	1.82	0.11
14	1.42	1.54	0.60
28	1.24	1.34	0.67
90	1.01	0.99	0.62

Furthermore, the cost of home medicine assumed for treatment of all postoperative complications.

Cost-effectiveness analysis

From the present study, total costs were labor, materials and capitals in OPD, wards, surgery room, including the management cost for intra-operative complication in PE method and home medication. Whereas, effectiveness was defined as an additional VA gain after 90 days of surgeries (MSICS and PE) as shown in Table 9.

Based on the above results, the cost of MSICS was 10,043.81 Baht and additional VA gain was 0.76, whereas the cost of PE was 11,590.72 Baht and additional VA was 0.66. It revealed that the PE method had higher cost but lower effectiveness, whereas MSICS method consumed lower cost and higher effectiveness at 90 days after surgery. Thus, from the present study MSICS had better cost-effectiveness than PE.

Discussion

MSICS method consumed lower material costs because the hospitalization days with MSICS were shorter than PE method. For the surgery unit, the

Table 8. The number of intraoperative complications (*i.e.*, during surgery) and postoperative complications (*i.e.*, 1, 2, 7, 14, 28 and 90 days after surgery) between two methods

Complications	Number of complications		p-value
	MSICS (n = 36)	PHACO (n = 69)	
Intraoperative (%)			
Vitreous loss	0	1 (1.40)	0.473
Total	0	1 (1.40)	
Postoperative (%)			
Corneal edema	2 (5.60)	0	0.160
Total	2 (5.60)	0	

Table 9. Cost-effectiveness analysis of cataract surgery

	MSICS	PE
Cost (Baht)	10,043.81	11,590.72
Effectiveness	0.76	0.66
CE ratio	13,215.50	17,561.70

total material costs were 4,715.63 and 4,840.34 Baht/case for MSICS and PE methods. In the PE method, reusable cubing set, Phaco tip and small part kit were used, so that material costs were higher. The total material cost of PE was slightly lower than that of MSICS, even though there were more items on surgery unit as phaco tip, reusable cubing set and small part kit but MSICS had more home medicine cost (for treatment of corneal edema) than the PE method.

The capital cost was a deterioration cost of medical devices and buildings. For the MSICS method, the cost was 2,248.17 Baht/case, whereas the cost of the PE method was 3,752.08 Baht/case. The capital cost of OPD was 13.90 Baht/case. All medical devices as well as buildings at the IPDs were expired, so that there was no deterioration cost. For surgery unit, total capital costs were 2,234.28 and 3,738.19 Baht/case for MSICS and PE. These PE-specific equipment and maintenance costs resulted in higher deterioration costs of the PE method than that of MSICS.

In the present study, cataract patients in each group had very high variation of VA values. The results showed a better progression of VA from all techniques. Average VA before surgery was 0.07 and 0.08 and it was 0.83 and 0.74 at 90 days after surgery for MSICS and PE groups. Both MSICS and PE methods gave good postoperative visual outcome for cataract surgery similar to the previous studies^(2,7,8). In India, Gogate PM et al⁽⁴⁾ reported that the PE method gave the better uncorrected visual acuity in a large proportion of patients at six weeks. In addition, the PE method provided good results in the retrospective study at Songklanagarind Hospital⁽⁹⁾.

The astigmatism is the condition from the suture with a relatively large incision. If these sutures are sewn too tightly, then this might result in astigmatism. The PE method results in a 2 to 3 mm incision and extends the incision to 5 mm for PMMA IOLs implantation. Therefore, the number of astigmatism from the PE method is not significantly lower than the MSICS method in the present study. Therefore, the average astigmatism after surgery 90 days was 1.01 D and 0.99 D for MSICS and PE methods. Similarly, the average astigmatism on six weeks study was not technically different between the MSICS and PE method⁽²⁾. However, the average changing of astigmatism was better in the PE than MSICS group, as 0.20 D and 0.15 D, respectively. In 2004 Gogate P et al reported that average astigmatism for PE was 0.84 D and for small incision was 0.95 D⁽⁷⁾, which is lower than the present study.

The complications were defined as intra-operative and postoperative complications measured at 1, 2, 7, 14, 28 and 90 days after surgery. The intra-operative complication (*i.e.*, 1 (1.40%) case of vitreous loss) occurred in the PE method and it could be fixed during operation by cutting the vitreous out. The intraoperative complication was lower than other studies^(2,7,8,10) and in the present study only occurred in the PE method which differed from previous studies^(2,7,8). For the postoperative complications, it happened only in the MSICS method. These consisted of two (5.60%) eyes of corneal edemas. There was no statistically significant difference in the number of intraoperative and postoperative complications between the two methods. Compared to the study in India, the corneal edema complication in the PE method was 9% and 4.5% for MSICS method at the first operative day⁽²⁾ that was higher due to grading of the nucleus in the present study being lower than that, so, all complications occurred less. Most postoperative complications could recover within seven days after surgery, with no treatment. Therefore, from this different number of complications, it implies that cataract surgery in the early stage or soft lens will have fewer complications than higher stage or hard lens.

In the PE method, vitreous loss occurred. This complication is not at all related to the loss of vitreous bulk itself but to the morphologic changes in the vitreous body. The important complications result from vitreous loss such as excessive degree of astigmatism, epithelial invasion of the anterior chamber, fibrous ingrowth, wound infection and endophthalmitis, iris prolapse, secondary glaucoma and others⁽¹⁰⁾. For corneal edema is common in the first few days after surgery, particularly if the cataract was very dense and required increased ultrasound time to break it up, or if there was excessive manipulation in the anterior chamber during surgery which occurred in the MSICS methods and can resolve spontaneously. Complication unique to PE is wound burn⁽¹⁰⁾, but it did not occur in the present study. It might be because the grading of the nucleus was lower than other studies, PE surgery did not take too long, and the new PE machine with other devices at Pharpoklao Hospital did not cause this problem.

By comparing the cost and effectiveness between MSICS and PE techniques, total hospital costs were 10,043.81 Baht/case for MSICS and 11,590.72 Baht/case for PE, whereas the additional VA was 0.76 for MSICS and 0.66 for PE methods (So, ICER

is not used). Therefore, the MSICS method had lower total costs, with good effectiveness compared with the PE method. Similar to a previous study⁽⁷⁾, it showed that the PE method was effective on VA similar to MSICS method and higher cost. The result in the present study suggested that the MSICS method was more cost-effective compared to the PE method based on the perspective of Phrapoklao Hospital.

To compare the results with other studies in other countries, the Thai Baht value was converted into US dollars (35.89 Baht/1US\$), Pound Sterling (70.38 baht/£1) and Malaysian Ringgit (10.46 Baht/1RM)⁽¹¹⁾. The total provider's cost of the MSICS method was 265.73 US\$, £135.51 and 911.77 RM and that of the PE method was 318.38 US\$, £162.35 and 1,092.40 RM. Two studies in India showed that the MSICS method provider's direct costs were lower (US\$15.68, US\$17.03) than the present study (US\$279.85)^(12,13). Unlike the study in UK, the total cost of PE was £359.89, which included the post-operative care and additional spectacle cost⁽¹⁴⁾.

Blindness due to cataract in Thailand in 2000 was 136,296 persons⁽¹⁾. If all cataract patients received the MSICS method, the total cost would be approximately 1.79 billion Baht. In addition, if all cataract patients had the PE method, it would cost 2.08 billion Baht. Thus, the cost saving from using MSICS instead of PE would be about 290 million Bath (not including postoperative complication cost by the PE method in high level of nucleus grading) and it would be rising in the future due to an increase in the aging population. Cataract surgery especially the MSICS method in Thailand is a good intervention for solving the blindness problem. The building of a national policy for treatment and prevention of blindness and developing sustainable systems will enable Thailand to eliminate avoidable blindness from major causes of blindness such as cataract for overall better sight.

Limitation of study

The follow-up period was 90 days after surgery, and it might not be enough for collecting the real effectiveness, which would occur after 90 days, and further, it cannot include the complications that occur later than 90 days as posterior capsule opacity (PCO), epithelial ingrowth, retinal detachment that may occur in 1 to 2 years after surgery.

Recommendations to policy maker

1. The MSICS method of cataract surgery is a preferred method to the PE method for cataract surgery

in Phrapoklao Hospital. From this study MSICS could be the choice of treatment cataract patient for the service providers.

2. The MSICS cataract surgery method is cost-effective and a useful method for preventing cataract blindness in Thailand.

3. From the present study, the provider's cost of cataract surgery (not including Non-Revenue Producing Cost Center (NRPCC) about 20-30%) was 10,043.81 and 11,590.72 Baht/case for MSICS and PE, respectively. While National Health Security Office (NHSO) of Thailand paid for cataract surgery about 8,000 Baht/case, therefore from this result, this may be taken into consideration for the reimbursement policy in the future.

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Potential conflicts of interest

None.

References

1. Health Situation in the South-East Asia Region, 1998-2000. WHO/SEARO, Strategic Plan for Vision 2020: The Right to Sight. New Delhi: WHO Regional office for South-East Asia; 2000.
2. Gogate PM, Kulkarni SR, Krishnaiah S, Deshpande RD, Joshi SA, Palimkar A, et al. Safety and efficacy of phacoemulsification compared with manual small-incision cataract surgery by a randomized controlled clinical trial: six-week results. *Ophthalmology* 2005; 112: 869-74.
3. Hennig A. Sutureless non-phaco cataract surgery: a solution to reduce worldwide cataract blindness? *Community Eye Health* 2003; 16: 49-51.
4. Gogate PM, Deshpande M, Wormald RP, Deshpande R, Kulkarni SR. Extracapsular cataract surgery compared with manual small incision cataract surgery in community eye care setting in western India: a randomised controlled trial. *Br J Ophthalmol* 2003; 87: 667-72.
5. Thylefors B, Chylack LT Jr, Konyama K, Sasaki K, Sperduto R, Taylor HR, et al. A simplified cataract grading system. *Ophthalmic Epidemiol* 2002; 9: 83-95.
6. Ministry of Commerce. Consumer price index and core consumer price index [Internet]. 2008 [cited 2009 Sep 7]. Available from: <http://www.indexpr>.

- moc.go.th/price_present/cpi/data/index_47_e.asp?list_month=08&list_year=2551 &list_region=country
7. Gogate PM, Kulkarni SR, Krishnaiah S, Deshpande RD, Joshi SA, Palimkar A, et al. Safety and efficacy of phacoemulsification compared with manual small incision cataract surgery by a randomized clinical controlled trial. AIOC Proceedings 2004: 151-3.
 8. Neekhara A, Trivedi HL, Todkar H. Comparative study of posterior rent in cases of routine extracapsular, small incision non phaco and phacoemulsification. Journal of the Bombay Ophthalmologists' Association 2002; 12: 15-8.
 9. Rueangphirakul C, Tantisarasart T. The results of phacoemulsification with intraocular lens (IOL) implantation in Songklanagarind Hospital. Songklanagarind Med J 2005; 23: 193-200.
 10. Jaffe NS, Jaffe MS, Jaffe GF. Intraoperative complication In: Jaffe NS, Jaffe MS, Jaffe GF, editors Cataract surgery and its complications. 6th ed. St. Louis: Mosby-Year Book; 1997: 248-51.
 11. Bank of Thailand. Foreign exchange rate [Internet]. 2007 [cited 2007 Feb 9]. Available from: http://www.bot.or.th/Bothomepage/databank/FinMarkets/ExchangeRate/exchange_e.asp.
 12. Gogate PM, Deshpande M, Wormald RP. Is manual small incision cataract surgery affordable in the developing countries? A cost comparison with extracapsular cataract extraction. Br J Ophthalmol 2003; 87: 843-6.
 13. Muralikrishnan R, Venkatesh R, Prajna NV, Frick KD. Economic cost of cataract surgery procedures in an established eye care centre in Southern India. Ophthalmic Epidemiol 2004; 11: 369-80.
 14. Minassian DC, Rosen P, Dart JK, Reidy A, Desai P, Sidhu M, et al. Extracapsular cataract extraction compared with small incision surgery by phacoemulsification: a randomised trial. Br J Ophthalmol 2001; 85: 822-9.

การศึกษาเปรียบเทียบต้นทุนประสิทธิผลของวิธีการผ่าตัดต่อกระดูกแมลงเล็กและวิธีสลายด้วยคลื่นความถี่สูงสำหรับผู้ป่วยโรคต่อกระดูก ณ โรงพยาบาลพระปกเกล้า ประเทศไทย

อัมพร จงเสรีจิตต์, เขียวชาญ วิริยะลัทภ, พิพัฒน์ คงทรัพย์, สุตสวาทสวัสดิ์ ภูมิพันธ์

วัตถุประสงค์: เพื่อศึกษาเปรียบเทียบต้นทุนและประสิทธิผลของวิธีการผ่าตัดต่อกระดูกแมลงเล็ก (MSICS) และวิธีสลายด้วยคลื่นความถี่สูง (PE) สำหรับผู้ป่วยโรคต่อกระดูก ณ โรงพยาบาลพระปกเกล้า ในมุมมองของโรงพยาบาล **วัสดุและวิธีการ:** การศึกษาแบบไปข้างหน้า (Prospective study) โดยใช้แบบเก็บข้อมูลและการสัมภาษณ์จากผู้ป่วย ต้นทุนประกอบด้วยค่าแรง ค่าวัสดุและเครื่องมือ ค่าสิ่งปลูกสร้าง ในปี พ.ศ. 2548 ปรับค่าเงินบาทเป็นปี พ.ศ. 2549 โดยดัชนีผู้บริโภค ประสิทธิภาพได้แก่ค่าระดับสายตา ค่าสายตาเอียงและภาวะแทรกซ้อน ในวันที่ 1, 2, 7, 14, 28 และ 90 หลังจากผ่าตัด เก็บข้อมูลแปลจากรายงานทางการแพทย์และแบบสัมภาษณ์ผู้ป่วย กลุ่มตัวอย่างเป็นผู้ป่วยที่ได้รับการผ่าตัดโดยวิธีเลือกแบบสะดวก วิเคราะห์ข้อมูลโดยโปรแกรมสถิติ SPSS 11.5

ผลการศึกษา: ต้นทุนเฉลี่ยของวิธี MSICS เป็นเงิน 10,043.81 บาทต่อรายและวิธี PE เป็นเงิน 11,590.72 บาทต่อราย หลังการผ่าตัด 90 วัน พบว่า ค่าเฉลี่ยระดับสายตา มีค่า 0.83 และ 0.74 โดยไม่มีความแตกต่างอย่างมีนัยสำคัญทางสถิติของทั้ง 2 กลุ่ม สำหรับค่าสายตาเอียง ค่าเฉลี่ยสายตาเอียงหลังผ่าตัด 90 วัน มีค่า 1.01 D. และ 0.99 D. ค่าเฉลี่ยการเปลี่ยนแปลงสายตาเอียงมีค่า 0.15 D. และ 0.20 D. สำหรับกลุ่ม MSICS และ PE ตามลำดับ ภาวะแทรกซ้อนระหว่างผ่าตัดคือมีการหลุดของขุ่นตา (1.40%) เกิดขึ้นในวิธี PE ภาวะแทรกซ้อนหลังการผ่าตัดคือกระจกตาบวม (5.60%) เกิดขึ้นในวิธี MSICS โดยไม่มีความแตกต่างอย่างมีนัยสำคัญทางสถิติของภาวะแทรกซ้อนหลังการผ่าตัด ในวันที่ 90 หลังการผ่าตัดระหว่างทั้ง 2 กลุ่ม

สรุป: ประสิทธิภาพของวิธี MSICS ไม่มีความแตกต่างกับวิธี PE อย่างมีนัยสำคัญทางสถิติในวันที่ 90 หลังการผ่าตัด โดยต้นทุนของวิธี PE สูงกว่าวิธี MSICS ดังนั้น MSICS เป็นวิธีที่มีประสิทธิผลดีกว่าเมื่อเทียบกับวิธี PE การผ่าตัดวิธี MSICS ควรเป็นวิธีผ่าตัดต่อกระดูกที่ควรเลือกเมื่อเปรียบเทียบกับวิธี PE ในมุมมองของโรงพยาบาล
