

Commentary: Evaluating affordability, cost-effectiveness, cost-utility, health economics, and incremental cost-effectiveness ratio of manual small-incision cataract surgery - The need of the hour

Cataract is the most common treatable cause of blindness, and surgical interventions for cataract have evolved over many years. With continued research and availability of the latest instruments, it is no longer only a visual rehabilitative surgery.^[1] Rather, it is the most common refractive surgery performed worldwide today. The surgery has evolved from extracapsular cataract extraction (ECCE) with an approximately 10-mm incision to manual small-incision cataract surgery (MSICS) (8–2 mm), phacoemulsification (3.2–2.2 mm), microincision cataract surgery (MICS) (1.8 mm), phakonit (0.9 mm), and microphakonit (0.7 mm). As newer techniques have evolved, the cost of surgery has multiplied exponentially.^[2] There has always been a question of affordability, especially in developing countries like India, Nepal, Pakistan, and Sri Lanka. Considering cost-effectiveness, outcome measures such as best-corrected visual acuity (BCVA), postoperative astigmatism, suture induced astigmatism, and spherical equivalent play a key role in deciding the type of surgery. This led to the increased popularity of MSICS in the developing world in the early to mid-1990s as a sutureless, cost-effective, and affordable surgery with comparable visual outcomes in contrast to phacoemulsification.^[3]

Evaluating the economics of a parameter or an intervention is imperative, and it involves a comparative analysis of the costs and outcomes of different alternatives. As quoted in the current study, there are six categories for economic evaluation described by Drummond *et al.*^[4] These are outcome description, cost description, cost-outcome description, efficacy or effectiveness analysis, cost analysis, and full economic evaluation. The last three can be used to compare different techniques. Before embarking on to health economics of a technique, we need to understand a few terminologies. Cost-minimization analysis (CMA) is choosing the least costly alternative intervention that is assumed to provide an equal outcome. Cost-benefit analysis (CBA)- indicator compares the cost and benefit of a technique or an intervention in financial terms. Cost-effectiveness analysis (CEA) indicator helps compare the price in monetary terms and outcomes in non-monetary terms. Cost-utility analysis (CUA) indicator compares costs in financial terms with patient outcomes measured in quality-adjusted life years (QALYs). Cost-consequence analysis (CCA) indicator compares prices and outcomes in different categories without measuring or collecting them.^[4]

Khan *et al.* in their analysis of 52 patients compared preoperative and postoperative logMAR visual acuity, visual function 14 (VF-14) score, and QALYs. Surgery duration was also compared. MSICS provided comparably equal outcomes in logMAR VA (0.03 [−0.05–0.11]), VF-14 score (7.92 [−1.03–16.86]), and QALYs (1.14 [−0.89–3.16]). MSICS was more cost-effective, with superior cost-utility value

than phacoemulsification. MSICS was also a significantly faster surgery (10.58 min [6.85–14.30]) than phacoemulsification (PE).^[1] Bhargava *et al.* studied the safety and efficacy of phacoemulsification and MSICS in patients with uveitic cataracts and concluded that MSICS and phacoemulsification did not differ significantly in complication and final BCVA outcomes; however, MSICS was significantly faster, and might be the preferred technique in a setting where surgical volume is high and access to phacoemulsification is limited, such as eye camps.^[2] Venkatesh *et al.* compared the safety and efficacy of phacoemulsification and MSICS to treat white cataracts. They found that both techniques achieved excellent visual outcomes with fewer complication rates. They also concluded that MSICS was significantly faster, less expensive, and less technology-dependent than phacoemulsification.^[3] Devendra *et al.* studied low socio-economic groups from rural areas who were offered free cataract surgeries by charitable organizations. The study concluded that SICS was a faster surgery with a more secure wound and significantly less astigmatism and is a better option in camp patients from rural areas than phacoemulsification with rigid IOL.^[5] Muralikrishnan *et al.* proposed that government and non-governmental hospitals providing cataract surgeries should invest in regular cost analyses, and review the literature on effectiveness and formal cost-effectiveness analyses to plan economically efficient interventions. They also concluded that considering the small incremental cost for providers (less than USD 1), improved outcomes, and lower patient costs, MSICS is an important technique to eliminate cataract blindness in India.^[6] In a study by Ruit *et al.*, which compared the surgical outcomes of both MSICS and phacoemulsification, both surgical techniques achieved surgical outcomes with low complication rates. This study states that MSICS is significantly faster, less expensive, and technologically less dependent than phacoemulsification.^[7] Gogate *et al.*, in their meta-analysis, concluded that there was no difference between phacoemulsification and MSICS for BCVA and uncorrected visual acuity (UCVA) of 6/18 and 6/60, respectively. Endothelial cell loss and intraoperative and postoperative complications were similar between procedures. MSICS resulted in statistically greater astigmatism and UCVA of 6/9 or worse; however, near UCVA was better.^[8]

The current systematic review by the authors provides intricate insights into cataract surgery's economic and financial indicators by analyzing various health economic indicators. The authors must be congratulated on this novel analysis. The authors have made a significant effort in screening 226 articles and selecting 32 articles for analysis. Considering cost analysis, as per the literature review of Gogate *et al.*,^[8] Muralikrishnan *et al.*,^[6] and Ruit *et al.*,^[7] the authors found that the average cost of MSICS was USD 15–17, and phacoemulsification was USD 25–70. However, Jongsareejit *et al.*^[9] from Thailand reported a higher cost of USD 62.25 (THB 2234.38) for MSICS and USD 104.15 (THB 3,738.19) for phacoemulsification, probably due to the smaller number of surgeries performed, stricter sterilization protocols, and use of costly instruments and equipment. Other factors that have reduced the cost of MSICS are using polymethyl methacrylate (PMMA) lenses as low as USD 1.44, viscoelastic, and pharmaceuticals. Considering the cost-effectiveness analysis of cataract surgery, the cost-effectiveness (CE) ratio for MSICS was 13,215.50 compared to phacoemulsification (CE ratio = 17,561.70).

The surgery is the least costly one in India, followed by Nepal, Thailand, and the UK. Comparing the cost-utility difference between phacoemulsification and MSICS, cost per gain in logMAR BCVA (mean change = 6175), cost per QALY gained (mean = 691), and cost per VF14 score increment (mean = 110) was more in phacoemulsification compared to MSICS. Also, the astigmatism analysis, as per Gogate *et al.*,^[8] Venkatesh *et al.*,^[9] was comparable with mean surgically induced astigmatism by phacoemulsification compared to MSICS. The incremental cost-effectiveness ratio (ICER) difference between phacoemulsification and MSICS showed an effectiveness of 0.76 for MSICS compared to 0.66 for phacoemulsification. The cost was THB 10,043.81, USD 265.73, GBP 135.51, and MYR 911.77 (Malaysian Ringgit) per case for MSICS and THB 11,590.72, USD 318.38, GBP 162.35, and MYR 1,092.40 per case for phacoemulsification, and CE ratio was USD 368.20 (THB 13,215.50) for MSICS and USD 489.30 (THB 17,561.70) for phacoemulsification. The present study concludes that MSICS provides the best outcomes given the cost-effectiveness compared to the phacoemulsification. MSICS has the least costs, followed by phacoemulsification, ECCE-IOL, and femtosecond-laser-assisted cataract surgery (FLACS). The cost of the equipment and maintenance of the phacoemulsification is higher than a simple, equally effective one, with a comparable outcome in MICS. Many present studies have focused on the surgeries' visual outcome and the surgically induced astigmatism component. The ultimate aim is to provide the best visual outcome with minimal complications and provide a financially better option for the patients with easy accessibility. The learning curve in MSICS and phacoemulsification are different, and the cost-effectiveness is also variably wide. Health economics and factors impacting the financial burden of surgery, especially for low socio-economic strata, are the key areas of future research. More studies will be needed in this regard to provide detailed insights. Reduced cost of the equipment with sufficient maintenance, when given access to the majority of the population, helps in achieving more cases to be handled effectively.

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