Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

HHS Public Access

Author manuscript

Arch Ophthalmol. Author manuscript; available in PMC 2015 August 24.

Published in final edited form as:

Arch Ophthalmol. 2010 August ; 128(8): 1050–1054. doi:10.1001/archophthalmol.2010.136.

Simultaneous versus Sequential Bilateral Cataract Surgery for Infants with Congenital Cataracts: Visual Outcomes and Economic Costs

Hreem Dave, B.A.[1], **Vidya Phoenix, M.D.**[2], **Edmund R. Becker, Ph. D.**[3], and **Scott R. Lambert, M.D.**[2]

[1]Emory University School of Medicine, Emory University, Atlanta, Georgia

[2]Department of Ophthalmology, Emory University, Atlanta, Georgia

[3]Department of Health Policy and Management at the Rollins School of Public Health

Abstract

OBJECTIVES—To compare the incidence of adverse events, visual outcomes and economic costs of sequential versus simultaneous bilateral cataract surgery for infants with congenital cataracts.

METHODS—We retrospectively reviewed the incidence of adverse events, visual outcomes and medical payments associated with simultaneous versus sequential bilateral cataract surgery for infants with congenital cataracts who underwent cataract surgery when 6 months of age or younger at our institution.

RESULTS—Records were available for 10 children who underwent sequential surgery at a mean age of 49 days for the first eye and 17 children who underwent simultaneous surgery at a mean age of 68 days (p=.25). We found a similar incidence of adverse events between the two treatment groups. Intraoperative or postoperative complications occurred in 14 eyes. The most common postoperative complication was glaucoma. No eyes developed endophthalmitis. The mean absolute interocular difference in logMAR visual acuities between the two treatment groups was 0.47±0.76 for the sequential group and 0.44±0.40 for the simultaneous group (p=.92). Hospital, drugs, supplies and professional payments were on average 21.9% lower per patient in the simultaneous group.

CONCLUSIONS—Simultaneous bilateral cataract surgery for infants with congenital cataracts was associated with a 21.9% reduction in medical payments and no discernible difference in the incidence of adverse events or visual outcome.

Introduction

Simultaneous bilateral cataract surgery is not commonly performed in the United States because of a belief that it puts patients at increased risk of developing bilateral

Corresponding Author: Scott R. Lambert, M.D., Emory Eye Center, 1365-B Clifton Rd, Atlanta, GA 30322, slamber@emory.edu, phone: 404-778-4417, Fax: 404-778-5203.

Proprietary interests: none

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

endophthalmitis. Acceptance of simultaneous bilateral cataract surgery in other countries has been shown to correlate closely with physician reimbursement rates for this procedure.[1, 2] Proponents of bilateral simultaneous cataract surgery cite low rates of adverse events including endophthalmitis,[3, 4] as well as benefits to patients and society including (1) avoidance of multiple preoperative examinations, (2) decrease in travel time/costs, (3) fewer follow-up visits, and (4) less time off of work.[5, 67–9]

The issue becomes more complicated in infants with dense bilateral congenital cataracts. In these cases, most ophthalmologists agree that surgery should be performed as soon as possible in order to mitigate deprivation amblyopia.[10] Some pediatric ophthalmologists advocate simultaneous bilateral cataract surgery to expedite the visual rehabilitation of both eyes and to prevent children from having to undergoing general anesthesia more than once.[6, 11–13] Additional considerations include the economic costs to families and society as well as parental preference.

While previous studies have evaluated the safety of simultaneous bilateral cataract surgery in children,[6, 11–13] to our knowledge, no reports have been published comparing the costs of simultaneous versus sequential bilateral cataract surgery in infants with congenital cataracts. The purpose of our study was to compare the incidence of adverse events and visual outcomes as well as the economic costs of simultaneous versus sequential bilateral cataract surgery for infants with congenital cataracts.

Methods

Patients who underwent surgery for bilateral congenital cataracts were identified from one surgeon's (SRL) operative records. A retrospective chart review was then performed. Children were eligible if they had bilateral congenital cataracts and underwent bilateral cataract surgery when six months of age or younger between 1996 and 2007. The study was approved by the Emory University Institutional Review Board and was in compliance with the Health Insurance Portability and Accountability Act. Data was collected using a case report form that included the following information: (1) age at diagnosis; (2) age at surgery; (3) initial method of refractive correction after surgery; (4) time elapsed between surgery and optical correction in each eye; (5) intraoperative or postoperative complications; and (6) Snellen visual acuity in each eye at the examination closest to age four years;. All Snellen acuities were converted to logMAR to facilitate data analysis.

Patients were generally examined 1 day, 1 week and 1 month following surgery and then every 3 months until 4 years of age.

Patients were divided into two groups--simultaneous and sequential surgery. Before 2001, parents were only offered sequential surgery. Beginning in 2002, parents were given a choice of sequential or simultaneous surgery after a discussion of the risks and benefits of each procedure including the relative risk of bilateral endophthalmitis using the two different approaches. Simultaneous surgery was defined as having cataract surgery on both eyes on the same day. Sequential surgery was defined as having the surgeries separated by at least 24 hours.

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

Economic Costs

Because the differences between healthcare charges and payments can be substantial, we elected to evaluate the costs of sequential versus simultaneous surgery based on the payer's perspective, e.g. payments.[14–17] Because many of our bilateral congenital cataract surgeries were performed on Medicaid patients and Medicaid hospital and physician payment information was readily available from the State of Georgia for 2009, we used Medicaid data to estimate the payer's perspective. We began by collecting and aggregating administrative hospital and physician Medicaid payment data for each of the procedures from Children's Healthcare of Atlanta at Egleston and the Emory Clinic. The hospital payment data were compiled by using hospital collection data from the three most recent patients that underwent sequential cataract surgery and simultaneous cataract surgery. The collection data included surgical operating room and anesthesia procedure times, specific drugs administered, complete list of supplies used, and Medicaid payments. These collection data were grouped into the hospital, drug, and supplies.

Physician reimbursements for surgery and anesthesia were calculated from physician payments to Emory Clinic for simultaneous bilateral cataract surgeries performed in 2009 based on the current procedure terminology (CPT-4) codes associated with the surgical and anesthesia procedures used.[18] In 2009, this procedure was performed on 6 children. Payments were still pending for 2 patients, so the payments for 4 patients were averaged. There are 4 different Medicaid programs in Georgia, so the payments differed somewhat between patients. In 2009, the published Georgia Medicaid surgeon reimbursement rate for CPT-4 code 66840 - removal of lens material; aspiration technique, one or more stages, was $507. We used this published number for the payment for sequential surgery since we did not perform any sequential bilateral lensectomies on babies in 2009. For simultaneous cataract procedures, the modifier 50 was added to CPT-4 code 66840 indicating bilateral surgery, and the mean Medicaid surgeon reimbursement rate to the Emory Clinic for this procedure was $827. We performed the analysis based on the Georgia Medicaid anesthesia reimbursement rate for sequential surgery as $219 while the mean anesthesia reimbursement rate for simultaneous cataract surgery was $322.

Statistical analysis

Visual acuity was transformed to logMAR units for analysis. The interocular difference in logMAR acuity of each child at the exam closest to age 4 years was used for the analysis. The mean interocular difference in visual acuity was compared between patients undergoing simultaneous and sequential surgery using an independent group t test. The percent of patients having intraoperative or postoperative adverse events was compared between the two groups using a chi-square test.

Results

Twenty seven children were included in the study. All children underwent a cataract extraction, primary posterior capsulotomy, and anterior vitrectomy using the same surgical technique. The sequential surgeries were performed from 1996 – 2005 and the simultaneous surgeries from 2002 – 2007. For patients undergoing simultaneous surgeries, after surgery

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

on the first eye was completed, the surgical drapes were removed, a new surgical tray was opened, the next operative eye was prepped and draped, and the surgeon rescrubbed and regowned. On no occasion did the plan to perform simultaneous bilateral cataract surgery in any patient have to be abandoned because of a serious intraoperative complication in the first eye.

The mean age of cataract diagnosis for the 10 children undergoing sequential surgery was 41 days and the mean age of cataract diagnosis for the 17 children undergoing simultaneous surgery was 67 days (p=0.17). The mean age at the time of cataract surgery for the first eye for the sequential group was 49 days versus a mean age of 68 days for the simultaneous group (p=.25). The mean time interval between cataract surgeries for patients in the simultaneous group was 7 day (range, 1–21) except for 1 outlier (119 days). None of the patients underwent primary intraocular lens (IOL) implantation. Postoperatively their aphakia was corrected with either gas permeable contact lenses or spectacles. Children in the simultaneous group were prescribed their optical correction at a mean age of 10 days following cataract surgery versus 18 days following cataract surgery on the first eye of the sequential group (p=0.41). Generally, children in the sequential group were not prescribed their optical correction until after cataract surgery on their second eye. The mean follow-up was 5.0 years for the sequential group versus 2.5 years for the simultaneous group. The longer follow-up for the sequential group largely reflects the fact that most of these surgeries were performed between 1996–2001, whereas some of the surgeries in the simultaneous group were performed as recently as 2007. Snellen visual acuities were obtained from 8 patients in the sequential group and 6 patients in the simultaneous group. The logMAR acuity of the OD was 0.96±0.45 in the sequential group and 1.20±0.59 in the simultaneous group (p = 0.54). The logMAR acuity of the OS was 1.24±0.59 in the sequential group and 0.86±0.64 in the simultaneous group with (p=0.27). The mean absolute interocular difference in logMAR visual acuities between the two treatment groups was 0.47±0.76 for the sequential group and 0.44±0.40 for the simultaneous group (p=.92). One eye in the sequential group experienced an intraoperative complication—an inadvertent iridotomy. One eye in both groups was noted to have a vitreous hemorrhage on the first postoperative day that cleared spontaneously within one week. Four patients (8 eyes) in the sequential group and 2 patients (3 eyes) in the simultaneous group developed glaucoma. No eyes developed endophthalmitis.

Economic Costs

Table 1 reports the Medicaid payments calculations for the sequential and simultaneous bilateral cataract surgeries and the respective percentage shares for each of the major components of the procedure and their payment differences. The sequential cataract surgeries, for both days, were associated with Medicaid payments of $10,577. For simultaneous surgeries, the Medicaid payments were $8,261. With both approaches, the hospital portion of the payment represented over 50% of the total Medicaid payment while the physician portion of the payment was nearly identical—13.7% for sequential versus 13.9% for simultaneous cataract surgery.

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

The overall payment difference between the two approaches for bilateral cataract surgery was $2,316. This amount represents a 21.9% savings for Medicaid if the procedure is performed simultaneously rather than sequentially. The biggest share of the overall savings (80.1%) came from the hospital portion of the payment which represented a savings of $1,855. The savings from the physician payment portion of the payment was $303, and while it represented the next biggest share of the savings (13.1%), it was substantially lower than the savings from the hospital portion of the Medicaid payment.

Discussion

Bilateral simultaneous congenital cataract surgery is being increasingly performed with good results.[8, 9, 19] Most studies have focused on the safety of this procedure. In our study, we found a similar incidence of adverse events between the two treatment groups. The most common adverse event was glaucoma that occurred in 11 (32%) eyes. While more postoperative complications occurred in the sequential group, this was likely due to the longer follow-up in this group. Aphakic glaucoma has been shown to increase in frequency in children with longer follow-up.[20–22] We did not find a significant difference in the visual outcomes between the patients in our two treatment groups. We had hypothesized that there would be a smaller interocular difference in visual acuity in the simultaneous group because both eyes would be rehabilitated at the same time, but we did not find this to be the case. However, our sample size was small and the power insufficient to detect small differences between treatment groups. The relatively poor visual results in both groups likely reflects the older age of these children at the time of cataract surgery and the high incidence of glaucoma.[10, 23] While we did not find a significant difference in the incidence of adverse events or visual outcome, we did find a significant cost savings associated with simultaneous bilateral cataract surgery.

The acceptance of simultaneous bilateral cataract surgery for adults varies significantly between different countries. It has been suggested that these varying levels of acceptance arise at least in part from differences in reimbursement policies for bilateral surgery.[1] For example, in Finland where simultaneous bilateral cataract surgery is reimbursed at twice the rate as unilateral cataract surgery, 40–60% of all patients now undergo simultaneous bilateral cataract surgery.[2, 24] However, in most countries simultaneous bilateral cataract surgery is reimbursed at a lower rate and the frequency of simultaneous bilateral cataract surgery is correspondingly lower. In the United States, the Centers for Medicare and Medicaid Services (CMS) policy requires that the modifier 50 be used when performing bilateral surgery which reduces the payment to 150% of the amount allowed for unilateral surgery. The 2009 Georgia Medicaid payment for simultaneous bilateral lensectomies is also only 150% the payment for a unilateral lensectomy. However, given the relatively low frequency of cataract surgery during infancy, economic issues are not likely to be a significant factor in determining the acceptance of simultaneous bilateral cataract surgery in this population.

Endophthalmitis is one of the most severe complications associated with cataract surgery. It has been reported to have incidence of 7 in 10,000 cataract surgeries in children.[4] Opponents of simultaneous bilateral cataract surgery emphasize several problems with this approach

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

including the risk of bilateral endophthalmitis and the inability to analyze the refractive outcome of the first eye prior to performing surgery on the fellow eye.[25] When bilateral endophthalmitis has occurred following simultaneous bilateral cataract surgery, it has generally been reported after a lapse in sterile technique.[26–29] None of the patients in our series developed endophthalmitis. To avoid this outcome, extreme vigilance must be maintained to adhere to sterile protocols when performing simultaneous bilateral cataract surgery. We used different instruments and solutions for each eye and redraped and rescrubbed between surgeries to reduce the risk of this complication. Simultaneous bilateral cataract surgery should also not be performed by inexperienced surgeons since they are known to have a higher complication rate.[30, 31] There are a number of contraindications to performing simultaneous bilateral cataract surgery in adults such as untreated blepharitis, immunosuppression or immunodeficiency, uncontrolled glaucoma, uveitis, high myopic or hyperopic refractive errors, a history of refractive surgery, lens subluxation, pseudoexfoliation, a history of ocular trauma, diabetes mellitus, an endothelial dystrophy or a serious complication occurring while performing surgery on the first eye.[9] This situation did not arise for any of the patients in our series. Since all of the patients in our study were left aphakic due to their young age, refractive surprises were not an issue in our study. It is unlikely that this would be a significant issue for infants even if intraocular lenses were implanted since it would take many months if not years to determine if the optimal IOL power had been chosen for the first eye given the large myopic shift that occurs in growing eyes.[32]

The advantages of simultaneous surgery include medical and social benefits. Medical benefits include undergoing preoperative care only once, only being put under general anesthesia once, and when necessary only being hospitalized once. Social benefits include less anxiety for parents since their infant only has to undergo general anesthesia once, time savings for parents, friends and relatives arising from a reduced number of doctors visits, and time savings for parents who would not need to take as much time off from work to care for their infant postoperatively. Sarikkola et al[8] reported improved patient satisfaction with simultaneous bilateral cataract surgery. They reported that 91% of patients that underwent simultaneous bilateral cataract surgery reported that they would recommend it to relatives or friends. Lundstrom et al[33] reported that adults undergoing simultaneous bilateral cataract surgery reported less difficulty performing daily life activities and better binocular contrast sensitivity than patients undergoing sequential bilateral cataract surgery. Since 2002, one of the authors (SRL) has given the parents of infants with bilateral congenital cataracts the option of having their child undergo sequential or simultaneous bilateral cataract surgery. Only 1 of 18 parents has chosen sequential surgery during this time period after the advantages and disadvantages of both approaches including the risk of bilateral endophthlamitis were explained to the parents. In the American Academy of Ophthalmology Preferred Practice statement for Cataract in the Adult Eye (http://one.aao.org/CE/practiceGuidelines/PPP.aspx) the need for general anesthesia in the presence of bilateral visually significant cataracts is listed as one of the indications for performing simultaneous bilateral cataract surgery. This is a particularly compelling reason to perform simultaneous bilateral cataract surgery during infancy given the increased risks of general anesthesia in this age group.[34–36]

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

In addition to the medical and social benefits of simultaneous surgery, there are also economic advantages. The hospital, drugs, supplies and professional payments for Medicaid were on average 21.9% lower per patient in the simultaneous group. This finding is consistent with the CMS policy which views bilateral surgeries --procedures performed on both sides of the body during the same operative session – as typically lower in costs for hospitals and physicians because they require fewer hospital resources (operating room time, drugs, and supplies) and professional resources (pre and postoperative time for surgical patients). Arshinoff and Chen[1] reported a 15% increase in the number of cataract operations that could be performed on a daily basis when performing simultaneous bilateral cataract surgeries in adults. Lundstrom et al[37] reported that adult sequential bilateral cataract surgery was 14% more expensive than simultaneous bilateral cataract surgery. A number of studies evaluating non-ophthalmic procedures have confirmed the cost advantage of bilateral simultaneous surgeries with savings ranging up to 50%.[38–43] We are unaware of any previous studies evaluating the economic advantages of simultaneous bilateral cataract surgery during infancy.

It has been reported that the incidence of congenital cataracts is 2.49/10,000/live births and 60% are bilateral.[44] In 2006, there were 4.3 million lives births in the US.[45] Therefore, we estimate that there were 1,071 births with congenital cataracts in the US in 2006 of which 643 would have been bilateral. Performing simultaneous bilateral cataract surgery rather than sequential bilateral cataract surgery would have resulted in a savings of $3.2 million in 2009 in the United States using the Georgia Medicaid payment schedule.

These savings could be even more significant from a global perspective. In 2008, the world population was estimated to be 6.705 billion and the estimated number of live births was 140 million (http://www.prb.org/pdf08/08WPDS_Eng.pdf.). Consequently, we estimate that there were 350,000+ live births with congenital cataracts and 210,000 births with bilateral congenital cataracts. These estimates are probably low since the incidence of congenital cataracts is higher in developing countries largely due to the low rate of Rubella vaccination rate in many of these countries.[4647] Therefore, it seems likely that removing infantile cataracts using simultaneous bilateral cataract surgery would generate significant cost savings if implanted on worldwide basis.

Our study had a number of shortcomings. First, our payment information is not based on actual payments, but extrapolated payments. Initially we tried to obtain all of the hospital and physician payments for all of the 27 children studied. However, we discovered there were a number of problems with doing this. While most of the patients had Medicaid, some of the patients had private insurance and the payments were higher for these patients. We also found that Medicaid payments decreased steadily over the time interval studied, so it was very difficult to compare payments from one year to the next. This was particularly a problem for sequential surgeries which were primarily performed before 2002. Since the payments for these surgeries were much higher, using the actual payment data would have distorted the relative costs for the two treatment groups. Finally, the hospital did not have payment information for all of the surgeries performed before 2000. A second problem was that we only studied the direct payments for surgeries. It would have been better if we could have considered all of the direct and indirect medical costs such as the cost to parents to

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

travel to the hospital for the surgeries and to take time off from work, but the complexity of doing this was beyond the scope of this study.

Given the spiraling costs of healthcare in the United State, efficiencies that result in cost reductions without compromising outcomes are highly desirable. Our study found no difference in outcomes performing simultaneous bilateral cataract surgery in infants but a 21.9% reduction in costs. Moreover, infants benefit from shorter hospitalizations, less travel time and office visits, and a reduction in time on postoperative medications. These results underscore the importance of simultaneous bilateral cataract surgery and the need for a greater understanding of its benefits.

Acknowledgments

Supported by National Institutes of Health Grants U10 EY13272 and U10 EY013287 and in part by NIH Departmental Core Grant EY06360 and Research to Prevent

References

1. Arshinoff SA, Chen SH. Simultaneous bilateral cataract surgery: Financial differences among nations and jurisdictions. J Cataract Refract Surg. 2006 Aug; 32(8):1355–1360. [PubMed: 16863975]
2. Arshinoff SA, Odorcic S. Same-day sequential cataract surgery. Curr Opin Ophthalmol. 2009 Jan; 20(1):3–12. [PubMed: 19077823]
3. Kattan HM, Flynn HW Jr, Pflugfelder SC, Robertson C, Forster RK. Nosocomial endophthalmitis survey. Current incidence of infection after intraocular surgery. Ophthalmology. 1991 Feb; 98(2): 227–238. [PubMed: 2008282]
4. Wheeler DT, Stager DR, Weakley DR Jr. Endophthalmitis following pediatric intraocular surgery for congenital cataracts and congenital glaucoma. J Pediatr Ophthalmol Strabismus. 1992 May-Jun; 29(3):139–141. [PubMed: 1432496]
5. Chang DF. Simultaneous bilateral cataract surgery. Br J Ophthalmol. 2003 Mar; 87(3):253–254. [PubMed: 12598429]
6. Zwaan J. Simultaneous surgery for bilateral pediatric cataracts. Ophthalmic Surg Lasers. 1996 Jan; 27(1):15–20. [PubMed: 8630750]
7. Chung JK, Park SH, Lee WJ, Lee SJ. Bilateral cataract surgery: a controlled clinical trial. Jpn J Ophthalmol. 2009 Mar; 53(2):107–113. [PubMed: 19333693]
8. Sarikkola AU, Kontkanen M, Kivela T, Laatikainen L. Simultaneous bilateral cataract surgery: a retrospective survey. J Cataract Refract Surg. 2004 Jun; 30(6):1335–1341. [PubMed: 15177613]
9. Smith GT, Liu CS. Is it time for a new attitude to "simultaneous" bilateral cataract surgery? Br J Ophthalmol. 2001 Dec; 85(12):1489–1496. [PubMed: 11734526]
10. Lambert SR, Lynn MJ, Reeves R, Plager DA, Buckley EG, Wilson ME. Is there a latent period for the surgical treatment of children with dense bilateral congenital cataracts? J AAPOS. 2006 Feb; 10(1):30–36. [PubMed: 16527677]
11. Guo S, Nelson LB, Calhoun J, Levin A. Simultaneous surgery for bilateral congenital cataracts. J Pediatr Ophthalmol Strabismus. 1990 Jan-Feb;27(1):23–25. discussion 26–27. [PubMed: 2109055]
12. Magli A, Fimiani F, Passaro V, Iovine A. Simultaneous surgery in bilateral congenital cataract. Eur J Ophthalmol. 2009 Jan-Feb;19(1):24–27. [PubMed: 19123145]
13. Totan Y, Bayramlar H, Yilmaz H. Bilateral paediatric cataract surgery in the same session. Eye (Lond). 2009 May; 23(5):1199–1205. [PubMed: 18535587]
14. Drummond, MF.; Sculpher, MJ.; Torrance, GW.; O'Brian, BJ.; Stoddard, GL. Methods for the Economic Evaluation of Health Care Programs. Oxford: Oxford University Press; 2005.

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

15. Atherly A, Culler SD, Becker ER. The role of cost effectiveness analysis in health care evaluation. Q J Nucl Med. 2000 Jun; 44(2):112–120. [PubMed: 10967622]
16. Byford S, Raftery J. Perspectives in economic evaluation. BMJ. 1998 May 16; 316(7143):1529–1530. [PubMed: 9582152]
17. Tompkins CP, Altman SH, Eilat E. The precarious pricing system for hospital services. Health Aff (Millwood). 2006 Jan-Feb;25(1):45–56. [PubMed: 16403744]
18. Becker, ER. Physician Costs--US: Conceptual and Methodological Issues and Selected Applications. In: Weintraub, WS., editor. Cardiovascular Helath Care Economics. Humana Press Inc; 2003.
19. Totan Y, Bayramlar H, Cekic O, Aydin E, Erten A, Daglioglu MC. Bilateral cataract surgery in adult and pediatric patients in a single session. J Cataract Refract Surg. 2000 Jul; 26(7):1008–1011. [PubMed: 10946191]
20. Egbert JE, Christiansen SP, Wright MM, Young TL, Summers CG. The natural history of glaucoma and ocular hypertension after pediatric cataract surgery. J AAPOS. 2006 Feb; 10(1):54–57. [PubMed: 16527681]
21. Chak M, Rahi JS. Incidence of and factors associated with glaucoma after surgery for congenital cataract: findings from the British Congenital Cataract Study. Ophthalmology. 2008 Jun; 115(6): 1013–1018. e1012. [PubMed: 18164065]
22. Haargaard B, Ritz C, Oudin A, et al. Risk of glaucoma after pediatric cataract surgery. Invest Ophthalmol Vis Sci. 2008 May; 49(5):1791–1796. [PubMed: 18223251]
23. Birch EE, Cheng C, Stager DR Jr, Weakley DR Jr, Stager DR Sr. The critical period for surgical treatment of dense congenital bilateral cataracts. J AAPOS. 2009 Feb; 13(1):67–71. [PubMed: 19084444]
24. Kontkanen M, Kaipiainen S. Simultaneous bilateral cataract extraction: a positive view. J Cataract Refract Surg. 2002 Nov; 28(11):2060–2061. [PubMed: 12457689]
25. Adams AJ, Brown B, Flom MC, Jones RT, Jampolsky A. Alcohol and marijuana effects on static visual acuity. Am J Optom Physiol Opt. 1975 Nov; 52(11):729–735. [PubMed: 1106208]
26. Benezra D, Chirambo MC. Bilateral versus unilateral cataract extraction: advantages and complications. Br J Ophthalmol. 1978 Nov; 62(11):770–773. [PubMed: 309767]
27. Ozdek SC, Onaran Z, Gurelik G, Konuk O, Tekinsen A, Hasanreisoglu B. Bilateral endophthalmitis after simultaneous bilateral cataract surgery. J Cataract Refract Surg. 2005 Jun; 31(6):1261–1262. [PubMed: 16039514]
28. Kashkouli MB, Salimi S, Aghaee H, Naseripour M. Bilateral Pseudomonas aeruginosa endophthalmitis following bilateral simultaneous cataract surgery. Indian J Ophthalmol. 2007 Sep-Oct;55(5):374–375. [PubMed: 17699948]
29. Puvanachandra N, Humphry RC. Bilateral endophthalmitis after bilateral sequential phacoemulsification. J Cataract Refract Surg. 2008 Jun; 34(6):1036–1037. [PubMed: 18499016]
30. Randleman JB, Wolfe JD, Woodward M, Lynn MJ, Cherwek DH, Srivastava SK. The resident surgeon phacoemulsification learning curve. Arch Ophthalmol. 2007 Sep; 125(9):1215–1219. [PubMed: 17846361]
31. Bhagat N, Nissirios N, Potdevin L, et al. Complications in resident-performed phacoemulsification cataract surgery at New Jersey Medical School. Br J Ophthalmol. 2007 Oct; 91(10):1315–1317. [PubMed: 17431020]
32. Lambert SR, Lynn M, Drews-Botsch C, et al. Optotype acuity and re-operation rate after unilateral cataract surgery during the first 6 months of life with or without IOL implantation. Br J Ophthalmol. 2004 Nov; 88(11):1387–1390. [PubMed: 15489478]
33. Lundstrom M, Albrecht S, Nilsson M, Astrom B. Benefit to patients of bilateral same-day cataract extraction: Randomized clinical study. J Cataract Refract Surg. 2006 May; 32(5):826–830. [PubMed: 16765801]
34. Lambert SR. Treatment of congenital cataract. Br J Ophthalmol. 2004 Jul; 88(7):854–855. [PubMed: 15205222]
35. Welborn LG, Ramirez N, Oh TH, et al. Postanesthetic apnea and periodic breathing in infants. Anesthesiology. 1986 Dec; 65(6):658–661. [PubMed: 3641541]

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

36. Gregory GA, Steward DJ. Life-threatening perioperative apnea in the ex-"premie". Anesthesiology. 1983 Dec; 59(6):495–498. [PubMed: 6650904]
37. Lundstrom M, Albrecht S, Roos P. Immediate versus delayed sequential bilateral cataract surgery: an analysis of costs and patient value. Acta Ophthalmol. 2009 Feb; 87(1):33–38. [PubMed: 18786128]
38. Gerber C, Lingenfelter EJ, Reischl N, Sukthankar A. Single-stage bilateral total shoulder arthroplasty: a preliminary study. J Bone Joint Surg Br. 2006 Jun; 88(6):751–755. [PubMed: 16720768]
39. Larson CM, Fischer DA, Smith JP, Boyd JL. Bilateral anterior cruciate ligament reconstruction as a single procedure: evaluation of cost and early functional results. Am J Sports Med. 2004 Jan-Feb;32(1):197–200. [PubMed: 14754744]
40. Macaulay W, Salvati EA, Sculco TP, Pellicci PM. Single-stage bilateral total hip arthroplasty. J Am Acad Orthop Surg. 2002 May-Jun;10(3):217–221. [PubMed: 12041943]
41. McBryde CW, Dehne K, Pearson AM, Treacy RB, Pynsent PB. One- or two-stage bilateral metal-on-metal hip resurfacing arthroplasty. J Bone Joint Surg Br. 2007 Sep; 89(9):1144–1148. [PubMed: 17905948]
42. McClinton S, Moffat LE, Ludbrook A. The cost of bilateral orchiectomy as a treatment for prostatic carcinoma. Br J Urol. 1989 Mar; 63(3):309–312. [PubMed: 2702430]
43. Schroeder L, Petrou S, Kennedy C, et al. The economic costs of congenital bilateral permanent childhood hearing impairment. Pediatrics. 2006 Apr; 117(4):1101–1112. [PubMed: 16585304]
44. Rahi JS, Dezateux C. National cross sectional study of detection of congenital and infantile cataract in the United Kingdom: role of childhood screening and surveillance. The British Congenital Cataract Interest Group. BMJ. 1999 Feb 6; 318(7180):362–365. [PubMed: 9933197]
45. Women's Health USA 2008. Rockville, Maryland: U.S. Department of Health and Human Services; 2008. U.S. Department of Health and Human Serivces HRaSA.
46. Lambert SR. Congenital rubella syndrome: the end is in sight. Br J Ophthalmol. 2007 Nov; 91(11): 1418–1419. [PubMed: 17947261]
47. Wilson ME, Pandey SK, Thakur J. Paediatric cataract blindness in the developing world: surgical techniques and intraocular lenses in the new millennium. Br J Ophthalmol. 2003 Jan; 87(1):14–19. [PubMed: 12488254]

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Table 1

Medicaid Payments and Percentage Shares for Bilateral Congential Cataracts for Sequential and Simultaneous Lensectomies

	Sequential		Simultaneous		
	Day 1 Medicaid Payments (%)	**Day 2 Medicaid Payments (%)**	**Day 1 and 2 Medicaid Payments (%)**	**Medicaid Payments (%)**	**Medicaid Payment Difference (%)**
Hospital Payment					
Hospital	$3,336 (58.1%)	$2,639 (54.6%)	$5,975 (56.5%)	$4,120 (49.9%)	$1,855 (80.1%)
Drugs	$296 (5.2%)	$238 (4,9%)	$534 (5.0%)	$474 (5.7%)	$60 (2.6%)
Supplies/Other	$1,383 (24.1%)	$1,233 (25.5%)	$2,616 (24.7%)	$2,518 (30.5%)	98 (4.2%)
Provider Payment					
Physician	$726 (15.6%)	$726 (15.0%)	$1,452 (13.7%)	$1,149 (13.9%)	$303 (13.1%)
Total	$5,741 (100.0%)	$4,836 (100.0%	$10,577 (100.0%)	$8,261 (100.0%)	$2,316 (100.0%)