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Immediately Sequential Bilateral Cataract Surgery for the Treatment of Bilateral Cataracts: A Review of Safety and Guidelines

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Abbreviations

DSBCS	Delayed sequential bilateral cataract surgery
EQ5D	EuroQOL Five Dimensions questionnaire
HUI3	Health Utility Index Mark 3
ISBCS	Immediately sequential bilateral cataract surgery
NICE	National Institute for Health and Care Excellence
NRS	Non-Randomized Study
QOL	Quality of life
RCT	Randomized Controlled Trial
SR	Systematic review
VF	Visual Function questionnaire

Context and Policy Issues

According to the Canadian Survey on Disabilities conducted in 2017, approximately 1.5 million Canadians were living with mild to very severe loss in vision.[1] As one of the leading causes of blindness, cataracts affected approximately 3.5 million Canadians as per the Cost of Vision Loss Report published in 2009.[1] Characterized by a loss in lens transparency due to breakdown of tissue and clumping of proteins, cataracts left untreated may lead to vision impairment and blindness.[2] With age-related cataract being the most common type,[2] cataract surgery utilization is anticipated to increase.[3]

By removing and replacing the cloudy lens with a prosthetic lens,[2] cataract surgery in both eyes, if indicated, is most commonly performed on separate days and is known as delayed sequential bilateral cataract surgery (DSBCS).[3] Alternatively, bilateral cataract surgery can also be performed on the same day, which is known as immediately sequential bilateral cataract surgery (ISBCS)[3] or bilateral simultaneous cataract surgery.[4]

With potential benefits such as reduced turnover time between procedures, lower health care costs, less postoperative visits, and fewer patient and staff encounters,[3,5] the use of ISBCS may help streamline health care delivery when faced with capacity challenges.[6] However, potential safety concerns such as the development of complications (e.g., bilateral endophthalmitis, corneal edema) should be considered. The aim of this report is to summarize and critically appraise the relevant clinical evidence and evidence-based guidelines regarding the safety and use of ISBCS for the treatment of bilateral cataracts.

Research Questions

1. What is the clinical evidence regarding the safety of immediately sequential bilateral cataract surgery for the treatment of bilateral cataracts?
2. What are the evidence-based guidelines regarding the use of immediately sequential bilateral cataract surgery for the treatment of bilateral cataracts?

Key Findings

One systematic review with meta-analysis, three primary non-randomized studies, and one evidence-based guideline regarding the safety or use of immediately sequential bilateral cataract surgery (ISBCS) for the treatment of bilateral cataracts were included in this report. The identified literature revealed varied, but largely neutral, conclusions regarding the safety of ISBCS for the treatment of bilateral cataracts. Specifically, the systematic review with meta-analysis suggested that there were no significant differences in postoperative

quality of life scores including Visual Function 7- and 14-item questionnaire, EuroQOL Five Dimensions questionnaire, and Health Utility Index Mark 3 score between those who underwent ISBCS versus delayed sequential bilateral cataract surgery (DSBCS). However, patients who underwent ISBCS exhibited significantly greater improvements in postoperative Catquest scores compared to those who underwent DSBCS.

Findings from a primary non-randomized study suggested that there were no significant differences in the rates of intraoperative complications including posterior capsular rupture and vitrectomy, while another non-randomized study observed numerically similar rates of posterior capsular rupture after adjustments for case complexity between ISBCS and DSBCS patients. One primary non-randomized study detected no significant differences in rates of postoperative endophthalmitis between ISBCS and DSBCS patients. However, patients who underwent ISBCS exhibited significantly lower rates of macular edema compared to those who underwent DSBCS.

Based on variable quality evidence, the NICE guideline recommends that patients need to be informed of the risks versus benefits of ISBCS (recommendation strength not assigned). In addition, ISBCS should be considered for patients with a low complication risk, or for those needing general anesthesia but anesthesia may increase their complication risk (evidence of benefit is less certain).

Overall, the body of evidence used to inform this report was limited in quantity and was largely low to moderate in quality. Additionally, the high degree of heterogeneity of studies in the systematic review and lack of randomization in the primary clinical studies should be taken into consideration when interpreting these results. Finally, since the sample populations consisted of patients living in the US, United Kingdom, Spain, New Zealand, Australia, Japan, Finland, Sweden, or Switzerland, these findings may not be generalizable to the Canadian setting.

Methods

Literature Search Methods

A limited literature search was conducted by an information specialist on key resources including Ovid Medline, Embase, the Cochrane Library, the University of York Centre for Reviews and Dissemination (CRD) databases, the websites of Canadian and major international health technology agencies, as well as a focused internet search. The search strategy was comprised of both controlled vocabulary, such as the National Library of Medicine's MeSH (Medical Subject Headings), and keywords. The main search concepts were sequential bilateral cataract surgery. No filters were applied to limit the retrieval by study type. Where possible, retrieval was limited to the human population. The search was also limited to English language documents published between January 1, 2010 and July 27, 2020.

Selection Criteria and Methods

One reviewer screened citations and selected studies. In the first level of screening, titles and abstracts were reviewed and potentially relevant articles were retrieved and assessed for inclusion. The final selection of full-text articles was based on the inclusion criteria presented in Table 1

Table 1: Selection Criteria

Population	Adults ≥ 18 years old with bilateral age-related cataracts
Intervention	ISBCS (i.e., surgery performed on both eyes on the same day but as separate procedures)
Comparator	Q1: DSBCS (i.e., surgery on both eyes but on separate dates), no comparator Q2: No comparator
Outcomes	Q1: Safety (adverse events, including incidence and type) • Local/direct complications (i.e., eye-related complications; e.g., early-onset: toxic anterior segment syndrome, endophthalmitis, ruptured capsule, zonular instability, steroid induced pressure rise; later onset: refractive challenges, intraocular cataract lenses choice, retina detachment, corneal decompensation, early decompensation of retinal disease [diabetic, macular degenerative]) • Other/indirect risks or complications (e.g., mobility complications at, such as requiring assistance for meals, bathroom, bathing, getting to appointments, putting drops in, increases in falls, changes in quality of life or pain outcomes) Q2: Recommendations regarding the use of ISBCS, including recommendations for managing routine functions or post-op protocols; recommendations regarding patient selection criteria
Study Designs	Health technology assessments, systematic reviews, randomized controlled trials, non-randomized studies, evidence-based guidelines

DSBCS = delayed sequential bilateral cataract surgery; ISBCS = immediately sequential bilateral cataract surgery.

Exclusion Criteria

Articles were excluded if they did not meet the selection criteria outlined in Table 1, they were duplicate publications, or were published prior to 2010. Studies involving patients with trauma-induced or congenital cataract, and those who underwent other forms of cataract surgery (e.g., femto laser-assisted cataract surgery were also excluded. Furthermore, systematic reviews in which all relevant studies were captured in other more recent or more comprehensive systematic reviews were excluded. Primary studies retrieved by the search were excluded if they were captured in one or more included systematic reviews. Guidelines with unclear methodology were also excluded.

Critical Appraisal of Individual Studies

The included publications were critically appraised by one reviewer using A MeaSurement Tool to Assess systematic Reviews 2 (AMSTAR 2)[7] for systematic reviews, the Downs and Black checklist[8] for non-randomized studies, and the Appraisal of Guidelines for Research and Evaluation (AGREE) II instrument[9] for guidelines. Summary scores were not calculated for the included studies; rather, the strengths and limitations of each included publication were described narratively.

Summary of Evidence

Quantity of Research Available

A total of 95 citations were identified in the literature search. Following screening of titles and abstracts, 78 citations were excluded and 17 potentially relevant reports from the electronic search were retrieved for full-text review. Six potentially relevant publications were retrieved from the grey literature search for full-text review. Of these potentially relevant articles, 18 publications were excluded for various reasons, and five publications met the inclusion criteria and were included in this report. These comprised one systematic

review (SR),[10] three non-randomized studies (NRSs),[11-13] and one evidence-based guideline.[4] Appendix 1 presents the PRISMA[14] flowchart of the study selection. Additional references of potential interest are provided in Appendix 5.

Summary of Study Characteristics

One SR with meta-analysis,[10] three NRSs,[11-13] and one evidence-based guideline[4] were identified for inclusion in this review. Additional details regarding the characteristics of included publications are provided in Appendix 2.

Study Design

The included SR with meta-analysis[10] consisted of English-language studies published from January 2000 to May 2014. With study designs restricted to SRs, meta-analyses, randomized controlled trials (RCTs), NRSs, and cost-effectiveness analyses, Malvankar-Mehta et al. (2015) included a total of 11 studies which all had relevant outcomes for this report.[10]

Three primary studies were included in this report.[11-13] Buchan et al. (2020)[13] and Herrinton et al. (2017) conducted non-randomized retrospective comparative studies, while Guber et al. (2015) conducted a retrospective single-arm study.

The included evidence-based guideline[4] was developed by the National Institute for Health and Care Excellence (NICE) and was published in 2017. This guideline was informed by systematic searches conducted on February 18, 2016 and screened for RCTs.[4] The NICE guideline development group used the Grading of Recommendations Assessment, Development and Evaluation (GRADE) approach to evaluate the quality of the evidence and graded the quality of evidence from very low to high.[4] The strength of recommendations were reflected in the wording (i.e., “offer/advise” was used for strong recommendations with clear evidence of benefit, while “consider” was used if the evidence was less certain).[4] The rating systems for quality of evidence and strength of recommendations are reported in Appendix 2. Decisions on the recommendations were reached through consensus.[4]

Country of Origin

The first author of the included SR[10] was from Canada. The authors of the three primary studies were from the United Kingdom,[13] US,[11] and Switzerland,[12] respectively. The NICE guideline is meant to apply to the United Kingdom.[4]

Patient Population

The identified SR included studies involving adult patients (≥ 19 years old) with bilateral cataracts.[10] The total number of participants included in this SR was 3,657.[10] The mean age of participants across the included primary studies within the SR ranged from 65.32 to 77.9 years old.[10]

The three included primary studies involved 249,414,[13] 24,615,[11] and 110[12] adult patients with bilateral cataracts, respectively. While one primary study specified adults to be ≥ 18 years old,[13] the two other primary studies did not specify an age cutoff.[11,12] The mean ages for the three primary studies were 75.5 years old,[13] 79.0 years old,[12] and not reported.[11]

The target population covered by the NICE guideline was adult patients (≥ 18 years old) with cataracts.[4] The intended users of this guideline are health care professionals, commissioners and providers, and people living with cataracts.[4]

Interventions and Comparators

The SR with meta-analysis[10] included primary studies that compared ISBCS and DSBCS using phacoemulsification for bilateral cataracts with no requirement for a specific follow-up duration. While two primary studies[11,13] compared ISBCS and DSBCS using phacoemulsification, one primary study only evaluated ISBCS using phacoemulsification.[12] The follow-up durations for the three primary studies were 120 days after surgery,[11] one month after surgery,[12] and not reported,[13] respectively.

The NICE guideline considered the overall management of cataracts at various stages (i.e., before, during, and after cataract surgery).[4] Specifically, this guideline made recommendations on the use of phacoemulsification or femtosecond laser-assisted cataract surgery.[4] Recommendations relevant for this report pertained to ISBCS using phacoemulsification.[4]

Outcomes

The authors of the SR with meta-analysis investigated effectiveness and safety outcomes for ISBCS and DSBCS using phacoemulsification.[10] Safety outcomes relevant for this report included quality of life (QOL) scores as measured by the Visual Function Questionnaire (VF-7, VF-14), EuroQOL Five Dimensions Questionnaire (EQ5D), Health Utility Index Mark 3 (HUI3), and Catquest Questionnaire.[10] Furthermore, the authors of the SR also qualitatively described postoperative complications associated with ISBCS and DSBCS.[10] Complete definitions of QOL scores are described in Appendix 2.

Authors of all three primary studies evaluated intraoperative and postoperative complications associated with ISBCS and/or DSBCS using phacoemulsification.[11-13] However, in the primary study authored by Buchan et al.,[13] the assessment and reporting of postoperative complications was limited to rates of endophthalmitis.

The NICE guideline made various recommendations regarding the management of cataracts before (i.e., referral), during, and after surgery. However, the outcomes relevant for this report were the appropriateness, risks, and benefits of ISBCS.[4]

Summary of Critical Appraisal

Additional details regarding the strengths and limitations of included publications are provided in Appendix 3.

Systematic Review and Meta-Analysis

As per AMSTAR II criteria,[7] the included SR[10] with meta-analysis was generally well conducted with clearly stated objectives, inclusion criteria, stated key search terms, provided search strategies, searched multiple databases, provided a list of included studies, and evaluated the risk of bias in included primary studies with appropriate techniques. Furthermore, details of study selection were explicitly stated, and data extraction was conducted in duplicate, which decreases the risk for inconsistencies.[10] Grey literature searches were conducted, which decreases the risk of missing relevant, non-indexed studies.[10] Finally, the SR authors disclosed their funding source to be the Canadian National Institute for the Blind and that there are no potential conflicts of interest.[10]

In terms of methodological limitations, the exclusion criteria were not explicitly stated, the exclusion of non-English publications was not justified, a list of excluded studies was not provided, and the use of an a priori study protocol was not reported.[10] The authors used I^2 statistics and χ2 test to assess for heterogeneity, which was rated as high.[10] Although the authors assessed the risk of publication bias using funnel plots, they were unable to rule out publication bias due partially to the small number of studies.[10] Additionally, albeit the authors conducted fixed-effect and random-effect meta-analysis for outcomes related to QOL, outcomes related to postoperative complications were described qualitatively due to the limited availability of safety data[10] Finally, since the primary studies were conducted in the US, Spain, New Zealand, Australia, Japan, Finland, and Sweden, the findings may not be generalizable to the Canadian setting.[10]

Non-Randomized Studies

The three NRS[11-13] shared some methodological strengths such as clearly stated objectives, methodology and time period for participant enrollment, interventions, outcome measures, and main findings. Buchan et al. disclosed that there were no conflicts of interest and no funding support was provided for their study.[13]

Nonetheless, these three NRS[11-13] also had some methodological limitations such as lack of reporting of characteristics of patients lost to follow-up and lack of sample size calculation a priori. The two comparative studies[11,13] lacked randomization, and patient and clinician blinding, which may result in selection bias. Specifically, baseline patient characteristics such as mean age varied between the ISBCS (71.5 years old) and DSBCS (75.6 years old) group in one comparative study,[13] while the mean age was not reported for the second comparative study.[11] Additionally, these two comparative studies contained unbalanced sample sizes with considerably fewer number of patients in the ISBCS compared to DSBCS groups (1,073 versus 248,341[13] and 5,247 versus 19,368[11]). Since the three NRS[11-13] did not report sample size calculations and the single-arm study[12] contained a relatively small sample size (N = 110), these studies may have been underpowered. Although the inclusion and exclusion criteria were clearly described in the study authored by Herrinton et al.,[11] Buchan et al.[13] only stated the inclusion criteria and Guber et al.[12] did not establish the inclusion and exclusion criteria. Statistical tests used to assess the main outcomes were described and estimates of random variability were reported in two studies,[11,13] but not in the third study.[12] Furthermore, statistical analysis was not reported for postoperative endophthalmitis rates in the study authored by Buchan et al.[13] The authors of the three NRS did not specify primary versus secondary outcomes and did not report on adjustment of multiplicity.[11-13] Finally, listing Kaiser Permanente as their funding source, Herrinton et al.[11] disclosed a potential conflict of interest in that Kaiser Permanente benefits from the implementation of ISBCS. Guber et al.[12] disclosed that there were no conflicts of interest but did not disclose their funding source.

Evidence-Based Guidelines

The NICE guideline provided a clear description of their objectives, specified the target populations and users, sought the views and preferences of the target population, provided unambiguous and easily identifiable recommendations, presented monitoring criteria for the recommendations, described facilitators or barriers to their application, provided tools for putting recommendations into practice, and explicitly described procedures for guideline updates.[4] The guideline development group was comprised of experts from multidisciplinary areas and the views of the funding sources did not appear to have influenced the guidelines' contents.[4] The supporting evidence, along with the quality of evidence, used to

inform the recommendations were provided.[4] However, details of external review was not reported.[4]

Summary of Findings

The overall findings of the included studies and guideline are highlighted below. One SR with meta-analysis,[10] three primary studies,[11-13] and one evidence-based guideline[4] met the inclusion criteria for this report. Detailed summaries of the main findings and authors' conclusions are available in Appendix 4.

Clinical Evidence Regarding the Safety of ISBCS for the Treatment of Bilateral Cataracts

Evidence regarding the safety of ISBCS for the treatment of bilateral cataracts was available from one SR with meta-analysis[10] and three primary studies.[11-13] Full definitions of QOL scores are described in Appendix 2.

Quality of Life Scores

In the SR with meta-analysis that compared ISBCS and DSBCS using phacoemulsification for bilateral cataract surgery, pooled estimates on postoperative QOL scores relevant for this report included Visual Function questionnaire (VF-7 and VF-14), EuroQOL Five Dimensions Questionnaire (EQ5D), Health Utility Index Mark 3 (HUI3), and Catquest questionnaire.[10]

In patients who underwent ISBCS, although there were significant postoperative improvements in VF-7, VF-14, EQ5D, and HUI3 scores compared to before the surgery, there were no significant differences in postoperative Catquest scores compared to before the surgery [10] However, patients who underwent ISBCS exhibited significant improvements in postoperative Catquest scores compared to those who underwent DSBCS.[10] Finally, there were no significant differences in postoperative VF-7, VF-14, EQ5D, and HUI3 scores in patients who underwent ISBCS compared to those that underwent DSBCS.[10]

Intraoperative Complications

Clinical evidence regarding intraoperative complications were available from three primary studies.[11-13] According to one primary comparative study, there was a significantly greater risk of intraoperative complications (3.5% versus 2.6% of eyes) and posterior capsular rupture rates (PCR) (1.9% versus 1.2% of eyes) in ISBCS compared to DSBCS eyes.[13] However, after adjustments for case complexity, PCR rates were numerically similar between ISBCS (0.98%) and DSBCS (0.78%) eyes (statistical comparison not performed and complexity adjustment details not available).[13] The case complexity was adjusted using variables such as surgeon grade, patient age, inability to lay flat during surgery, and diabetic retinopathy.[13]

Findings from another primary comparative study suggested that there were no significant differences in PCR (0.84% versus 0.67% of patients) or vitrectomy (0.42% versus 0.45% of patients) rates between patients undergoing ISBCS and DSBCS.[11] Lastly, in the primary single-arm study involving patients who underwent ISBCS, observed intraoperative complications included intraoperative floppy-iris syndrome (9% of eyes), intraoperative conversion to intracapsular cataract extraction (1% of eyes), accidental sulcus implantation (0.5% of eyes), and intraocular lens implant breakage (0.5% of eyes).[12]

Postoperative Complications

Clinical evidence regarding postoperative complications were available from one SR[10] with meta-analysis and three primary studies.[11-13] The authors of the SR[10] with meta-analysis narratively described the data (i.e., not pooled analysis) regarding postoperative complications from four clinical studies (statistical analyses not reported)[15-18] In ISBCS eyes, complications with rates ≥ 5% included central corneal edema and intraocular pressure > 30 mmHg.[10] In DSBCS eyes, complications with rates ≥ 5% included posterior capsule fibrosis and intraocular pressure > 30 mmHg.[10] The authors did not report if there were cases of endophthalmitis.[10]

In the primary comparative study authored by Buchan et al., endophthalmitis rates of 0% and 0.01% were observed in patients who underwent ISBCS and DSBSC, respectively (statistical analysis not reported).[13] Postoperative complications other than endophthalmitis were not reported in this study.[13] In the primary comparative study authored by Herrinton et al., no significant differences were observed in endophthalmitis rates between patients who underwent ISBCS (1 per 10,000 eyes) and DSBCS (0.5 per 10,000 eyes), with no cases of bilateral endophthalmitis in either group.[11] However, there was a significantly greater rate of macular edema in patients who underwent DSBCS (0.85%) compared to ISBCS (0.55%).[11] Lastly, in the primary single-arm study involving patients who underwent ISBCS, observed postoperative complications included hypertony (1% of eyes), corneal decompensation (1% of eyes), wound dehiscence with iris incarceration (0.5% of eyes), conversion from dry to wet age-related macular degeneration (0.5% of eyes), herpes keratitis reactivation (0.5% of eyes), and prolonged anterior chamber inflammation (0.5% of eyes).[12] The authors of this single-arm study did not report if there were cases of endophthalmitis.[12]

Guidelines Regarding the Use of ISBCS for the Treatment of Bilateral Cataracts

One identified evidence-based guideline provided recommendations regarding the use of ISBCS for the treatment of bilateral cataracts.[4] The recommendations in the NICE guideline were based on very low to high quality evidence.[4] This guideline recommends using the same criteria as the first eye when offering cataract surgery for the second eye (strong recommendation).[4] Furthermore, this guideline recommends that ISBCS should be considered for patients with a low risk of ocular complications, or for patients requiring general anesthesia but for whom anesthesia would increase their risk of distress or complications (evidence of benefit is less certain).[4] Patients should be informed of the risks and benefits of ISBCS including the potential immediate bilateral visual improvement or impairment, the need for additional postoperative support, and the inability to select an alternate intraocular lens based on first-eye outcomes (recommendation strength not assigned).[4]

Limitations

Limitations were identified in the critical appraisal (details in Appendix 3); however, additional limitations exist.

Although the included SR[10] with meta-analysis was generally well-conducted, the authors rated the underlying evidence from relevant primary studies as being poor to high in quality. Additionally, there was a high degree of between-study heterogeneity with I^2 index as high as 97.1%.[10] Due to limited clinical evidence regarding safety, outcomes related to postoperative complications were presented narratively and not included in the meta-analysis.[10]

The lack of primary RCTs not included in the aforementioned SR[10] and the small sample size (N = 110) in the single-arm study[12] should be considered when interpreting the findings of this report. Since two relevant primary studies involved patients from surgical sites within the Kaiser Permanente Northern California system[11] or from one specific hospital in Switzerland,[12] these sample populations may not represent the population of interest in those respective countries and may limit the external validity of the study findings. Additionally, since the three primary studies were conducted in the United Kingdom,[13] US,[11] or Switzerland,[12] the findings may not be generalizable to the Canadian setting.

The NICE guideline was developed for use in the United Kingdom; therefore, the generalizability of the recommendations to the Canadian context is unclear.[4] Overall, considering the limitations mentioned, the findings and recommendations summarized in this report need to be interpreted with caution.

Conclusions and Implications for Decision or Policy Making

This review was comprised of one SR[10] with meta-analysis and three NRS[11-13] regarding the safety of ISBCS for the treatment of bilateral cataracts. Furthermore, one evidence-based guideline was identified regarding the use of ISBCS for the treatment of bilateral cataracts.[4] Due to unclear methodology, guidance documents published by the Canadian Ophthalmological Society,[5] and jointly by the Royal College of Ophthalmologists and United Kingdom and Ireland Society of Cataract and Refractive Surgery[6] were excluded from this report and allocated to Appendix 5.

Findings from the SR[10] with meta-analysis suggested that, compared to those who received DSBCS, patients who underwent ISBCS experienced significantly greater improvements in postoperative Catquest scores. However, no significant differences were detected in other QOL scores including VF-7, VF-14, EQ5D, and HUI3 between the ISBCS and DSBCS group.[10] Furthermore, postoperative complications with rates ≥ 5% included central corneal edema and intraocular pressure > 30 mmHg in ISBCS eyes and posterior capsule fibrosis and intraocular pressure > 30 mmHg in DSBCS eyes (statistical analysis not reported).[10]

Findings from three primary NRS[11-13] evaluating intraoperative and postoperative complications varied, but mostly suggested no significant difference between those undergoing ISBCS versus DSBCS when statistical analysis was reported. Specifically, rates of intraoperative PCR were comparable between ISBCS and DSBCS eyes after adjustment for case complexity based on factors such as patient age and comorbidities.[13] Additionally, no significant differences were detected in intraoperative PCR or vitrectomy rates between ISBCS and DSBCS patients in another study.[11] Postoperative endophthalmitis rates of 0% and 0.01% were observed in patients who underwent ISBCS and DSBSC, respectively (statistical analysis not reported).[13] Additionally, no significant differences were observed in endophthalmitis rates between ISBCS and DSBCS eyes in another study.[11] However, rates of macular edema were significantly less in ISBCS versus DSBCS patients.[11] Lastly, in the primary single-arm study with only ISBCS patients, intraoperative complications such as intraoperative floppy-iris syndrome (9% of eyes) and conversion to intracapsular cataract extraction (1% of eyes), and postoperative complications such as hypertony (1% of eyes) and corneal decompensation (1% of eyes) were observed.[12]

The identified NICE guideline recommends that ISBCS should be considered for those with a low risk of complications, or for those needing general anesthesia but anesthesia may increase their risk of distress or complications (evidence of benefit is less certain).[4] Furthermore, clinicians should inform patients of the risks and benefits of ISBCS

(recommendation strength not assigned).[4] These recommendations were based on evidence that ranged in quality from very low to high.[4]

Overall, the body of evidence used to inform the included SR with meta-analysis ranged in quality from poor to high, and had a high degree of heterogeneity.[10] The three primary studies[11-13] ranged in quality from low to moderate. Furthermore, the two comparative studies[11,13] lacked randomization, which may result in selection bias. Additionally, since the studies within the SR[10] with meta-analysis and the three primary NRS[11-13] were conducted in the US, United Kingdom, Spain, New Zealand, Australia, Japan, Finland, Sweden, or Switzerland, the findings may not be generalizable to the Canadian setting.

Further research investigating the safety of ISBCS, especially with large multinational clinical trials with Canadian representation, would provide additional knowledge base for clinicians providing care to adults living with bilateral cataracts. Additionally, guidelines developed with rigorous methodology that are specific to the Canadian context would provide additional guidance for bilateral cataract surgery during times with capacity challenges.

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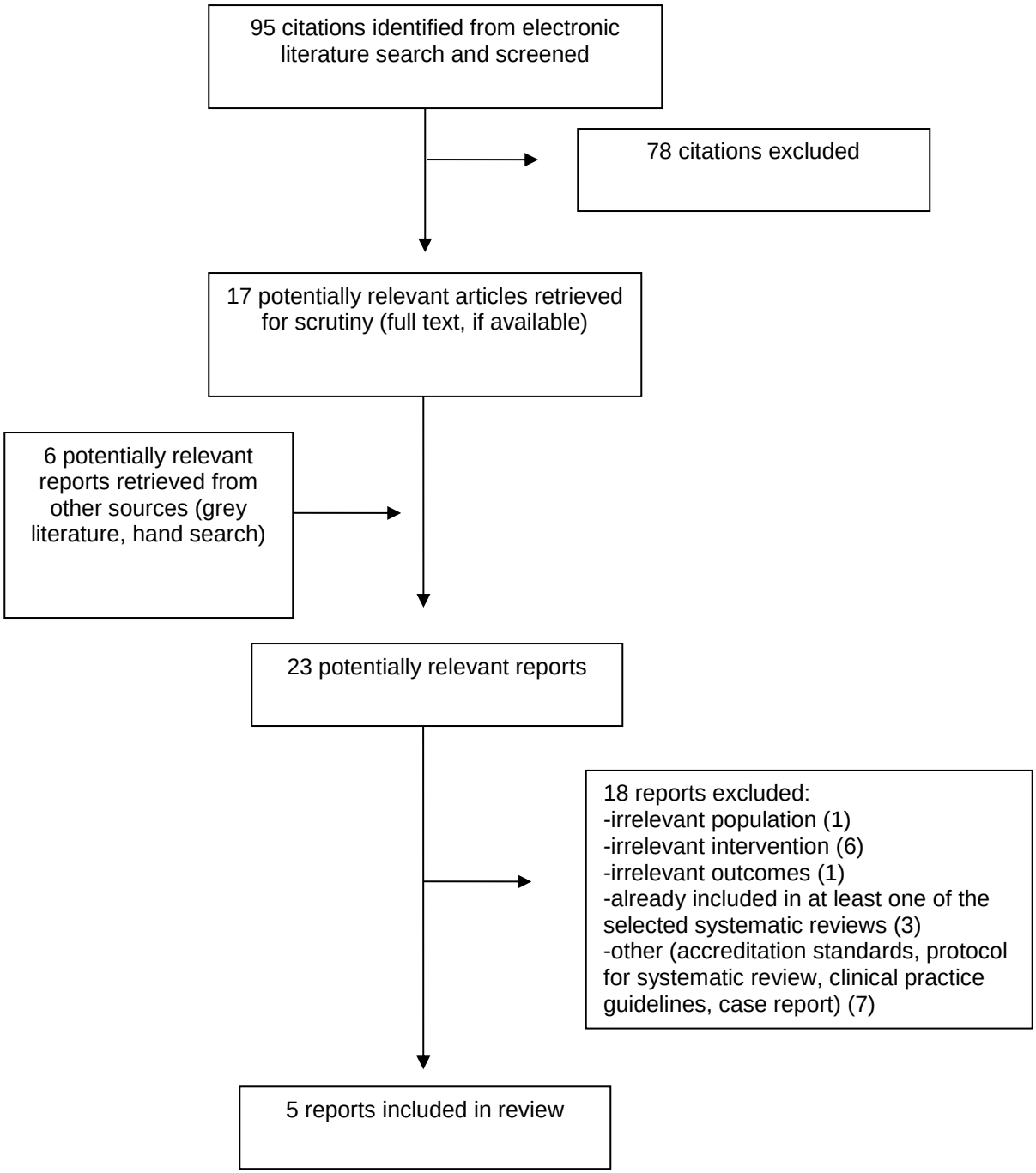
23. Lundström M, Pesudovs K. Catquest-9SF patient outcomes questionnaire: nine-item short-form Rasch-scaled revision of the Catquest questionnaire. *J Cataract Refract Surg.* 2009;35(3):504-513.

Appendix 1: Selection of Included Studies



Appendix 2: Characteristics of Included Publications

Table 2: Characteristics of Included Systematic Review and Meta-Analysis

Study citation, country, funding source	Study designs and numbers of primary studies included	Population characteristics	Intervention and comparator(s)	Clinical outcomes, length of follow-up
Malvankar-Mehta et al., 2015 [10] Canada Funding Source: Canadian National Institute for the Blind's Baker New Researcher Fund	**Study design**: Systematic review and meta-analysis of relevant systematic reviews, meta-analyses, randomized controlled trials, non-randomized studies, and cost-effectiveness analyses **Literature search strategy**: Literature searches were conducted in MEDLINE, EMBASE, BIOSIS, CINAHL, HEED, ISI Web of Science, and Cochrane Library from January 2000 to May 2014. Grey literature searches were also conducted for abstracts from conferences and meetings (e.g., COS, AAO, SOE). **Number of studies included**: Eleven primary studies were included in the meta-analysis for effectiveness (i.e., BCVA) and safety (i.e., QOL) outcomes. Of the 11 studies, four included complication outcomes which were described qualitatively. **Quality assessment tool**: Downs and Black checklist **Objective**: To compare the effectiveness and safety between ISBCS and DSBCS using phacoemulsification	Adult patients ≥ 19 years of age with bilateral cataracts N = 3,657	**Intervention:** - ISBCS using phacoemulsification **Comparators:** - DSBCS using phacoemulsification	**Relevant Outcomes:** - QOL (as measured by utility scores including VF-7, VF-14, EQ5D, HUI3, Catquest Questionnaire[a]) - Postoperative complications **Follow-up:** Studies with any follow-up duration were included

AAO = American Academy of Ophthalmology; BCVA = best corrected visual acuity; COS = Canadian Ophthalmology Society; DSBCS = delayed sequential bilateral cataract surgery; HEED = Health Economic Evaluations Database; ISBCS = immediately sequential bilateral cataract surgery; QOL = quality of life; SOE = European Society of Ophthalmology.

[a] Definitions for QOL scores:

VF-7 and VF-14: Visual Function Questionnaires are patient-reported visual disability measurement tools based on seven or 14 daily activities, such as watching television and reading, that may be affected by cataracts. Scores range from 0 (i.e., maximum disability) to 100 (i.e., no disability).[19,20]

EQ5D: EuroQOL Five Dimensions Questionnaire is a patient-reported QOL measurement tool consisting of five dimensions: mobility, self-care, usual activities, pain/discomfort, and anxiety/depression. Respondents rate each dimension with three response categories (i.e., no problems, some problems, and extreme problems) with each dimension resulting in a one-digit number. Formed by combining digits from all five dimensions, a five-digit number results to represent a patient's health state.[21]

HUI3: Health Utility Index Mark 3 is a patient-reported QOL measure measurement tool consisting of eight attributes (i.e., vision, hearing, speech, ambulation, dexterity, cognition, emotion, and pain). Each attribute can be rated as level one (e.g., full functional capacity) to level six (i.e., lowest functioning level).[22]

Catquest Questionnaire is a patient-reported QOL measurement tool designed to evaluate the effects of cataract surgery. Questions are categorized into four areas: frequency of performing activities, difficulty in performing daily activities, difficulties in general and satisfaction with vision, and cataract symptoms. Scores range from 1 (i.e., better outcomes) to 4 (i.e., worse outcomes).[23]

Table 3: Characteristics of Included Non-Randomized Studies

Study citation, country, funding source	Study design	Population characteristics	Intervention and comparator(s)	Clinical outcomes, length of follow-up
Buchan et al., 2020[13] United Kingdom Funding Source: Healthcare Quality Improvement Partnership	**Study design:** Non-randomized retrospective analysis of anonymized patient data from the Royal College of Ophthalmologists' National Ophthalmology Database Audit between January 4, 2010 and August 31, 2018 **Setting:** Cataract surgical centres in the United Kingdom **Objective:** To compare patient and operative characteristics for ISBCS and DSBCS using phacoemulsification	Adults patients aged 18 years and older with bilateral cataracts **Number of patients:** N = 1,073 (ISBCS) N = 248,341 (DSBCS) **Mean age (years):** 75.5	**Intervention:** - ISBCS using phacoemulsification **Comparator:** - DSBCS using phacoemulsification	**Relevant Outcomes:** - Intraoperative complications - Postoperative endophthalmitis **Follow-up:** - Follow-up duration was not reported - For DSBCS, the median time between the first and second eye was 3.4 months
Herrinton et al., 2017[11] United States Funding Source: Kaiser Permanente Garfield Fund	**Study design:** Non-randomized retrospective analysis of electronic health record data from patients who underwent cataract surgery between January 1, 2013 and June 30, 2015 **Setting:** Cataract surgical centres within the Kaiser Permanente Northern California system **Objective:** To compare the effectiveness and safety of ISBCS and DSBCS using phacoemulsification	Adults patients (age cutoff not reported) with bilateral cataracts **Number of patients:** N = 5,247 (ISBCS) N = 19,368 (DSBCS) **Mean age and age range:** Not reported	**Intervention:** - ISBCS using phacoemulsification **Comparator:** - DSBCS using phacoemulsification	**Relevant Outcomes:** - Intraoperative complications - Postoperative complications **Follow-up:** - Follow-up duration was 120 days after surgery

Study citation, country, funding source	Study design	Population characteristics	Intervention and comparator(s)	Clinical outcomes, length of follow-up
Guber et al., 2015[12] Switzerland Funding Source: Not reported	**Study design:** Retrospective single-arm study of patients who underwent cataract surgery between April 2000 and September 2013 **Setting:** Kantonsspital Winterthur in Switzerland **Objective:** To assess the effectiveness and safety of ISBCS using phacoemulsification	Adults patients (age cutoff not reported) with bilateral cataracts **Number of patients:** N = 110 **Mean age (years):** 79.0 **Age range (years):** 26 to 97	**Intervention:** - ISBCS using phacoemulsification **Comparator:** - No comparator	**Relevant Outcomes:** - Intraoperative complications - Postoperative complications **Follow-up:** - Follow-up duration was one month

DSBCS = delayed sequential bilateral cataract surgery; ISBCS = immediately sequential bilateral cataract surgery.

Table 4: Characteristics of Included Guideline

Intended users, target population, country, funding source	Intervention and practice considered	Major outcomes considered	Evidence collection, selection, and synthesis	Evidence quality assessment	Recommendations development and evaluation	Guideline validation
NICE Guideline, 2017[4]						
Intended users: Health care professionals, commissioners and providers, and people living with cataracts **Target population:** Adults (18 years and older) with cataracts United Kingdom	The guideline provided recommendations regarding the management of cataracts before (i.e., referral), during, and after surgery. Recommendations relevant for this report pertained to the appropriateness, risks, and benefits of ISBCS.	Visual acuity and function, surgical complication rates, risk of falls, health-related quality of life, patient satisfaction	Literature searches were conducted on February 18, 2016 in various databases (e.g., Medline, Embase, Cochrane Database of Systematic Reviews) with no date restrictions. Retrieved articles were screened for randomized	Evidence quality was assessed using the GRADE approach.	The guideline development group produced recommendations based on scientific evidence and other evidence such as expert testimony and stakeholder views. The guideline development group reaches an agreement on the strength of recommendations through an informal consensus process. **The strength of recommendations is**	Draft NICE guidelines are posted online for review by registered stakeholders. The authors of this guideline did not report whether external experts were solicited for review.

Intended users, target population, country, funding source	Intervention and practice considered	Major outcomes considered	Evidence collection, selection, and synthesis	Evidence quality assessment	Recommendations development and evaluation	Guideline validation
			controlled trials.		**reflected in the wording:** Offer/Advise: Strong recommendation (i.e., clear evidence of benefit) Consider: Evidence of benefit is less certain	

GRADE = Grading of Recommendations Assessment, Development and Evaluation; ISBCS = immediately sequential bilateral cataract surgery; NICE = National Institute for Health and Care Excellence.

Appendix 3: Critical Appraisal of Included Publications

Table 5: Strengths and Limitations of Systematic Review Using AMSTAR 2[7]

Strengths	Limitations
Malvankar-Mehta et al., 2015 [10]	
• The objectives and inclusion criteria were clearly stated, and timeframe for follow-up was stipulated • Components of PICO that were described were population, intervention, comparator, and outcome • Multiple databases were searched (MEDLINE, EMBASE, BIOSIS, CINAHL, HEED, ISI Web of Science, Cochrane Library) • Grey literature searches were conducted • Search terms and time frames were provided (January 2000 to May 2014) • The details of study selection and extraction were explicitly reported and performed by two reviewers • The choice of included study designs was justified • A list of included studies was provided, and the characteristics of included studies were described • The quality of included studies was assessed using the Downs and Black checklist • Fixed-effect and random-effect meta-analysis was conducted • Assessed for heterogeneity using I^2 statistics and $\chi 2$ test • Publication bias was assessed using funnel plots • The authors disclosed their funding source to be CNIB and that there are no potential conflicts of interest	• The exclusion criteria were not explicitly stated and a list of excluded studies was not provided • The use of an a priori study protocol was not reported • The exclusion of non-English publications was not justified • The relevant primary studies were conducted in the US, Spain, New Zealand, Australia, Japan, Finland, and Sweden; findings may not be generalizable to the Canadian setting

AMSTAR 2 = A MeaSurement Tool to Assess systematic Reviews 2; CNIB = Canadian National Institute for the Blind; HEED = Health Economic Evaluations Database.

Table 6: Strengths and Limitations of Non-Randomized Studies Using the Downs and Black checklist[8]

Strengths	Limitations
Buchan et al., 2020[13]	
• The study's objective, intervention, and main findings were clearly stated • The main outcomes to be measured were clearly described in the Methods section • The inclusion criteria were clearly described • Estimates of random variability were reported • The statistical tests used to assess the main outcomes were described and appropriate • Patient data were retrieved from the Royal College of Ophthalmologists' National Ophthalmology Database Audit, which would be representative of the population of interest in the UK • Data analyses were planned at the outset of the study • The main outcome measures used were valid and reliable	• This was not a randomized controlled trial, but a retrospective comparative study using anonymized patient data • The exclusion criteria were not explicitly stated • Characteristics of patients lost to follow-up were not reported • A sample size calculation was not conducted a priori • Although rates of postoperative endophthalmitis, a full analysis of other postoperative complications was not performed • Study was conducted in the UK; findings may not be generalizable to the Canadian setting

Strengths	Limitations
• The time period over which patients were recruited was specified • The authors disclosed that there were no conflicts of interest and no funding support was provided for this study	
Herrinton et al., 2017[11]	
• The study's objective, intervention, and main findings were clearly stated • The main outcomes to be measured were clearly described in the Methods section • The inclusion and exclusion criteria were clearly described • Estimates of random variability were reported • The statistical tests used to assess the main outcomes were described and appropriate • Data analyses were planned at the outset of the study • The main outcome measures used were valid and reliable • The time period over which patients were recruited was specified • The authors disclosed their funding source to be a grant from the Kaiser Permanente Garfield Fund	• This was not a randomized controlled trial, but a retrospective comparative study using electronic health record data • Characteristics of patients lost to follow-up were not reported • Patient data were retrieved from surgical sites within the Kaiser Permanente Northern California system, which may not be representative of the population of interest in the US • A sample size calculation was not conducted a priori • Study was conducted in the US; findings may not be generalizable to the Canadian setting • The authors disclosed a potential conflict of interest in that Kaiser Permanente benefits from the implementation of ISBCS
Guber et al., 2015[12]	
• The study's objective, intervention, and main findings were clearly stated • The main outcomes to be measured were clearly described in the Methods section • The main outcome measures used were valid and reliable • The time period over which patients were recruited was specified • The authors disclosed that there were no conflicts of interest	• This was not a randomized controlled trial, but a retrospective single-arm study • The authors did not establish inclusion and exclusion criteria • The statistical tests used to assess the main outcomes were not reported • Estimates of random variability were not reported • A sample size calculation was not conducted a priori • Characteristics of patients lost to follow-up were not reported • Patient data were retrieved from one hospital, which may not be representative of the population of interest in Switzerland • Study was conducted in Switzerland; findings may not be generalizable to the Canadian setting • The authors did not disclose their funding source

ISBCS = immediately sequential bilateral cataract surgery.

Table 7: Strengths and Limitations of Guideline Using AGREE II[9]

Item	Guideline
	NICE, 2017[4]
Domain 1: Scope and Purpose	
1. The overall objective(s) of the guideline is (are) specifically described.	Yes
2. The health question(s) covered by the guideline is (are) specifically described.	Yes
3. The population (patients, public, etc.) to whom the guideline is meant to apply is specifically described.	Yes
Domain 2: Stakeholder Involvement	
4. The guideline development group includes individuals from all relevant professional groups.	Yes
5. The views and preferences of the target population (patients, public, etc.) have been sought.	Yes
6. The target users of the guideline are clearly defined.	Yes
Domain 3: Rigour of Development	
7. Systematic methods were used to search for evidence.	Yes
8. The criteria for selecting the evidence are clearly described.	Yes
9. The strengths and limitations of the body of evidence are clearly described.	Yes
10. The methods for formulating the recommendations are clearly described.	Yes
11. The health benefits, side effects, and risks have been considered in formulating the recommendations.	Yes
12. There is an explicit link between the recommendations and the supporting evidence.	Yes
13. The guideline has been externally reviewed by experts prior to its publication.	NR
14. A procedure for updating the guideline is provided.	Yes
Domain 4: Clarity of Presentation	
15. The recommendations are specific and unambiguous.	Yes
16. The different options for management of the condition or health issue are clearly presented.	Yes
17. Key recommendations are easily identifiable.	Yes
Domain 5: Applicability	
18. The guideline describes facilitators and barriers to its application.	Yes
19. The guideline provides advice and/or tools on how the recommendations can be put into practice.	Yes
20. The potential resource implications of applying the recommendations have been considered.	Yes
21. The guideline presents monitoring and/or auditing criteria.	Yes
Domain 6: Editorial Independence	
22. The views of the funding body have not influenced the content of the guideline.	Yes
23. Competing interests of guideline development group members have been recorded and addressed.	Yes

AGREE II = Appraisal of Guidelines for Research and Evaluation II; NICE = National Institute for Health and Care Excellence; NR = not reported.

Appendix 4: Main Study Findings and Authors' Conclusions

Table 8: Summary of Findings Included Systematic Review and Meta-Analysis

Main study findings	Authors' conclusion
Malvankar-Mehta et al., 2015[10]	
Systematic review with meta-analysis that compared the effectiveness and safety between ISBCS and DSBCS using phacoemulsification in adult patients aged ≥ 19 years with bilateral cataracts. **Postoperative QOL for ISBCS** VF-7 • Overall SMD = -2.10 (95% CI, -2.26 to -1.95) (significant improvement) • I^2 not reported VF-14 • Overall SMD = 2.08 (95% CI, 1.14 to 3.02) (significant improvement) • I^2 = 96.5% EQ5D • Overall SMD = 0.40 (95% CI, 0.24 to 0.56) (significant improvement) • I^2 not reported HUI3 • Overall SMD = 0.57 (95% CI, 0.41 to 0.73) (significant improvement) • I^2 not reported Catquest Questionnaire • Overall SMD = -0.37 (95% CI, -1.05 to 0.31) • I^2 not reported **Postoperative QOL for ISBCS vs DSBCS** VF-7 • Overall SMD = -0.02 (95% CI, -0.15 to 0.10) • I^2 not reported VF-14 • Overall SMD = -0.25 (95% CI, -1.06 to 0.57) • I^2 = 97.1% EQ5D • Overall SMD = 0.14 (95% CI, -0.14 to 0.41) • I^2 not reported HUI3 • Overall SMD = 0.12 (95% CI, -0.15 to 0.40) • I^2 not reported Catquest Questionnaire • Overall SMD = 1.45 (95% CI, 0.88 to 2.01) (significantly greater improvement in ISBCS compared to DSBCS) • I^2 not reported **Postoperative Complications:** - The authors of the systematic review extracted and described narratively the data regarding postoperative complications from four studies (statistical analyses not reported)[15-18] **Serrano-Aguilar et al. (2012)[15]** - ISBCS: central corneal edema (5.9%), IOL decentration (0.8%), anterior chamber flare (1.2%) - DSBCS: posterior capsule fibrosis (7.7%), minor posterior capsule opacification (0.12%), posterior capsule tear (0.13%), immediate corneal edema (0.38%), foreign-body sensation (0.13%) **Sarikkola et al. (2011)[16]**	"The results for utility score, which were measured using various instruments, indicated non-significant improvement in the utility due to DSBCS compared to ISBCS. However, a significant improvement in postoperative utility score was seen using Catquest questionnaire for ISBCS compared to DSBCS. (p. 2)."[10]

Main study findings	Authors' conclusion
- ISBCS: CME (0.2%), anterior capsule tear (1.8%), posterior capsule tear (2%), zonular tear (0.2%), vitreous loss (1.2%), sphincterotomy (1.6%), sutures in wound (2.4%), IOP >30mm Hg (10.6%), wound leak (0.2%), out-of-bag IOL implantation (1.2%), central corneal edema (7.4%), IOL decentration (0.6%), anterior chamber flare (2.2%) - DSBCS: CME (0.8%), posterior capsule fibrosis (6.6%), anterior capsule tear (0.8%), posterior capsule tear (2.6%), zonular tear (0.8%), vitreous loss (1.4%), sphincterotomy (0.6%), sutures in wound (4.8%), IOP >30mm Hg (13.8%), wound leak (0.6%), out-of-bag IOL implantation (1.4%) **Lundstrom et al. (2006)[17]** - ISBCS: high IOP (2%), corneal edema (1%), postoperative iritis (1%), vitreous detachment (1%), posterior capsule opacification (2%) - DSBCS: high IOP (2%), corneal edema (1%), postoperative iritis (1%), vitreous detachment (1%), posterior capsule opacification (2%) **Chung el al. (2009)[18]** - ISBCS: uveitis (0.53%), posterior capsule rupture (1.06%), transient IOP spike (2.13%) - DSBCS: posterior capsule rupture (1%), transient IOP spike (2.5%)	

CI = confidence interval; CME = cystoid macular edema; DSBCS = delayed sequential bilateral cataract surgery; EQ5D = EuroQOL five dimensions questionnaire; HUI3 = health utility index mark 3; IOL = intraocular lens; IOP = intraocular pressure; ISBCS = immediately sequential bilateral cataract surgery; QOL = quality of life; SMD = standardized mean difference; VF-7 = visual function questionnaire-7; VF-14 = visual function questionnaire-14; vs = versus.

Table 9: Summary of Findings of Included Non-Randomized Studies

Main study findings	Authors' conclusion
Buchan et al., 2020[13]	
Non-randomized retrospective analysis of anonymized patient data that compared patient and operative characteristics for ISBCS and DSBCS using phacoemulsification in adults aged ≥ 18 years with bilateral cataracts. **Intraoperative Complications:** • Intraoperative complications occurred in 76 (3.5%) ISBCS eyes and 12,792 (2.6%) DSBCS eyes (OR, 1.389; 95% CI, 1.082 to 1.782; P = 0.010) • PCR occurred in 41 (1.9%) ISBCS eyes and 5,720 (1.2%) DSBCS eyes (OR, 1.672; 95% CI, 1.220 to 2.290; P = 0.001) • Case complexity adjusted PCR rates were 0.98% (95% CI: 0.64–1.49%) for ISBCS eyes and 0.78% (95% CI: 0.75–0.80%) for DSBCS eyes (statistical comparison not performed) **Postoperative Endophthalmitis:** • ISBCS: No cases • DSBCS: 53 (0.01%) • Statistical analysis not reported	"Posterior capsular rupture (PCR) rates adjusted for case complexity were comparable (0.98% ISBCS and 0.78% DSCS). ISBCS was performed on younger patients, with difficulty cooperating and lying flat, worse pre-operative vision, higher rates of known PCR risk factors and more frequent use of general anaesthesia than DSCS in centres recorded on NOD (p. 1)."[13]
Herrinton et al., 2017[11]	
Non-randomized retrospective analysis of electronic health records data that compared the effectiveness and safety of	"We confirmed one case of postoperative endophthalmitis in 10,494 ISBCS eyes (1.0 per 10,000 eyes), two cases in 38,736 DSBCS eyes (0.5 per 10,000 eyes) (p=0.6), and no patient had

Main study findings	Authors' conclusion
ISBCS and DSBCS using phacoemulsification in adult patients (age cutoff not reported) with bilateral cataracts. **Intraoperative Complications:** • PCR: ISBCS (0.84% of patients) vs DSBCS (0.67%) (P = 0.23) • Vitrectomy: ISBCS (0.42% of patients) vs DSBCS (0.45%) (P = 0.82) **Postoperative Complications:** • Endophthalmitis: ISBCS (one case; rate: 1 per 10,000 eyes) vs DSBCS (two cases; rate: 0.5 per 10,000 eyes) (P = 0.32) • Furthermore, no bilateral endophthalmitis were observed in any patient • Macular edema: ISBCS (0.55%) vs DSBCS (0.85%) (P = 0.03)	bilateral endophthalmitis. Compared with DSBCS cataract surgery, we found no evidence that ISBCS surgery was associated with worse postoperative BCVA or RE, or with an increased complication risk (p. 2)."[11]
Guber et al., 2015[12]	
Retrospective single-arm study that assessed the effectiveness and safety of ISBCS using phacoemulsification in adult patients (age cutoff not reported) with bilateral cataracts. Complications were described narratively. Of 110 study participants, 12 participants exhibited unilateral complications, and none exhibited bilateral complications. **Intraoperative Complications:** • Accidental sulcus implantation in one eye (0.5%), intraoperative conversion to ICCE in three eyes (1%), IOL implant breakage in one eye (0.5%), IFIS in 18 eyes (9%) **Postoperative Complications:** • Postoperative hypertony (IOP > 30mmHg) in 3 eyes (1%), wound dehiscence with iris incarceration in one eye (0.5%), corneal decompensation in one eye (1%), conversion from dry to wet AMD in one eye (0.5%), herpes keratitis reactivation in one eye (0.5%), prolonged anterior chamber inflammation in one eye (0.5%) • The occurrence of postoperative endophthalmitis was not reported	"ISBCS performed under general anaesthesia achieves target refraction in 83 % of eyes after consideration of complications, ocular co-morbidities and systemic restrictions. In the majority of cases where IOL power calculation could be considered, the achieved refraction of the second surgical eye was within ±1.0 D of intended refraction. This undermines the utility of IOL power adjustments in the second surgical eye (p. 1)."[12]

AMD = age-related macular degeneration; CI = confidence interval; DSBCS = delayed sequential bilateral cataract surgery; ICCE = intracapsular cataract extraction; IFIS = intraoperative floppy-iris syndrome; IOL = intraocular lens; IOP = intraocular pressure; ISBCS = immediately sequential bilateral cataract surgery; mmHg = millimetre of mercury; OR = odds ratio; PCR = posterior capsular rupture; vs = versus.

Table 10: Summary of Recommendations in Included Guideline

Recommendations and supporting evidence	Quality of evidence and strength of recommendations
NICE Guideline, 2017[4]	
Evidence-based guideline regarding the management of cataracts before (i.e., referral), during, and after surgery. Recommendations relevant for this report pertained to the appropriateness, risks, and benefits of ISBCS, which is also known as bilateral simultaneous cataract surgery. These recommendations were informed by a review of the published randomized controlled trials. 1. "Offer second-eye cataract surgery using the same criteria as for the first-eye surgery (p. 23)."[4] 2. "Consider bilateral simultaneous cataract surgery for • people who are at low risk of ocular complications during and after surgery or • people who need to have general anaesthesia for cataract surgery but for whom general anaesthesia carries an increased risk of complications or distress (p. 23)."[4] 3. "Discuss the potential risks and benefits of bilateral simultaneous cataract surgery with people, which should include: • the potential immediate visual improvement in both eyes • how it will not be possible to choose a different intraocular lens based on the outcome in the first eye • the risk of complications in both eyes during and after surgery that could cause long-term visual impairment • the likely need for additional support after the operation (p. 23)."[4] These recommendations were informed by an evidence review conducted by NICE[4]	The wording of recommendations reflects the recommendation strength: Offer/Advise: Strong recommendation (i.e., clear evidence of benefit) Consider: Evidence of benefit is less certain 1. Strong recommendation (i.e., clear evidence of benefit) 2. Evidence of benefit is less certain 3. No strength assigned The quality of the supporting evidence for these recommendations ranged from very low to high

ISBCS = immediately sequential bilateral cataract surgery; NICE = National Institute for Health and Care Excellence.

Appendix 5: Further Information

Health Technology Assessment – Alternative Intervention (DSBCS)

Frampton G, Harris P, Cooper K, Lotery A, Shepherd J. The clinical effectiveness and cost-effectiveness of second-eye cataract surgery: a systematic review and economic evaluation. *Health Technol Assess.* 2014;18(68). https://njl-admin.nihr.ac.uk/document/download/2002567. Accessed 2020 Aug 24.

Systematic Review – Full Overlap with Other Systematic Review

Kessel L, Andresen J, Erngaard D, Flesner P, Tendal B, Hjortdal J. Immediate sequential bilateral cataract surgery: a systematic review and meta-analysis. *J Ophthalmol*. 2015;2015:912481.
PubMed: PM26351576

Non-Randomized Study – Mixed Population (Pediatric and Adult)

Ganesh S, Brar S, Sreenath R. Immediate sequential bilateral cataract surgery: a 5-year retrospective analysis of 2470 eyes from a tertiary care eye center in South India. *Indian J Ophthalmol*. 2017;65(5):358-364.
PubMed: PM28573990

Clinical Practice Guidelines – Unclear Methodology

Canadian Ophthalmological Society. Immediately Sequential Bilateral Cataract Surgery (ISBCS) – key points. 2020; https://www.cosprc.ca/resource/immediately-sequential-bilateral-cataract-surgery-isbcs-key-points/ Accessed 2020 Aug 4.

UKISCRS RCOphth Covid Response Team. Immediate Sequential Bilateral Cataract Surgery (ISBCS) during COVID recovery: RCOphth/UKISCRS rapid advice document. 2020; https://www.cosprc.ca/resource/immediate-sequential-bilateral-cataract-surgery-isbcs-during-covid-recovery-rcophth-ukiscrs-rapid-advice-document/ Accessed 2020 Aug 4.

Adult cataract surgery. London (GB): Royal College of Ophthalmologists; revised 2018: https://www.college-optometrists.org/asset/A70E324D-D04B-40E1-AB082EEA6C1515F4/. Accessed 2020 Aug 24.

Lundström M, Barry P, Henry Y, Rosen P, Stenevi U. Evidence-based guidelines for cataract surgery: guidelines based on data in the European Registry of Quality Outcomes for Cataract and Refractive Surgery database. *J Cataract Refract Surg*. 2012 Jun;38(6):1086-1093.
PubMed: PM22541829

Additional References

Protocol for Systematic Review

Dickman MM, Spekreijse LS, Winkens B, et al. Immediate sequential bilateral surgery versus delayed sequential bilateral surgery for cataracts. *Cochrane Database Syst Rev*. 2019 19 Feb;2019 (2) (no pagination)(CD013270).
PubMed: PMPMC6380770

Accreditation Standards

Non-Hospital Medical and Surgical Facilities Accreditation Program
Accreditation Standards. Immediately sequential bilateral cataract surgery. Vancouver (BC): College of Physicians and Surgeons of British Columbia; 2018: https://www.cpsbc.ca/files/pdf/NHMSFAP-AS-ISBCS.pdf. Accessed 2020 Aug 24