

# Emerging Cataract Surgery Practice Patterns in the Veterans Health Administration

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A survey finds low rates for femtosecond laser-assisted cataract surgery, intracameral antibiotics, and immediate sequential bilateral cataract surgery in cataract surgery practice.

The rates of cataract surgery, the most commonly performed ophthalmic procedure in the U.S., have increased in the past few decades with an estimated rate of 1,100 surgeries per 100,000 people in 2011.<sup>1,2</sup> Several emerging practices have the potential to radically impact the efficacy, safety, and cost of cataract surgery.<sup>3-5</sup> These practices include femtosecond laser-assisted cataract surgery, intracameral antibiotics, and bilateral same-day cataract surgery.

The femtosecond laser is capable of producing precise incisions in the cornea for access by surgical instruments and reduction of astigmatism. Laser pulses also can create a perfectly round incision of the anterior lens capsule, which surrounds and supports the crystalline lens, and make incisions into the cataractous lens to facilitate disassembly for easy removal of fragments.

Placement of antibiotics internally into the anterior chamber, the space between the crystalline lens

and the posterior cornea (intracameral space), is a more direct method to prevent bacterial infection within the eye (endophthalmitis), compared with current external methods, including injections under the conjunctiva (subconjunctival) and/or use of antibiotic drops directly onto the eye surface (topical).<sup>6</sup>

Routine cataract surgery is typically staged, with a period of time between sequential surgeries of 1 week or more to allow for observation of infection (delayed sequential surgery). In view of the very low rate of infection and the impact of staged surgery on patients, including additional visits and copays, some surgeons have begun to perform bilateral surgery (immediate sequential bilateral surgery, using separate patient safety checklists, surgical preps, instruments, and medications) on the same day for patients with significant cataracts in both eyes to promote rapid restoration of binocular vision as well reduce the number of patient visits.

The extent of adaptation of femtosecond laser surgery, intracameral antibiotics, and immediate sequential bilateral surgery in the U.S. is currently unknown.<sup>7,8</sup> To provide an updated snapshot of these cataract surgery practices, the authors report on the results of a brief survey administered to ophthalmology section chiefs in the VHA, the largest integrated health care system and the largest provider of health care training in the U.S.

## METHODS

Following institutional review board approval from the Providence VA Medical Center, the office of the National Program Director of VA Ophthalmology provided a list of all VHA ophthalmology section chiefs and their contact information. The study targeted section chiefs because they are responsible for all eye surgery performed at their respective VAMCs. The survey queried the section chiefs on femtosecond laser-assisted cataract surgery, intracameral antibiotics, immediate sequential bilateral cataract surgery, and resident training at their institutions (Table).

The survey was administered using the web-based Research Electronic Data

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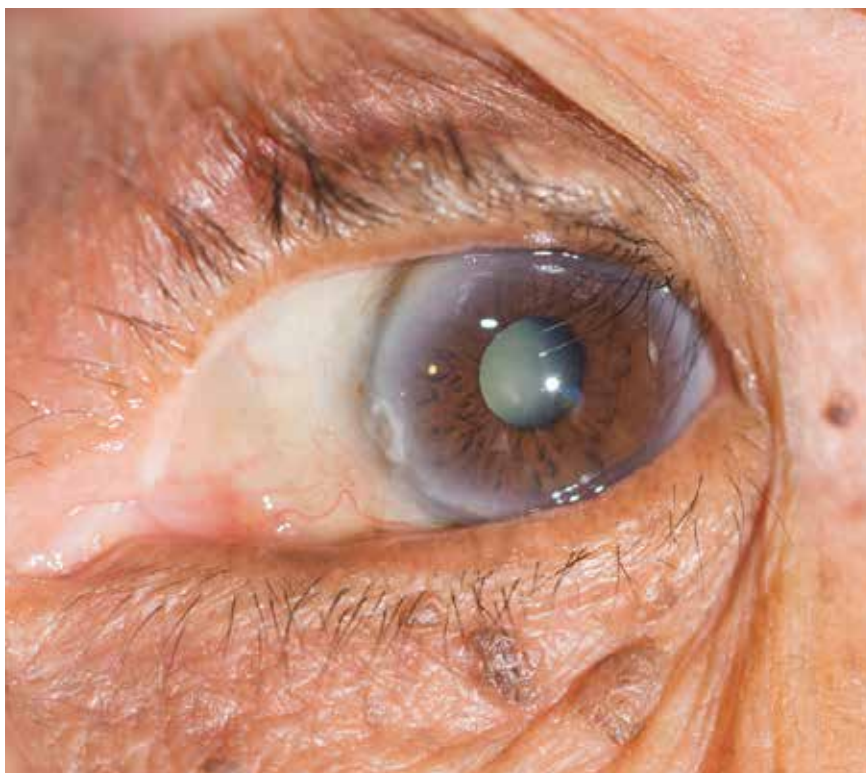
Capture (REDCap) software.<sup>9</sup> The initial survey was e-mailed in April 2015, followed by 2 reminder e-mails 1 week apart and then 2 phone calls 1 week apart to nonresponders.

The survey responses were stored anonymously in the REDCap database and analyzed using descriptive statistics.

## RESULTS

The original list from the office of the National Program Director included 114 ophthalmology section chiefs (excluding one of the authors). After follow-up phone calls, 9 individuals were identified who were not ophthalmologists (eg, optometrists or nonophthalmic surgeons) or who were incorrectly listed as section chiefs, and 9 were duplicates from institutions that were represented twice on the contact list. These 18 individuals, none of whom had responded to the survey, were removed from the eligible sample. Hence, the analysis included 86% (95/111) of the VAMCs where cataract surgery is performed.<sup>10</sup> Sixty-five responses were received for an overall response rate of 68% (65/96), including 1 ophthalmologist who responded to the survey twice.

Most section chiefs (86%, 56/65) trained ophthalmology residents at their respective medical centers (Table). Eleven VAMCs (17%) offered femtosecond laser-assisted cataract surgery; 8 of those 11 (73%) also offered resident training in this surgery. At 12 VAMCs (18%), cataract surgeons used intracameral antibiotics, which included vancomycin (4), cefuroxime (4), moxifloxacin (3), and unspecified (1); at 10 of these VAMCs (83%), surgeons used intracameral and postoperative topical antibiotics concomitantly; 8 VAMCs (67%) compounded the intracameral antibiotics—either in the hospital



pharmacy (5) or within the operating room (3). The 2 most common reasons cited for not using intracameral antibiotics were risk of dilution error (28%; 15/53) and a lack of evidence for use (25%; 13/53). Only 2 medical centers (3.1%) offered immediate sequential bilateral cataract surgery.

## DISCUSSION

This survey provides updated information on the role of emerging cataract surgery practices in the VHA. These trends may impact future U.S. cataract surgery practice patterns given the large number of ophthalmology residents who receive training in the VHA.

Only 17% of VAMCs offered femtosecond laser-assisted cataract surgery. Reasons for this low rate may include (a) the high cost of the femtosecond laser units (the lowest average cost of a laser is \$400,000, while the average costs of services can be \$40,000 or more per year); and (b) the lack of evidence that a femtosecond laser improves cataract sur-

gery outcomes relative to standard phacoemulsification.<sup>4,11-15</sup> Another potential barrier to procurement of femtosecond lasers is the emphasis within VHA to increase access to care for the many newly enrolled veterans, which this technology does not address. However, most of the VAMCs with a femtosecond laser unit offered resident training in this technique, confirming early reports on the potential for incorporating femtosecond laser-assisted cataract surgery into ophthalmic graduate medical education.<sup>16</sup>

In 2007, the multicenter, prospective, randomized European Society of Cataract and Refractive Surgery Endophthalmitis Study demonstrated that intracameral cefuroxime was associated with a 5-fold decrease in the risk of postoperative endophthalmitis.<sup>17</sup> In 2011, a statement from the American Society of Cataract and Refractive Surgery (ASCRS) Cataract Clinical Committee noted that the method of antibiotic prophylaxis with the strongest evidence

**Table. Survey of Emerging Cataract Surgery Practice Patterns in the VHA**

Question	Responses	No. (%)
Does your section train residents?	65	
Yes		56 (86.2)
No		9 (13.9)
Does your section perform FLACS?	65	
Yes		11 (16.9)
No		54 (83.1)
If yes, are residents being trained to perform FLACS?	11	
Yes		8 (72.7)
No		2 (18.2)
Did not respond		1 (9.1)
Does your section use intracameral antibiotics?	65	
Yes		12 (18.5)
No		53 (81.5)
If antibiotics are used, which are used?	12	
Cefuroxime		4 (33.3)
Vancomycin		4 (33.3)
Moxifloxacin		3 (25.0)
Did not respond		1 (8.3)
Is the antibiotic compounded?	12	
Yes		8 (66.7)
No		4 (33.3)
If yes, where is the antibiotic compounded?	8	
Hospital pharmacy		5 (62.5)
Operating room by registered nurse		3 (37.5)
Other		0
Do you use concomitant topical antibiotics postoperatively?	12	
Yes		10 (83.3)
No		2 (16.7)
If antibiotics are not used, what is the primary reason you do not use intracameral antibiotics?	53	
Risk of contamination		7 (13.2)
Risk of dilution error		15 (28.3)
Risk of increasing bacterial resistance		4 (7.5)
Did not respond		2 (3.8)
Other (free response) <sup>a</sup>		25 (47.2)
Did not respond		2 (3.8)
Does your section perform bilateral cataract surgery on the same day?	65	
Yes		2 (3.1)
No		63 (96.9)

Abbreviation: FLACS, femtosecond laser-assisted cataract surgery.

<sup>a</sup>Responses were organized into 8 categories; some respondents gave more than 1 reason, and their responses were included in more than 1 category. Responses included (no.): risk of contamination, dilution error, and increased bacterial resistance (3); lack of evidence or not indicated (13); concern about anaphylaxis or toxicity (2); no pharmacy approval or preparation (4); high cost (1); surgeon's preference (2); and considering use (2).

base is “a direct intracameral bolus at the conclusion of surgery.”<sup>18</sup> However, surgeons used intracameral antibiotics in only 19% of VAMCs. Although this is a higher rate than those reported in older surveys of VHA ophthalmologists (14%)<sup>7</sup> and ASCRS members (15%), it is still significantly lower than the 74% reported in a recent survey of the European Society of Cataract and Refractive Surgeons.<sup>3,8</sup>

The most common reasons given for not using intracameral antibiotics included risk of a dilution error when preparing the antibiotics and lack of evidence supporting their effectiveness. Less common reasons included risk of contamination, lack of pharmacy approval, and increasing bacterial resistance to commonly used antibiotics. Most of these concerns have been previously cited as barriers to the adoption of intracameral antibiotics.<sup>19</sup> The availability of a prepackaged intracameral antibiotic (eg, cefuroxime in Europe) would help address the risks of compounding dilution errors and contamination in the U.S.<sup>6</sup> The publication of 3 large observational studies in 2016 has also significantly strengthened the evidence base supporting the use of intracameral antibiotics.<sup>20-22</sup>

Only 2 VAMCs (3%) offered immediate sequential bilateral cataract surgery. The advocates of this practice have touted its potential cost savings, patient convenience, and the opportunity for more rapid visual rehabilitation.<sup>23</sup> Recently, several multicenter, randomized clinical trials have reported similar refractive outcomes, complication rates, and patient satisfaction for immediate and delayed bilateral cataract surgery.<sup>24,25</sup> Hence, it is possible that rates of immediate sequential bilateral cataract surgery may increase in the VHA over the next few years.

### Strengths/Limitations

A strength of this survey is its high response rate (67.7%), which exceeds the 53% and 33% rates reported in previous surveys of cataract surgery practice patterns among VHA ophthalmologists and ASCRS members, respectively.<sup>7,8</sup> Another strength is lack of financial incentive for adaptation of any new practices by VHA surgeons, suggesting that these decisions have been made to improve patient safety, quality of care, and/or resident education. A limitation of this study is that its findings may not be generalizable to ophthalmologists practicing in the private sector or in teaching hospitals outside the VHA.

### CONCLUSION

This study suggests that femtosecond laser-assisted cataract surgery, intracameral antibiotics, and immediate sequential bilateral cataract surgery have limited roles in VHA cataract surgery. More research and clinical experience are needed to understand the barriers to more widespread acceptance and to assess the impact of these emerging practices on cataract surgery in the U.S. ●

### Author disclosures

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