

Japanese survey of perioperative antibiotic prophylaxis in cataract surgery

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Abstract

Purpose: To identify the trends of perioperative antibiotic prophylaxis use in cataract surgery in Japan.

Design: National survey via website, mail, or interviews.

Methods: The use of perioperative antibiotic prophylaxis in cataract surgery was evaluated through a survey across 12 regions within Japan from February to March 2025.

Results: The response rate was 63.8% (785/1230). Preoperative and postoperative topical antibiotics were used by 94.5% and 98.8% of respondents, respectively. Additionally, 8.0% used antibiotic-containing irrigation bottles, and 12.3% used subconjunctival injections. Meanwhile, 10.4% administered intracameral antibiotics, among which 93.7%, 5.1%, and 1.3% used MFLX, LVFX, and ceftazidime, respectively. Neither cefuroxime nor vancomycin was used. The majority (96.1%) preferred the intracameral antibiotic procedure using a large-volume diluted solution (i.e., flushing technique). The total number of patients was 251,912, of whom 54 (0.021%) had infectious endophthalmitis. Endophthalmitis was reported in 51 out of 213,905 patients that were not given intracameral antibiotics (0.024%). Endophthalmitis was reported in 3 out of 38,007 patients (0.008%) with intracameral antibiotics, and 1 out of 25,078 patients (0.004%) with intracameral flushing using 10-fold diluted MFLX.

Conclusion: The overall use of perioperative prophylactic antibiotics (i.e., eyedrops, subconjunctival injection, and antibiotic-containing irrigation) has decreased compared to our previous survey in 2012, 2014, and 2016. Intracameral antibiotic use has not gained popularity in Japan. If used properly, intracameral MFLX may play an important role in endophthalmitis prophylaxis.

Introduction

Postoperative endophthalmitis has become a rare surgical complication. However, surgeons may overuse prophylactic antibiotics, since it can have devastating consequences on vision.

In 2012, 2014, and 2016, we previously conducted surveys regarding the prophylactic procedures for endophthalmitis in Japan [1–3]. Previously, postoperative antibiotic eyedrops were used by more than 99% of surgeons, with 66% using postoperative eyedrops longer than 1 month. Meanwhile, only 7% of surgeons employed intracameral antibiotics, whereas its use has spread in Europe and North America.

In May 2015, the World Health Assembly discussed an international response to antimicrobial resistance and issued a Global Action Plan, encouraging medical professionals to enhance their awareness and understanding of antimicrobial resistance and optimize the use of antimicrobials in humans and animals. Consequently, minimizing the use of perioperative prophylactic antibiotics is a concern in ophthalmologic surgery as well [4]. In the present study, we surveyed surgeons from 12 regions in Japan to clarify the national trends of perioperative antibiotic use in cataract surgery.

Materials and methods

The survey included a questionnaire that was administered through a website, mail, and face-to-face surveys from February to March 2025. The survey included 16 questions that took less than 10 minutes to complete (Fig. 1). The following 12 regions were selected to avoid an uneven sampling distribution: Hokkaido, Iwate, Fukushima, Tochigi, Fukui, Nagano, Shiga, Tottori, Shimane, Ehime, Miyazaki and Kagoshima (Fig. 2). The surgeons in these areas were selected using an official list of ophthalmologists, excluding those who did not routinely conduct ordinary cataract surgery. A representative was assigned to the region with which he/she was thoroughly familiar. Each representative surveyed his/her assigned region and collected data. Regions (prefectures) with a large population were excluded from the survey as they have many ophthalmologists, making it difficult for the representative to identify which facilities (ophthalmologists) routinely conduct cataract surgery. This will complicate the survey and lead to the collection of inaccurate data. Contrarily, in regions with medium- to small-sized populations, the representatives can easily assess the situation. This enabled the survey to target a broad range of surgeons, regardless of their background (academic orientation, type of facilities involved, surgical volume, experience as a surgeon). In fact, we believe that almost all cataract surgeons in each region participated in our study. Cases of endophthalmitis that occurred within 1 month postoperatively and were aggressively managed as infectious endophthalmitis were counted regardless of the results of the bacterial culture or PCR. We conducted a similar survey in 2012 (6 regions, 285 responders) [1], 2014 (8 regions, 386 responders) [2], and 2016 (12 regions, 544 responders) [3]. The data obtained in this survey were compared with those in the previous one [1–3].

Ethics

The authors declare that approval to conduct the study was granted by the Institutional Review Board of Nojima Hospital. Informed consent was obtained from all responders for participating in this study. The present study was conducted following the Declaration of Helsinki.

Results

Responses were received from 785 out of 1,230 (63.8%) surgeons who were surveyed. Among these, 22 responses were excluded due to invalid data, and 763 responses were included in the analysis. Of the 763 responders, 18 were from a university hospital, 54 from a public hospital, 100 from a private hospital, and 316 from a private clinic (Table 1). The survey consists of both low- and high-volume surgeons (Table 2). The response rates in the 12 regions ranged from 41.8% to 100% (Table 3).

Table 1
Type of facilities

	Overall				With IC antibiotics			
	Facilities	Surgeons	Total cases	Endophthalmitis cases	Facilities	Surgeons	Total cases	Endophthalmitis cases
University hospital	18	121	23679	6	1	4	1400	0
Public hospital	54	87	21094	3	5	15	3444	0
Private hospital	100	153	39807	13	7	7	3390	2
Private clinic	316	398	167232	32	43	53	29773	1
others	1	1	100	0	0	0	0	0
Total	489	763	251912	54	56	79	38007	3
IC=intracameral								

Table 2
Number of the responders from the region

Surgeons	Hokkaido	Iwate	Fukushima	Tochigi	Fukui	Nagano	Shiga	Tottori	Shimane	Ehime	Miyazaki	Kagoshima	Tokushima
	298	92	87	106	53	188	67	31	35	94	77	102	12
Responders	185	72	59	55	34	84	28	31	30	75	43	67	76
%	62.1%	78.3%	67.8%	51.9%	64.2%	44.7%	41.8%	100.0%	85.7%	79.8%	55.8%	65.7%	66.7%

Table 3
Distribution of responders by annual cataract volume

Total cases	2025	2016 [3]
	(763)	(544)
< 100	157	77
100 ~ 299	308	244
300 ~ 499	146	109
500 ~ 999	102	80
> 1000	49	34
Total	752	544
The numbers in parentheses shows the number of the responders in each survey		

Preoperative topical antibiotics were used by 94.5% of surgeons in this survey, representing a decrease from our previous surveys in 2012 (99%), 2014 (99%), and 2016 (98%) (Table 4). The topical antibiotic preferences were similar to those in 2016 and 2014, with more than 90% using fluoroquinolones: 40%–45% using LVFX and 40%–45% using MFLX or GFLX (Table 5). Meanwhile, the use of postoperative topical antibiotics remained similar (98.8%) compared to our earlier surveys (100% in 2012, 2014, and 2016). However, these were used at a shorter duration. Specifically, more than 40% of respondents discontinued postoperative topical antibiotics by 2 weeks, compared to only 7% and 5% of respondents in the 2014 and 2012 surveys, respectively. Furthermore, only 6.9% of respondents continued postoperative topical antibiotics for more than 2 months, compared to 22% and 27% of respondents in the 2014 and 2012 surveys, respectively (Table 6).

Table 4
Perioperative use of antibiotic prophylaxis

	2025	2016 ^[3]	2014 ^[2]	2012 ^[1]	2021 ^[11]	2014 ^[11]
	(763)	(544)	(386)	(285)	ASCRS	ASCRS
Preoperative topical antibiotics	94.5% (721)	98%	99%	99%	73%	85%
Postoperative topical antibiotics	98.8% (754)	100%	100%	100%	86%	97%
Irrigation bottle	8.0% (61)	19%	22%	24%	3%	8%
Intracameral injection	10.4% (79)	7%	7%	1%	63%	42%
Subconjunctival injection	12.3% (94)	24%	23%	24%	5%	8%
Antibiotic ointment	82.4% (629)	78%	79%	89%		
Intravenous injection	26.7% (204)					
Oral Antibiotics	24.7% (189)					
IC=intracameral, ASCRS=American Society of Cataract and Refractive Surgery						
The numbers in parentheses shows the number of the responders in each survey						

Table 5
Preferred preoperative topical antibiotics

MFLX	2025(703)	2016(544) ^[3]	2014(377) ^[2]
	25.6% (195)	21.9% (119)	22.8% (86)
GFLX	19.9% (152)	21.7% (118)	18.9% (73)
LVFX	43.4% (331)	44.7% (243)	43.3% (167)
Other quinolones	6.6% (5)	5.9% (32)	2.6% (10)
cephem	2.2% (17)	7.0% (38)	9.8% (38)
aminoglycoside	0.9% (7)	0.5% (3)	0.3% (1)
others	0	0.2% (1)	0.5% (2)
MFLX=moxifloxacin, GFLX=gatifloxacin, LVFX= levofloxacin			
The numbers in parentheses shows the number of the valid reply in each survey			

Table 6
Duration of postoperative topical antibiotic use

1w	2025 (754)	2014(386) ^[2]	2012 (285) ^[1]
	15.4% (116)	-	-
~ 2W	31.8% (245)	7% (25)	5% (14)
2~4W		30% (117)	25% (71)
1M	45.2% (341)		
1~2M		41% (160)	43% (123)
2M~	6.9% (52)	22% (84)	27% (77)
The numbers in parentheses shows the number of the valid reply in each survey			

Subconjunctival antibiotic injection was used by 12.3% (94/763) of surgeons (Table 4), specifically using gentamycin (n = 70, 74.5%), cephem (n = 17, 18.1%), and fluoroquinolones (n = 5, 5.3%) (Table 7). Meanwhile, antibiotic-containing irrigation bottles were used by 8.0% (61/760) of surgeons (Table 4), specifically using cephem (n = 8, 13.1%), fluoroquinolones (n = 14, 23.0%), and imipenem (n = 32, 52.5%) (Table 7). The use of subconjunctival antibiotic injections and antibiotic-containing irrigation bottles was fewer compared to the earlier surveys (Table 4). Ophthalmic antibiotic ointments were used by 82.4% of surgeons (Table 4), with most containing ofloxacin (Table 7).

Table 7
Choice of antibiotics

	Preoperative topical antibiotics	Subconjunctival injection	Intracameral injection	Irrigation bottle	Antibiotic ointment
	(703)	(94)	(79)	(61)	(623)
fluoroquinolone	97.2% (683)	5.3% (5)	98.7% (78)	23.0% (14)	95.2% (593)
cephem	1.8(13) + 0.6% (4)	18.1% (17)	1.3% (1)	13.1% (8)	
aminoglycoside	1.0% (7)	74.5% (70)		4.9% (3)	
imipenem		2.1% (2)		52.5% (32)	
penicillin				4.9% (3)	
vancomycin				1. (1)	
erythromycin					4.8% (30)
4 surgeons used cefmenoxime combined with fluoroquinolone					
The numbers in parentheses shows the number of the valid reply in each survey					

Intracameral antibiotics were used at the end of surgery by 10.4% (79/760) of surgeons, specifically, MFLX (n = 74), LVFX (n = 4), and ceftazidime (n = 1). Cefuroxime and vancomycin were not used. The number of surgeons using intracameral antibiotics did not dramatically increase, remaining almost equal to those in 2014 and 2016 (Tables 4,7). Only one university hospital (4 surgeons) used intracameral antibiotics (Table 1).

Among the 74 surgeons who used intracameral MFLX, 3 surgeons used 0.1 mL of 0.5% MFLX stock solution (Vigamox). Regarding the procedure for intracameral antibiotics, the flushing technique [5] was common in Japan. The flushing technique using 10-fold (0.05%), 25-fold (0.02%), and 125-fold (0.004%) diluted MFLX solution was employed by 59 (79.7%), 10 (13.5%), and 1 (1.4%) surgeon, respectively. Four surgeons used the flushing technique with 10-fold diluted LVFX solution (Table 8).

Table 8
Preferences of injection procedure and concentration for intracameral MFLX

	2025 present study (74)	2021 ASCRS ^[11]
0.1ml 0.5% (5000µg/ml)=Vigamox stock solution	4.0% (3)	39%
0.5ml 0.1% (1000µg/ml)	0	41%
2–3 ml 0.05% (500µg/ml flushing with 10-folds solution)	79.7% (59)	0
2–3 ml 0.02% (100µg/ml flushing with 10-folds solution)	13.5% (10)	0
2–3 ml 0.004% (40µg/ml flushing with 10-folds solution)	1.4% (1)	0
No answer	1.4% (1)	20%
The numbers in parentheses shows the number of the valid reply in each survey		

There were no apparent intraoperative complications related to the intracameral antibiotics, such as toxic anterior segment syndrome or corneal endothelial cell damage. The solutions for intracameral antibiotic injection were prepared mostly by the operating room staff (90.0%) and, less commonly, the surgeons themselves (10.0%). None obtained their antibiotic solutions from in-house/outside compounding pharmacies or used commercially available products (Table 9).

Table 9
Who prepares intracameral antibiotics

Who prepares IC antibiotics	2025 Japan (70)	2021 ASCRS ^[11]
Operating room staff	90.0%(63)	44%
Surgeon	10.0%(7)	3%
Commercial intraocular solution	0	7%
Pharmacy	0	45%
Inhouse/outside compounding		12%/33%
IC=intracameral, Total cases, ASCRS=American Society of Cataract and Refractive Surgery		
The numbers in parentheses shows the number of the valid reply in each survey		

Out of 251,912 patients in total, there were 54 cases of infectious endophthalmitis (0.021%). Endophthalmitis was reported 51 out of 213,905 cases that were not given intracameral antibiotics (0.024%). Endophthalmitis was reported in 3 out of 38,007 patients (0.008%) with intracameral antibiotics, and 1 out of 25,078 patients (0.004%) with intracameral flushing using 10-fold diluted MFLX (Table 10).

Table 10
Occurrence of endophthalmitis with/without intracameral MFLX

Total cases	Surgeons	cataract cases	Endophthalmitis cases	Occurrence of endophthalmitis
	763	251912	54	0.021%
without IC antibiotics	687	213905	51	0.024%
with IC antibiotics	76	38007	3	0.008%
with IC MFLX (Flushing 2–3 ml 500µg/ml)	70	25078	1	0.004%
IC=intracameral, MFLX=moxifloxacin				

Discussion

Our survey revealed a decreasing trend in the use of perioperative prophylactic antibiotics as eyedrops, subconjunctival injection, or antibiotic-containing irrigation bottles. Likewise, the duration of postoperative topical antibiotics was also decreased. These results possibly reflect the surgeons' greater interest in avoiding antibiotic resistance. Studies on cataract surgery have reported that perioperative eyedrop use inevitably leads to an increase in local antibiotic-resistant bacteria [6]. In 2020, a Japanese panel officially stated that there was limited evidence supporting the effectiveness of perioperative topical antibiotics in preventing endophthalmitis following cataract surgery.

Fluoroquinolones are the most commonly used perioperative eyedrops. Although moxifloxacin penetrates well into the anterior chamber, its concentration after topical administration (1.8 µg/mL) [7] and subconjunctival injection (3.1 µg/mL) [8] does not exceed the minimum inhibitory concentration required to inhibit the growth of 90% (MIC90) of resistant pathogens [9]. Ophthalmic antibiotic ointment is also widely used. However, its concentration in the anterior chamber 1 h after topical administration is only 219 ng/mL [10], which is less than the MIC90 for most pathogens [9]. In contrast, intracameral antibiotics have the advantage of achieving sufficient antibiotic concentrations during surgery. Moreover, intracameral injection, involving a single administration of a high-concentration solution, has a little risk of promoting the growth of antibiotic-resistant bacteria.

Intracameral antibiotics remain unpopular in Japan, with only 10.4% of the respondents reported using it (Table 4). On the contrary, intracameral MFLX is becoming more popular in other countries including the US and India. Its safety and efficacy have been supported in several studies, including large retrospective analyses [11–13]. Haripriya et al. reported that intracameral MFLX was associated with a 3.5-fold reduction in the rate of postoperative endophthalmitis in an extremely large series including 2,062,643 consecutive eyes [12]. In their report, no instances of toxic anterior segment syndrome or corneal decompensation were attributed to the antibiotic injection. This could be attributed to the availability of a commercially approved solution in India that includes preservative-free moxifloxacin hydrochloride (5 mg/1 mL) packaged in sterile glass vials (Auromox; Tamil Nadu, India). This essentially eliminates human error from overdosing or contamination, since no mixing or dilution is required for the intraocular injection. On the other hand, commercially approved antibiotic solutions are not readily available in the US. Only 7% of the respondents used these, and pharmacies and operating room staff accounted for 45% and 44% of the responders, respectively, in the 2021 ASCRS report (Table 9) [11]. In the present study, antibiotic solutions for intracameral injection were all prepared by the staff (90.0%) or surgeons (10.0%) in the operating room, and no pharmaceutical/commercial products were used (Table 9). If used properly, intracameral MFLX is safe and effective [11–13], although its in-house preparation carries a risk of dilution errors and contamination. As no commercialized products for intracameral antibiotics are currently available in Japan and their use remains off-label, patient consent under the physician's responsibility alongside ethics committee approval is required.

In the present study, 93.7% (74/79) and 5.1% (4/79) used MFLX and LVFX as intracameral antibiotics, respectively, while none used cefuroxime or vancomycin. In the 2021 ASCRS survey, MFLX was used as the intracameral antibiotic by 73% of respondents, while the use of vancomycin fell from 52% in 2014 to 6% in 2021 [11]. Intracameral vancomycin has been discouraged by the FDA due to risk of hemorrhagic occlusive retinal vasculitis [14]. Furthermore, the use of cefuroxime also decreased from 14% in 2014 to 11% in 2021. The intracameral injection of cefuroxime has gained popularity in Europe, and it is generally injected in small doses (0.05–0.1 mL). In the US, either 0.1 mL of 0.5% (5 mg/mL) solution or 0.5 mL of 0.1% (1 mg/mL) solution of intracameral MFLX is used [15]. For the former regimen, the optimal dose can be easily prepared by drawing 0.1 mL from a newly opened bottle of Vigamox (0.5%). However, a small-volume injection may result in inaccurate drug delivery into the anterior chamber due to individual differences in anterior segment volume and the unpredictable egress of solution through the incision upon injection [16]. Additionally, when using a small-volume injection, it is possible that the drug will not reach the areas that are most susceptible to endophthalmitis (i.e., the posterior surface of the IOL and the equator of the bag capsular). Theoretically, the latter regimen (0.5 mL of 0.1% solution) can achieve a more consistent aqueous concentration. Arshinoff et al. concluded that administering 0.5–0.6 mL of 0.15% solution can properly compensate for the expected leakage and achieve the target of 500 µg in the anterior chamber [16]. Shorstein et al. reported using a mathematical model that small volume resulted in less accuracy, and the large volume flushing technique offered consistent concentration in the eye [17].

For intracameral antibiotic administration, we developed the flushing technique, a method of flushing the anterior chamber, the area behind the intraocular lens (IOL), and equator capsular using diluted antibiotics at the end of surgery [5]. Using this technique with larger amounts (2–3 mL) of 10-fold diluted MFLX (500 µg/mL) results in stable and scheduled antibiotic concentrations in the eye regularly. We have had no cases of endophthalmitis among over 25,542

patients [18]. Similarly, in the present survey, 79.7% of those who employed intracameral MFLX also used a 10-fold diluted solution (Table 8). In the present study, endophthalmitis was reported in only 1 out of 25,078 patients (0.004%) with intracameral flushing using 10-fold diluted MFLX (Table 10).

One limitation of our study is that only participants from 12 of the 47 prefectures (regions) in Japan were included. However, we believe that our data reflect the overall trend in Japan, because all ophthalmologists who conduct cataract surgery in the aforementioned areas were included and the response rate was high. Our study design did not use a large database to include all patients, so the patients' backgrounds are unknown. In addition, the diagnoses of infectious endophthalmitis and the complications following intracameral antibiotics were made by the surgeons (responders). Thus, the criteria for diagnoses may vary among the responders.

Conclusions

There is a decreasing trend in the overall use of perioperative prophylactic antibiotics as eyedrops, subconjunctival injection, and antibiotic-containing irrigation. Intracameral antibiotics remain unpopular in Japan. If used properly, intracameral MFLX may play an important role in endophthalmitis prophylaxis.

Declarations

Competing Interests

The authors have no relevant financial or non-financial interests to disclose.

Ethics approval

The authors declare that approval to conduct the study was granted by the Institutional Review Board of Nojima Hospital. Informed consent was obtained from all responders for participating in this study. The present study was conducted following the Declaration of Helsinki.

Consent to participate

Informed consent was obtained from all individual participants included in the study.

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Author Contribution

KM and DM were responsible for the conception and design of the study. All authors contributed the acquisition and analysis of the data. KM and DM analyzed and interpreted the data. KM wrote the draft. DM and TM revised the manuscript critically.

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Data Availability

The datasets used during the current study are available from the corresponding author on reasonable request.

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Figures

Antibiotic prophylaxis for cataract surgery

1. Which preoperative topical antibiotics do you use?

- ☐ None
☐ Moxifloxacin
☐ Levofloxacin
☐ Gatifloxacin
☐ Cefmenoxime
☐ Other (please specify)

2. Which postoperative topical antibiotics do you use?

- ☐ None
☐ Moxifloxacin
☐ Levofloxacin
☐ Gatifloxacin
☐ Cefmenoxime
☐ Other (please specify)

3. How long do you use postoperative topical antibiotics?

- ☐ 1week
☐ 2week
☐ 1month
☐ 2month<

4. Which antibiotic agents do you use for intracameral injection?

- ☐ None
☐ Moxifloxacin
☐ Vancomycin
☐ Cefroxime
☐ Other (please specify)

5. Intracameral antibiotic preparation uses

- ☐ unpreserved topical antibiotic
☐ Commercially available product for intracameral use
☐ Injection cefuroxime or vancomycin

1

6. Who prepared the solution?

- ☐ Operating room staff
☐ Surgeon
☐ Pharmacy
☐ Inhouse compounding
☐ outhouse compounding

7. How do you conduct the intracameral injection

- ☐ Uses 0.1ml solution
☐ Uses higher volume solution (ml)

8. If you use preserved free topical moxifloxacin or levofloxacin intracamerally, which concentration do you use?

- ☐ Stock solution
☐ 10-fold diluted solution (500µg/ml)
☐ Other (please specify fold dilution)

9. Have you experienced complications after use of intracameral antibiotics, if yes, please indicate which ones you saw?

- ☐ None
☐ Toxic anterior segment syndrome
☐ Retinal toxicity (hemorrhages, vasculitis)
☐ Corneal endothelial cell damage
☐ Other (please specify fold dilution)

10. Which antibiotic agent do you use in irrigation bottle during the surgery?

- ☐ None
☐ Fluoroquinolone (please specify)
☐ Cephem (please specify)
☐ Imipenem (please specify)
☐ Other (please specify)

2

11. Which antibiotic agent do you use for subconjunctival injection at the end of surgery?

None

- ☐ Amonoglycoside (please specify)
☐ Fluoroquinolone (please specify)
☐ Cephem (please specify)
☐ Other (please specify)

12. Which antibiotic ointment do you use at the end of surgery?

- ☐ None
☐ Fluoroquinolone (please specify)
☐ Erythromycin (please specify)
☐ Other (please specify)

13. Do you use systemic antibiotic as intravenous drip infusion, if yes how long?

- ☐ None
☐ 1 day
☐ Several days (days)

14. Do you use oral antibiotics, if yes how long?

- ☐ None
☐ 1 day
☐ Several days (days)

15. Do you experience infectious endophthalmitis in 2024?

If the patients were aggressively managed as infectious endophthalmitis (intravitreal antibiotic injection, Vitrectomy), the cases should be counted as endophthalmitis cases regardless the results of bacterial culture or polymerase-chain-reaction tests.

- ☐ None
☐ Yes (cases)

16. If you experienced infectious endophthalmitis, please choose one in parentheses

Case1

- ☐ Bacterial culture (positive, negative)
☐ Timing of occurrence (<1week, 1~2week, 2~4week)
☐ Posterior capsular rupture (yes, no)
☐ Final best corrected visual acuity (<20/2000, <20/70, <20/28, <20/28) (decimal vision acuity: <0.01, <0.3, <0.7, <0.7)
☐ Treatment (Anterior chamber irrigation, Pars plana vitrectomy, Intracocular lens extraction, Intravitreal antibiotic injection)

Case2

- ☐ Bacterial culture (positive, negative)
☐ Timing of occurrence (<1week, 1~2week, 2~4week)
☐ Posterior capsular rupture (yes, no)
☐ Final best corrected visual acuity (<20/2000, <20/70, <20/28, <20/28) (decimal vision acuity: <0.01, <0.3, <0.7, <0.7)
☐ Treatment (Anterior chamber irrigation, Pars plana vitrectomy, Intracocular lens extraction, Intravitreal antibiotic injection)

#If you experienced more than 3 cases of infectious endophthalmitis, please contact the surveyor.

Figure 1

Content of the 17 questions.

The questions were translated and described in English.

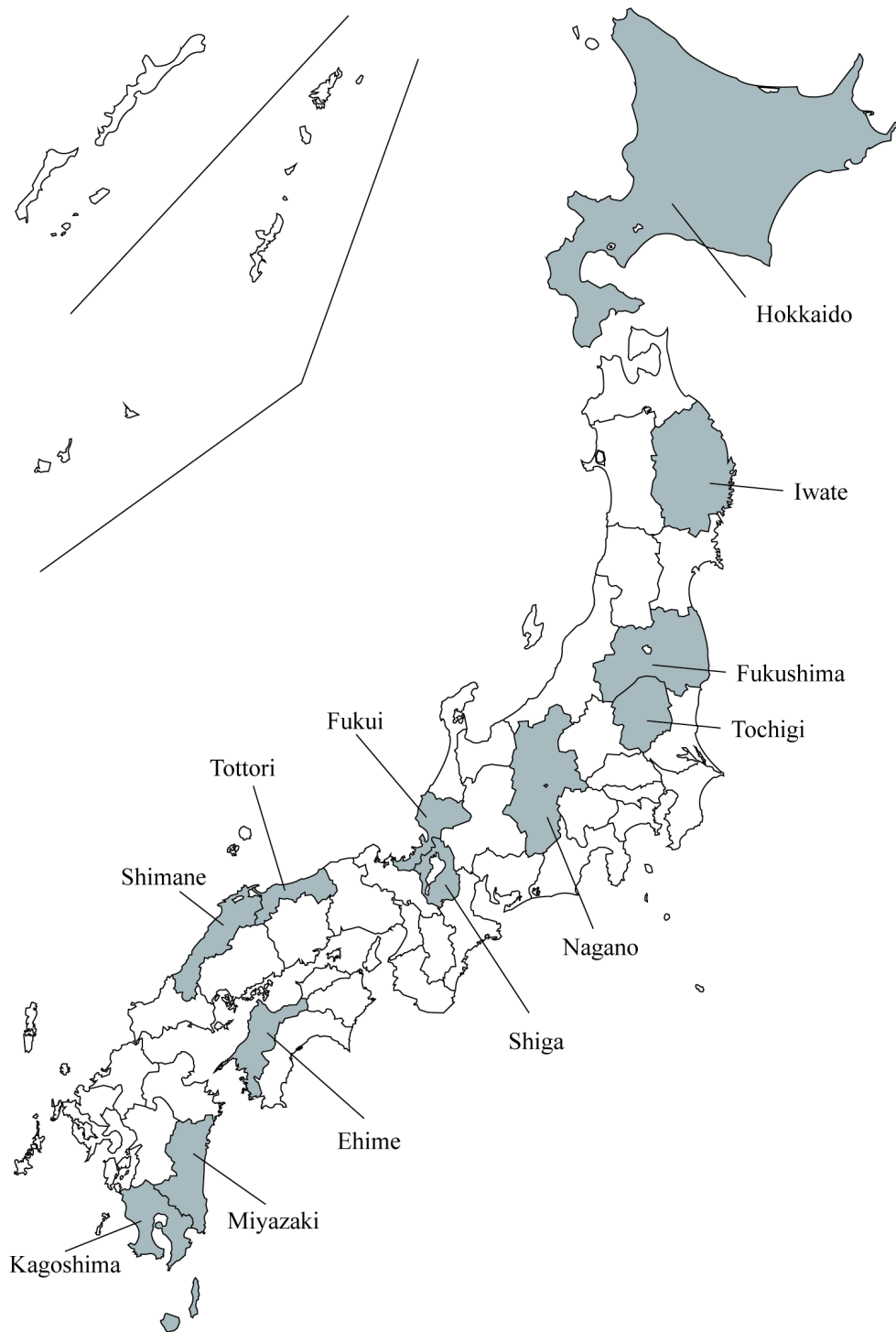


Figure 2

Twelve regions were selected to avoid an uneven sampling distribution: Hokkaido, Iwate, Fukushima, Tochigi, Fukui, Nagano, Shiga, Tottori, Shimane, Ehime, Miyazaki and Kagoshima.