



NSW Therapeutic Advisory Group Inc.
Promoting the quality use of medicines in public hospitals

An analysis of prescribing and supply of medicines for ophthalmic surgery in NSW public hospitals - 2015



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1 About NSW TAG

The New South Wales Therapeutic Advisory Group Inc. (NSW TAG) is an independent, not-for-profit, member-based organisation, comprised of clinical pharmacologists, pharmacists, nurses and clinicians committed to promoting quality use of medicines (QUM) in NSW public hospitals and the wider community. NSW TAG's core membership is representatives of the Drug and Therapeutics Committees (DTCs) in NSW public hospitals.

NSW TAG aims to provide consumers of pharmaceutical health care in NSW with the most suitable medicines in the most appropriate manner whilst ensuring that the limited resources of the health care budget devoted to medicines are used according to sound economic principles. In pursuing this goal, we focus on providing information, advice and support to decision-makers in NSW public hospitals, NSW Ministry of Health and other relevant organisations.

2 Executive Summary

In February 2015, a NSW TAG member raised concern regarding the apparent heavy resource required to manage the supply of eye preparations for people undergoing routine ophthalmic surgery. The member wondered how other hospitals were managing supply to their patients. Initial enquiries suggested wide variation in both the prescribing and supply of medicines for patients undergoing routine eye surgery. NSW TAG undertook a survey to describe the prescribing and dispensing of peri-operative eye medicines in NSW public hospitals performing eye surgery; to measure the presence and extent of any variation; to compare eye medicines use with the current evidence base and recommendations of clinical guidelines; and, to identify strategies that hospitals use to provide efficient eye medicines supply and counselling to patients. Cataract surgery is one of the most frequent surgeries performed in Australia, and survey findings and subsequent recommendations have the potential to inform clinical practice nationally and improve patient outcomes.

Pharmacists from nineteen NSW hospitals, including large tertiary institutions and smaller rural hospitals, provided responses to the survey. They reported that Drug and Therapeutics Committees (DTCs) were responsible for the formulary, and had oversight of standing orders and policies or protocols concerning eye medicines. Approximately one third had clinical pathways for routine eye surgery with a greater proportion having applicable standing orders.

Sixteen NSW public hospitals provided details of the eye medicines that were prescribed peri-operatively. Substantial variation in the pre- and post-surgery use of eye drops was seen. Despite Therapeutic Guidelines Antibiotics 2014¹ recommendations discouraging the use of topical antibiotic eye drops, they were widely prescribed pre- and post-surgery. Corticosteroid and NSAID eye drops were also widely used. Variation in the specific eye drops prescribed within hospitals was also observed.

The majority of hospitals (almost 60%) prescribed antibiotic (chloramphenicol and quinolone) eye drops for pre-surgical use. Fewer hospitals (approximately 38%) prescribed corticosteroid (dexamethasone, some prednisolone or fluoromethalone) eye drops pre-surgery. Use increased for both antibiotic and corticosteroid eye drops post-surgery with 88% of hospitals prescribing these eye drops. Approximately 70% of hospitals prescribed NSAID (diclofenac or ketorolac) eye drops for use pre-surgery; with a reduction to 38% of hospitals for post-surgery use.

Two hospitals (13%) reported no eye drop prescriptions post-surgery. One of these hospitals prescribed only NSAID eye drops pre-surgery whilst the other prescribed antibiotic, corticosteroid and NSAID eye drops pre-surgery. Both used intra-cameral antibiotics.

Despite a Therapeutic Guidelines Antibiotics 2014¹ recommendation regarding the use of intracameral injection of antibiotics for antibiotic prophylaxis in those undergoing ophthalmic surgery, this route of antibiotic administration was reported to be used in only 50% of hospitals. Furthermore, whilst these guidelines recommended chloramphenicol eye drops as first line when eye drops were used, a

significant proportion of hospitals used quinolone eye drops as first line therapy pre- and post-surgically.

With regard to the post-surgery supply of eye drops, an average of two eye preparations (antibiotics and corticosteroid) were prescribed for post-surgery use by patients; and the majority (73%) were supplied by the hospital. However the method by which this was done varied: five hospitals dispensed pre-surgery, four dispensed post-surgery and two used pre-labelled ward stock. Four hospitals used community pharmacies to dispense eye drops for post-surgery use, with two supplying the eye drops pre-surgery and two supplying post-surgery.

Given that the initial impetus for the survey was the apparent heavy resource required to manage the supply of eye preparations for people undergoing routine ophthalmic surgery, respondents were asked whether they had adopted any systems-based approaches to reduce pharmacy workload. Of the nine responses, seven employed pre-surgery dispensing of eye drops with varying delivery methods (e.g. the ophthalmologists of one hospital wrote PBS scripts for some medicines and another hospital provided pre-packs for the doctors).

Pharmacists from seven hospitals detailed concerns they had with the supply or dispensing of eye preparation for routine eye surgery. These concerns included potentially inadequate counselling that patients received with regard to the use of eye drops post-surgery with apparent little use of written information such as Consumer Medicines Information. Respondents commented on the wide variation in prescribing practices, including inappropriate medicine prescription and duration of use. Comments regarding the high workload were received with a high number of unused returns to the pharmacy. Little quality improvement activity had been undertaken in hospitals despite their concerns. A lack of communication and consultation between the hospital pharmacy department and the ophthalmology surgical unit appeared to be common.

This survey has a number of limitations, particularly the small sample given the high volume of eye surgery that occurs in NSW public and private hospitals. It would also be useful to have patient outcome data to determine the impact that wide variation in practice, poor adherence to evidence-based guidelines and possible inadequate patient counselling may have.

NSW TAG's analysis of the survey responses highlights a number of issues that warrant further investigation: i) significant variation in clinical practice that appears unwarranted; ii) lack of adherence to guideline recommendations for antibiotic prophylaxis for routine eye surgery, i.e. the suboptimal use of intracameral antibiotics, use of topical antibiotics pre and post-surgery and the apparent use of non-recommended topical antibiotics; iii) the lack of a proprietary product for intracameral injection; iv) the deficient evidence base for use of anti-inflammatory eye drops, particularly corticosteroid eye drops, to prevent inflammation post-eye surgery and possible unnecessary duplicated use of anti-inflammatory eye products; v) potential for harm and unnecessary costs with the use of eye medicines further compounded by inadequate counselling; and, vi) the lack of clinical audit and quality improvement activities in NSW public hospitals, which should include outcome data. It would seem that a greater adherence to the current evidence base would result in a reduced need for the dispensing of eye drops pre- and post-surgery. Such a reduction in workload may enable opportunities for improved patient counselling and follow-up and, safer and more appropriate and effective medicines use with the capacity to implement quality improvement.

NSW TAG has made some suggestions in the report with regard to the way forward and proposes to provide this report to relevant stakeholders with a view to assisting the development of a consistent evidence-based approach to medicines use in routine eye surgery ensuring patients and clinicians are adequately supported in the appropriate, safe and effective use of medicines. Routine measurement of clinical practice with implementation of improvement strategies (as indicated) to ensure optimal patient outcomes is advocated.

3 Introduction

NSW TAG received a query from a NSW TAG member about current eye drop dispensing practices for patients undergoing eye surgery, as this can be a resource-intensive activity. Initial enquiries suggested there may be significant variation amongst hospitals regarding the type, number and supply of eye preparations prescribed for patients undergoing routine eye surgery (both pre- and post-surgery). For example, with respect to antibiotic prophylaxis for ophthalmic surgery, the Therapeutic Guidelines Antibiotics 2014 question the use of topical antibiotics pre- and post-operatively and yet initial enquiries suggested these were widely used [eTG 2015].

4 Aims

- To describe the current prescribing and dispensing of peri-operative eye medicines in NSW public hospitals performing eye surgery;
- To measure the presence and extent of any variation in the use of these eye medicines;
- To compare eye medicines use with the current evidence base and recommendations of clinical guidelines; and,
- To identify strategies that hospitals use to provide efficient eye medicines supply and counselling to patients.

5 Methods

NSW TAG and TAGNet members¹ were surveyed via Survey Monkey™ about the prescribing and dispensing practices for patients undergoing routine eye surgery at their respective hospitals (Appendix 1). Hospitals were also asked to provide a copy of local clinical pathways for eye surgery, if they were available.

Survey questions sought to understand:

- the use of Drug and Therapeutics Committee (DTC)-approved clinical pathways or standing orders for routine eye surgeries;
- the type of eye surgery performed and the frequency of each surgery;
- the medicines used, their formulation, time of dispensing; and,
- pharmacists' concerns with the supply and dispensing of medicines for routine eye surgery, and existing strategies to reduce the impact on pharmacy workload.

For the purposes of this survey, *routine eye surgery* included cataract and pterygium surgeries and trabeculectomy, although other surgeries could be considered routine if regularly scheduled and performed. Descriptive statistics were used to describe eye medicines prescribing and dispensing. Free text answers regarding concerns were thematically analysed.

6 Results

6.1 Responses

Responses were received from the following nineteen NSW hospitals:

- Bankstown Hospital
- Bathurst Hospital
- Belmont Hospital
- Broken Hill Hospital
- Coffs Harbour Hospital

¹ A total of 65 invitations were sent to NSW TAG and TAGNet members. TAG members represent the 18 larger principal and tertiary referral and specialist hospitals (Peer Groups A1, A2 and A3) in NSW. TAGNet hospitals represent smaller metropolitan and rural hospitals in NSW (from Peer Groups B1, B2, C1 and C2).

- Concord Repatriation General Hospital
- Inverell Hospital
- John Hunter Hospital
- Kurri Kurri Hospital
- Macksville Hospital
- Moree Hospital
- Nepean Hospital
- Royal North Shore Hospital
- Ryde Hospital
- St George Hospital
- St Vincent's Hospital
- Sydney Hospital/Sydney Eye Hospital
- Tamworth Hospital
- Westmead Hospital

This list includes eight major metropolitan hospitals (>500 beds), three major regional hospitals (approx. 200 beds), three medium metropolitan hospitals (approx 100 beds), four medium regional hospitals (50-100 beds) and one small metropolitan hospital (<50 beds). All but one hospital performed routine eye surgery. This latter hospital referred all eye surgery to Sydney Eye Hospital. The remaining 18 hospitals reported that a Drug and Therapeutics Committee (DTC) was responsible for the formulary, oversight of standing orders and policies or protocols concerning eye medicines. The majority of respondent hospitals (n=13/16, 81%) reported performing routine eye surgery on more than twenty patients each week; other hospitals did not respond or did not know.

6.2 Routine eye surgeries, clinical pathways and standing orders

Sixteen hospitals provided details of the routine eye surgeries performed. Major types of routine eye surgery performed included:

- cataract surgery, which was the most frequently performed surgery. It was performed weekly in thirteen hospitals, and at least monthly in three hospitals.
- pterygium surgery, which was performed at least weekly in two hospitals and monthly in nine hospitals.
- trabeculectomies, which were performed at least monthly in eleven hospitals.

Respondents from five hospitals provided details of other "routine" surgeries that were performed:

- corneal transplants, vitrectomy, detached retinas, corneal grafts, oculoplastic surgery
- dacryocystorhinostomy (DCR), retinal surgery, corneal grafts, phacotrabulectomy, retinal detachment membrane peel, pan retinal photocoagulation (PRP), pars plana vitrectomy (PPV) cryobuckle & macular hole
- vitreo-retinal surgery, eye lid surgery/plastic procedures
- vitreo-retinal surgery, corneal surgery, oculoplastic surgery
- retinal detachment surgery, vitrectomy, penetrating keratoplasty, eyelid repairs

Table 1 shows the number of hospitals reporting existence of documented clinical pathways and/or standing orders in place.

Table 1. Number of respondent hospitals with clinical pathway and/or standing orders for eye surgery

Routine Surgery	Number of hospitals with clinical pathway	Number of hospitals with standing orders
Cataract surgery, n=16	6	14
Pterygium surgery, n=11	4	8
Trabeculectomy, n=11	3	7
Other routine surgery, n=4	1*	3*

*type of surgery not specified

Of the 16 hospitals where cataract surgery was performed, 38% had a clinical pathway whereas a greater proportion (88%) had applicable standing orders. Four hospitals provided standing orders for cataract surgery to NSW TAG; however, no hospitals provided a clinical pathway.

Of the 11 hospitals where pterygium surgery was performed, 36% had a clinical pathway, whereas 73% had applicable standing orders. Three hospitals provided standing orders for pterygium surgery to NSW TAG; however, no hospitals provided a clinical pathway.

Of the 11 hospitals where trabeculectomy was performed, 27% had a clinical pathway, whereas 64% had applicable standing orders. Three hospitals provided standing orders to NSW TAG; however, no hospitals provided a clinical pathway.

Of the standing orders provided to NSW TAG, standing orders sometimes indicated the specific ophthalmologist that the standing orders applied. A hospital could have more than one standing order for the same surgery due to an individual ophthalmologist's preference. Standing orders could be for pre-surgical or post-surgical use and include eye drops and analgesic therapy. No standing orders for intra-cameral injection were provided.

6.3 Prescription of medicines for eye surgery

Sixteen hospitals provided information about the medications prescribed for eye surgery patients. Medicines prescribed pre-surgery were differentiated from medicines prescribed post- surgery. Participants were asked to nominate the topical medicines that were used in various medicine classes: antibiotic, corticosteroid, non-steroidal anti-inflammatory drugs, mydriatics and cycloplegic drugs (and combination products) and whether they were used as multidose or single dose preparations (eye drops vs minims). Appendix 2 provides a summary of the responses from the sixteen hospitals regarding their most commonly prescribed topical medicines for routine eye surgery.

6.3.1 Prescription of ANTIBIOTIC eye drops for routine eye surgery, n=16

Of the ANTIBIOTIC preparations prescribed for use *pre-surgery*:

- Chloramphenicol eye drops were the most commonly used. Five hospitals used chloramphenicol as first line therapy, and another two hospitals used chloramphenicol as an alternate antibiotic.
- Three hospitals used ciprofloxacin as first line therapy, and another two hospitals used ciprofloxacin as an alternative to chloramphenicol.
- One hospital used ofloxacin as first line therapy.
- Hospitals did not report routine pre-surgery use of tobramycin eye drops or minims, ciprofloxacin minims, any antibiotic eye ointment or other antibiotic eye drops or minims.

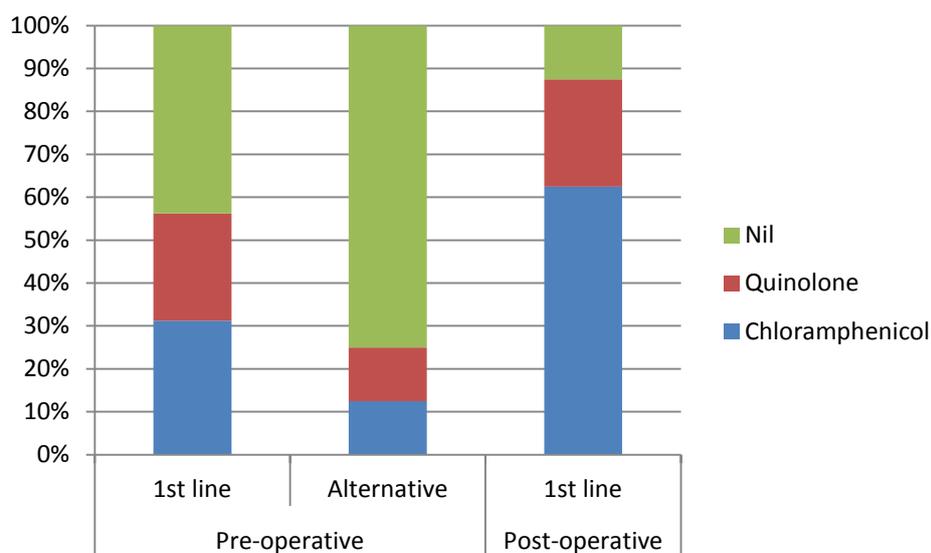
- Seven hospitals reported no routine antibiotic eye drop use pre-surgery.

Of the ANTIBIOTICS preparations prescribed for use *post-surgery*:

- Chloramphenicol eye drops were used in ten hospitals
- Ciprofloxacin eye drops were used in three hospitals
- Ofloxacin eye drops were used in one hospital
- Two hospitals reported no routine antibiotic use post-surgery.

Figure 1 displays the first line and alternative topical antibiotic medicines prescribed for pre- and post-surgery use.

Figure 1: Percentage of hospitals reporting specific peri-operative topical antibiotic prescriptions



6.3.2 Prescription of CORTICOSTEROID eye drops for routine eye surgery, n=16

Of the CORTICOSTEROID preparations prescribed for use *pre-surgery*:

- Dexamethasone eye drops were used first line in four hospitals, and as an alternative to prednisolone +phenylephrine in one additional hospital
- Prednisolone eye drops were first line in one hospital
- Prednisolone + phenylephrine eye drops were first line in one hospital
- Fluoromethalone eye drops were used as an alternative to dexamethasone in one hospital.
- Ten hospitals reported no routine corticosteroid use pre-surgery.

Of the CORTICOSTEROID preparations prescribed for use *post-surgery*:

- Dexamethasone eye drops were used in five hospitals
- Prednisolone eye drops were used in two hospitals
- Prednisolone + phenylephrine eye drops were used in seven hospitals
- Two hospitals reported no routine corticosteroid use post-surgery.

6.3.3 Prescription of non-steroidal anti-inflammatory drugs (NSAIDs) for routine eye surgery, n=16

Of the NSAID preparations prescribed for use *pre-surgery*:

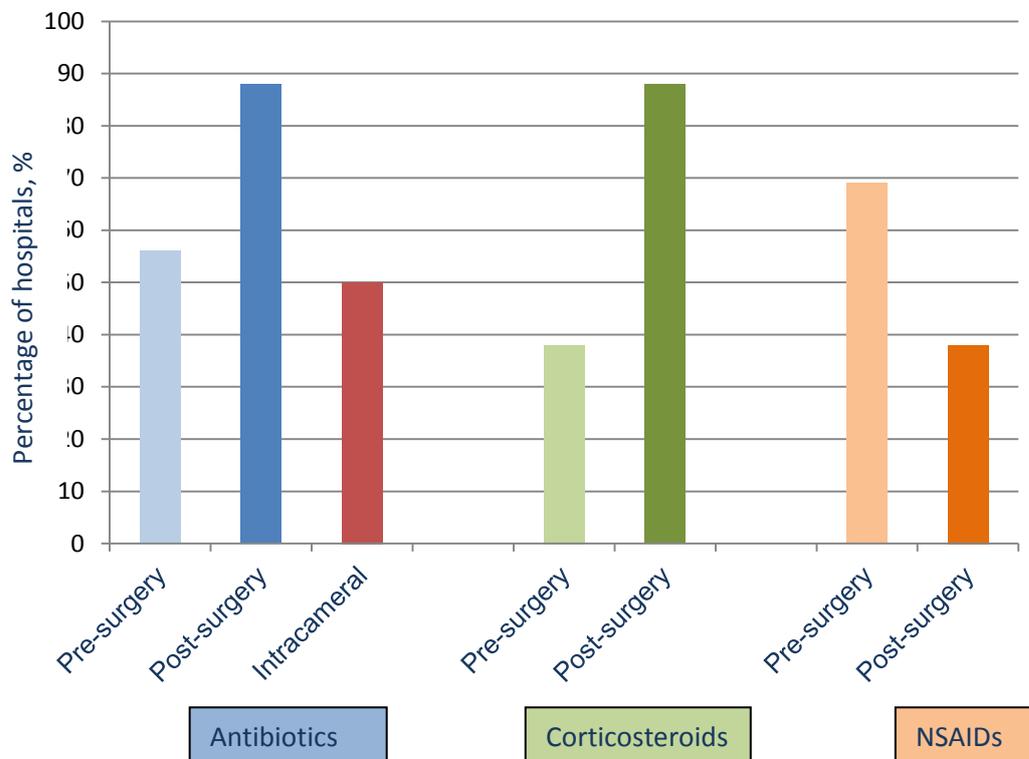
- Diclofenac eye drops were used first line in five hospitals, and as an alternative to ketorolac in one hospital. Two hospitals also reported using diclofenac minims as an alternative NSAID preparation (however these have since been discontinued).
- Ketorolac eye drops were used first line in five hospitals, and ketorolac minims were used first line in one other hospital.
- No hospitals reported use of flurbiprofen drops or minims
- Five hospitals reported no routine NSAID eye drop use pre-surgery.

Of the NSAID preparations prescribed for use *post-surgery*:

- Diclofenac drops were used in two hospitals
- Ketorolac drops were routinely used in five hospitals, and occasionally used in another hospital.
- Nine hospitals reported no routine NSAID use post-surgery.

Figure 2 displays a bar graph of hospitals dispensing various routinely prescribed peri-operative eye medicines (topical and intracameral) in hospitals.

Figure 2: Percentage of hospitals using various routinely prescribed peri-operative eye medicines in hospitals



6.3.4 Prescription of other preparations for routine eye surgery patients, n=16

Of the OTHER preparations prescribed for use *pre-surgery*:

- Phenylephrine eye drops were used first line in three hospitals, and as an alternative to phenylephrine **and** anticholinergic eye drops in another hospital
- Phenylephrine drops/minims **and** anticholinergic drops/minims were used first line in six hospitals.
- Anticholinergic drops were used first line in one hospital, and anticholinergic minims were used as an alternative to phenylephrine eye drops in another hospital.
- Six hospitals reported no routine use of other eye preparations

No hospitals reported use of OTHER topical eye preparations *post-surgery*.

6.3.5 Preservative-free preparations, n=16

Survey participants were asked about the use of preservative-free ophthalmic preparations.

Seven of the sixteen respondent hospitals reported using preservative-free ophthalmic preparations routinely. All hospitals sourced these preparations from an external supplier.

Three hospitals gave specific examples:

- One hospital reported using preservative-free chloramphenicol minims for corneal transplants
- One hospital reported using preservative-free prednisolone minims for glaucoma surgery
- One hospital reported using preservative-free chloramphenicol, prednisolone, homatropine, dexamethasone (via SAS), cyclopentolate, tropicamide and fluorescein minims.

6.3.6 Intracameral injection of antibiotics during surgery, n=16

Sixteen hospitals provided a response regarding the use of intracameral administration of antibiotics during routine eye surgery.

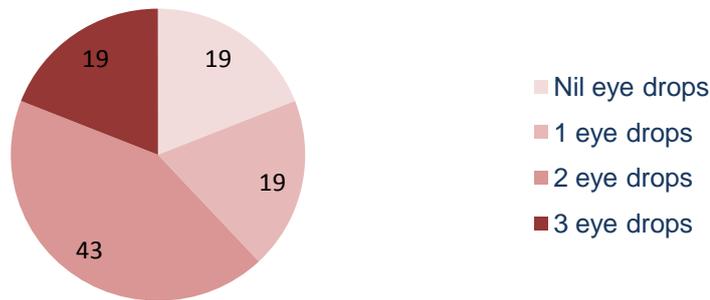
- Eight hospitals reported using intracameral antibiotics
- Four hospitals did not know if intracameral antibiotics were used
- Four hospitals reported that intracameral antibiotics were not used

6.3.7 Number of topical eye medicines prescribed pre- and post-surgery, n=16

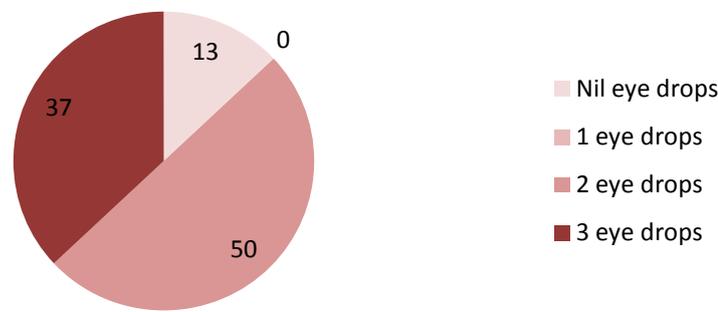
Figure 3 displays pie charts of numbers of topical eye medicines prescribed pre- and post-surgery. On average, TWO eye-drop preparations were prescribed per patient for post-surgery use.

Figure 3: Percentage of hospitals prescribing various amounts of peri-operative eye drops, n=16

Pre-surgery routine eye drop numbers, %



Post-surgery routine eye drop numbers, %



No hospitals reported prescribing one eye drop for post-surgical use.

6.4 Dispensing of eye drops required for post discharge use

As the impetus for the survey had been to understand the current eye drop dispensing practices for patients undergoing eye surgery, participants were asked to indicate where and when eye drops intended for post discharge use were dispensed. Fifteen hospitals provided responses to these questions. Eye drops were supplied by the hospital in 73% of respondent hospitals.

- Five hospitals use the HOSPITAL PHARMACY to dispense eye drops for post discharge use, and they were supplied PRE SURGERY
Of these five hospitals:
 - all hospitals dispense antibiotic eye drops
 - all hospitals dispense corticosteroid* eye drops
 - four hospitals dispense anti-inflammatory eye drops
 - one hospital occasionally dispenses homatropine eye drops and oral cephalexin.

- Four hospitals use the HOSPITAL PHARMACY to dispense eye drops for post discharge use, and they were supplied POST SURGERY
Of these four hospitals:
 - all hospitals dispense antibiotic eye drops
 - all hospitals dispense corticosteroid* eye drops
 - one hospital dispenses anti-inflammatory eye drops on occasion

(One hospital reported the post-surgery dispensing of antibiotic eye drops, which had been obtained originally from imprest and labelled with a BRADMA for pre-surgical use).

- Two hospitals use PRE-LABELLED EYE DROPS FROM WARD STOCK for post discharge use. Of these two hospitals:

- both hospitals provide antibiotic and corticosteroid (either stand-alone or combination) eye drops
- one hospital also provides anti-inflammatory eye drops

Of these two hospitals, one hospital reported that the doctor was responsible for writing the patient's name on the pre-labelled drops. The other hospital reported that use of pre-labelled ward stock was monitored by the hospital pharmacy.

- Four hospitals use a COMMUNITY PHARMACY to supply eye drops for post discharge use. Of these four hospitals:

- two hospitals arranged for antibiotic, corticosteroid* and anti-inflammatory eye drops to be supplied PRE-SURGERY
- two hospitals arranged for antibiotic, corticosteroid* and anti-inflammatory eye drops to be supplied POST-SURGERY.

6.5 Other medicines routinely prescribed and dispensed/supplied on discharge post eye, n=16

Dispensing of acetazolamide was reported by seven hospitals. It was the most common "other" medicine dispensed.

Of these seven hospitals:

- two hospitals noted that acetazolamide was prescribed rarely
- one hospital noted that acetazolamide was prescribed by a particular surgeon only
- one hospital noted that acetazolamide was prescribed post cataract surgery only.

Other responses received:

- Paracetamol/codeine was dispensed at four hospitals
- Oxycodone was dispensed at one hospital
- Chloramphenicol eye ointment was dispensed rarely at one hospital
- Oral antibiotics were dispensed very rarely at one hospital, however all anti-inflammatories were purchased from a community pharmacy if required.

6.6 Impact of dispensing eye surgery medicines on pharmacy workload, n=16

Participants were asked to provide examples of any systems-based approaches that have been adopted at their hospital to reduce the impact of eye surgery medicines dispensing on pharmacy workload. Nine responses were received:

- Pharmacy provides pre-packs for the doctor to dispense.
- Scripts are usually sent to pharmacy pre-surgery and are delivered to the day surgery unit when filled. Ophthalmology decided, without pharmacy input, to write PBS scripts to reduce patient waiting time. Use of macro codes for dispensing eye drops (commands that automatically expand with pre-written text for labels).
- A patient list is sent to pharmacy 3-4 days prior to surgery. Discharge packs are prepared by pharmacy staff and collected by theatre staff on the day of surgery.
- Routine post-operative eye drops are prescribed in advance, and given to patients post-surgery (in a standard package).

- All eye drops are dispensed prior to surgery with a pre-printed information leaflet.
- Administration sheet for each patient sent to pharmacy 24 hours prior to operation
- Administration sheet for each patient sent to pharmacy 2 days prior to operation
- Standing order set with eye list summary sheet sent to pharmacy
- Antibiotic and corticosteroid eye drops are on theatre imprest list. These are opened in theatre and patient identification label attached. Sent to pharmacy with prescriptions post surgery and dispensing label attached.

6.7 Concerns with prescribing, supply or dispensing of eye preparations for routine eye surgery, n=16

Seven hospitals reported the following concerns associated with the prescribing, supply or dispensing of medicines for eye surgery:

- *High workload and waiting time for supply of eye drops; inappropriate prescribing (ofloxacin in particular); inappropriate duration of drops (chloramphenicol for more than 7 days, or prescribing one bottle and one repeat); inadequate patient counselling; high number of dispensed items are returned unused to pharmacy.*
- *Inadequate patient counselling; no Consumer Medicine Information (CMI) or counselling provided for take home eye drops and acetazolamide.*
- *No dispensing pharmacy facility at this hospital. All patients are responsible for having scripts filled by a local pharmacy.*
- *Wide variation in the prescribing practices and high workload associated with supply. Eye patients are administered eye medication from the theatre imprest list. For continuation of any eye medication, it is expected that the patient obtains from a community pharmacy.*
- *Significant workload involved (230-300 eye drop scripts per month)*
- *Different VMOs do different things. Prevalence of phone orders.*
- *Hard to monitor use and supply of medicines in OT, as have to scrub and gown, and there are no resources for this.*

6.8 Quality improvement activities, n=16

Only two respondents reported having considered some quality improvement activity around the prescribing, supply or dispensing of eye preparations for routine eye surgery:

- *Met with Head of Ophthalmology to streamline peri-operative antibiotic use (both intracameral and subconjunctival). There is high use of vancomycin and there has been discussion to change to routine cephazolin use. Have considered doctors writing scripts for patients to obtain outside.*
- *We are in the process of developing an education leaflet for eye drops use after cataract surgery*

7 Discussion

Issues under four broad themes were identified from the survey responses: variation in practice, prevention of infection post-surgery, prevention of inflammation post- surgery and the supply of eye medicines for routine eye surgery. It is acknowledged that a limitation of the findings is that the responses may not be generalizable given an approximate 30% response rate from NSW public hospitals, that the majority of routine eye surgery may be occurring in private facilities and that pharmacy may not be aware of all prescribing, supply and external dispensing practices. Nevertheless sixteen public hospitals in NSW of varying demographics showed wide variety in prescribing practices that often do not appear to be consistent with the evidence, may lead to unnecessary use of resources and costs. It is unclear whether there is associated patient harm.

7.1 Variation in practice

Responses from 16 NSW hospitals demonstrated wide variation in the current practice of eye drop prescribing and dispensing for patients undergoing routine eye surgery in NSW hospitals.

In summary, the majority of hospitals (approximately 60%) prescribed antibiotic and corticosteroid eye drops pre-surgery. This rose to 88% for post-surgical use. The use of non-steroidal eye drops was more common before surgery than after. Two hospitals (12.5%) reported no eye drop prescriptions post-surgery. Variations were seen with the use of intra-cameral antibiotics and preservative-free eye preparations.

Not only is there variation between hospitals but variation also occurs within hospitals with different standing orders for different eye surgeons. It is unclear whether the identified variations in prescribing practice are warranted or unnecessarily complex with potential to increase the risk of error and costs.

7.2 Prevention of infection post-surgery

The use of antibiotics in eye surgery is indicated for the prevention of endophthalmitis, a rare but potentially serious complication of intraocular surgery. It is an infection resulting from bacterial inoculation of the eye, during or shortly after surgery. Good evidence exists regarding antibiotic prophylaxis in cataract surgery, perhaps because cataract surgery is now one of the most common surgical procedures in the world. Exogenous endophthalmitis following cataract surgery is the most common cause of acute endophthalmitis in Australia, and usually presents within a few days of the initial operation.² According to the literature, the rate of infection post cataract surgery is somewhere between 0.4 and 2.65 per 1000.³

7.2.1 Use of topical antibiotic drops

The survey found that almost 60% of respondent hospitals used topical antibiotic drops prior to surgery, and approximately 90% of hospitals used topical antibiotic drops post surgery.

In 2013, the Swedish National Cataract Register reported findings of a six year review of almost half a million cataract operations, that showed the addition of topical antibiotic drop prophylaxis pre-operatively and/or post-operatively did not demonstrate a clear benefit over pre-operative antiseptics + intracameral antibiotic prophylaxis with regard to reduction in endophthalmitis rates.⁴ Raen et al published results of a retrospective study, also in 2013, which looked at the omission of prophylactic topical antibiotics post cataract surgery in 15,254 patients (post 2007), and found “*no difference in the frequency of post operative endophthalmitis (PE) following cataract surgery when changing the postoperative topical medication from a mixture of corticosteroids and antibiotics to only corticosteroids.*”⁵

The European Society of Cataract & Refractive Surgeons (ESCRS) guidelines⁶ discuss three distinct timeframes for administration of topical antibiotic drops, and state their position on each:

1. Pre-operative - The guidelines explain that the two aims of prophylactic preoperative antibiotic drops are “*to reduce microbial flora in the precorneal tear film prior to surgery and to allow diffusion of topically applied antibiotic into the anterior chamber with the intention of combating bacteria at that site.*” They also explain that although concentrations of topical antibiotic drops are comparatively high in comparison to common bacterial minimum inhibitory concentrations (MICs), they are immediately diluted by the tear film, and undergo local elimination via nasolacrimal drainage. Hence, inadequate contact time occurs in order for a bactericidal effect to be produced.
2. Intra-operative – The guidelines acknowledge that microbial contamination may occur during the surgical procedure; however they also state that “*no matter what antibiotic levels may be*

achieved in AH (aqueous humour) due to preoperative drop dosing, these AH levels are drained at the moment of surgical incision, so that the AH levels during surgery, derived from preoperative drops, are essentially zero. (The contribution of any antibiotic sequestration in ocular tissues is minimal to negligible and would not help sustain meaningful aqueous humour levels.)”

3. Post-operative – The guidelines acknowledge factors such as wound healing, surface antisepsis and conditions during surgery may also induce infection, and therefore the choice of post-operative antibiotic drop administration is at the discretion of the surgeon, who may best assess these factors. As referred to earlier, the guidelines also consider that intracameral injection of antibiotics to be the most appropriate method to reduce risk of post-operative endophthalmitis.

7.2.2 Australian guideline recommendations regarding use of topical antibiotics

The Therapeutic Guidelines Antibiotics 2014¹ state the following recommendations for antibiotic prophylaxis in ophthalmic surgery:

“The aim of antibiotic prophylaxis in ophthalmic surgery is to reduce acute postoperative endophthalmitis, a sight-threatening complication of intraocular surgery. All intraocular surgeries may result in inoculation of the eye with organisms and subsequent infection. Prevention of endophthalmitis involves a combination of preoperative screening, antisepsis of the periocular area and ocular surface, intraoperative techniques (including correct wound construction and sealing), and postoperative patient care.

Active conjunctivitis, dacryocystitis or blepharitis must be treated and resolved before surgery.

.....

The use of preoperative topical antibiotics does not provide additional benefit to the above interventions. Postoperative topical antibiotics, though widely prescribed, lack evidence; the rate of endophthalmitis was not increased in large cohort studies using intracameral antibiotics alone (without postoperative topical antibiotics). Therefore, topical tobramycin or quinolones should not be prescribed either pre- or postoperatively due to the lack of evidence to support their use and the important risk of antibiotic resistance. If postoperative topical antibiotics are considered necessary, use chloramphenicol 0.5% eye drops (1 to 2 drops into the operated eye, 4 times daily for 7 days).

Tobramycin eye drops should only be considered for patients hypersensitive to chloramphenicol.

Antibiotics (particularly vancomycin) in irrigation solutions should not be used.”

Almost 60% of respondent hospitals used topical antibiotic eye drops prior to surgery, and 88% of hospitals used topical antibiotic drops post-surgery. Only one hospital did not routinely prescribe them pre- or post- surgery and an additional hospital prescribed them pre-surgery but not post-surgery. Furthermore four hospitals used pre- and post-surgical quinolone antibiotic eye drops as first line therapy, while another two hospitals used them pre-surgically as alternative eye drops. No hospitals reported the use of tobramycin eye drops. Hence there appears to be poor adherence with the Australian guidelines recommendations regarding the use of topical antibiotics.

7.2.3 Use of intracameral antibiotics

7.2.3.1 Guideline recommendations

Fifty percent of respondent hospitals reported the use of intracameral antibiotic. Their use is advocated by the Therapeutic Guidelines Antibiotics (eTG 2015)¹:

“Intracameral administration (injection into the anterior chamber of the eye) of antibiotics at the end of surgery is the most effective method of reducing the risk of endophthalmitis after cataract surgery. Use:

Cephazolin 1 to 2.5 mg intracamerally, as a single dose at the end of surgery.”

The eTGs make reference to documents published by the European Society of Cataract & Refractive Surgeons (ESCRS) in 2007 and 2013.^{6,7}

The aim of the 2007 study was to determine if perioperative antibiotics, administered either topically or intracamerally, prevented rates of endophthalmitis after cataract surgery.⁶ This study produced statistically significant results showing a five-fold reduction in post-operative endophthalmitis rates in patients who received an intracameral injection of cefuroxime 1mg at the close of surgery. Nine countries participated in the ESCRS study, and subsequently, all continue the routine use of intracameral antibiotic at the end of cataract surgery. In addition, the ESCRS guidelines also report routine use of intracameral antibiotic injection in Sweden, France, South Africa and a region of the United States.

The 2013 publication “Guidelines for Prevention and Treatment of Endophthalmitis Following Cataract Surgery: Data, Dilemmas and Conclusions” also recommend the use of intracameral cefuroxime (based on the findings of the 2007 study).⁷ Issues surrounding availability of an appropriate formulation are discussed. In 2012, the European Medicines Agency (EMA) approved an intracameral formulation of cefuroxime (Aprokam^R) specifically indicated for the prophylaxis of endophthalmitis following cataract surgery.⁸ This formulation is not yet available in Australia, and hence it is current standard practice to dilute cephazolin powder under aseptic conditions to prepare intracameral injection of antibiotics. The ESCRS guidelines⁷ also refer to a Singaporean study by Tan and colleagues, published in 2012 that supports the findings of the 2007 ESCRS study, by demonstrating a six-fold reduction in endophthalmitis rates in patients receiving intracameral cephazolin at the close of cataract surgery.⁹

The ESCRS guidelines⁷ provide a review of published pharmacokinetic and pharmacodynamic data demonstrating that intracameral injection delivers antibiotic directly to the aqueous humour, resulting in superior concentrations than those achieved with either topical drops or subconjunctival injection. They also state that the concentration of antibiotic will persist in the aqueous humour for a “period of time” when injected intracamerally at the close of surgery. The product information for Aprokam^R states “After intracameral injection of 1 mg cefuroxime, cefuroxime levels in the aqueous humour were over MIC for several relevant species for up to 4- 5 hours after surgery.”¹⁰

The ESCRS guidelines⁷ acknowledge intracameral injection of antibiotics such as vancomycin and gentamycin has also been described in the literature; however, they recommend that these should not be used for routine prophylaxis, but rather be reserved for cases of antibiotic-resistant strains.

7.2.3.2 Safety and preparation of intracameral antibiotics

A review of the safety, efficacy and preparation of intracameral antibiotics was published by the American Society of Cataract and Refractive Surgery (ASCRS) in 2014.¹¹ Controversies surrounding intracameral antibiotics, such as antimicrobial resistance and safety were discussed. The review concluded that, while there was a lack of published evidence, routine intracameral antibiotic prophylaxis is unlikely to promote drug resistance, as the anterior chamber is a closed compartment, and therefore intracameral antibiotic injection should not lead to significant systemic levels. With regard to safety and the possibility of toxic anterior segment syndrome occurring with solutions injected into the anterior chamber, the review highlighted that reported cases had occurred as a result of incorrect use of high doses, dilution errors and osmolality errors.

Issues regarding cross-reactivity between cephalosporins and penicillins (and specifically with the use of intracameral cefuroxime) have been explored.⁷ Cross-reactivity is dependent on the similarity of side chains of penicillins and cephalosporins. Cefuroxime, ceftriaxone and ceftazadime do not share a similar side chain to that of penicillin and hence do not have an increased risk of cross-allergenicity. This is in contrast to first generation cephalosporins such as cephazolin which may confer an increased risk of allergic reaction in patients with a true penicillin allergy. Anaphylaxis after intracameral injection of cefuroxime 1mg is reported to be very rare and when it has occurred, symptoms have resolved after treatment.⁷ In Sweden, every patient undergoing cataract surgery receives intracameral cefuroxime unless the patient has a distinct allergy to a cephalosporin rather than an allergy to penicillin.⁷ If there is evidence or suspicion of cephalosporin allergy, intracameral moxifloxacin or vancomycin is recommended.

NSW TAG has received anecdotal reports of cephalosporins for intracameral/intravitreal use being prepared in the operating theatre for prophylaxis of endophthalmitis or outside aseptic suites for the emergency treatment of endophthalmitis (the latter in conjunction with the other antibiotics and corticosteroid). It is best practice for these preparations to be prepared in sterile suite facilities to minimise microbial contamination. Furthermore, preparation requires serial dilution to achieve the necessary concentrations for intracameral or intravitreal injection with different sized syringes, syringe tip connectors, micron filters, needles, sterile gloves, mask and diluent required. Currently NSW hospitals obtain prefilled syringes (PFS) for intracameral injection from on-site aseptic suites or from Baxter Pharmaceuticals. Baxter requires a minimum order of 10 PFS and injections have an expiry of 12 days, which can be challenging requirements for all hospitals, especially rural and remote locations. There may be wastage or over-ordering as a consequence. These issues, together with the potential for error due to incorrect preparation, further support the need for the commercial availability of a fit for purpose formulation for intra-optic administration of antibiotic.

7.2.3.3 Audits of intracameral antibiotic use in clinical practice

A cataract surgery audit of 3740 cases undertaken between 2006 and 2013 at a South Australian teaching hospital reported a rate of endophthalmitis of 0.11%. The use of intracameral antibiotic at the close of surgery was routine at the time of this audit.¹²

In the USA, results of an American Society of Cataract and Refractive Surgery (ASCRS) member survey conducted in 2007 showed 77% of respondents were not

using intracameral antibiotics post-operatively at that time, however 82% responded that they would be more likely to use intracameral antibiotic prophylaxis if a reasonably priced commercial preparation was available.¹³ As in Australia, there is currently no commercially available single use preparations of intracameral antibiotics in the USA. The ASCRS believe that an approved commercial preparation should increase the safety of cataract surgery by better providing endophthalmitis prophylaxis, and have called on the pharmaceutical industry and the U.S Food and Drug Administration (FDA) to prioritise the development and approval of such products.

7.2.4 Pre-operative antisepsis

The Therapeutic Guidelines state that prevention of endophthalmitis is multi-factorial, and includes “antisepsis of the peri-ocular area and ocular surface”, however they do not provide a specific recommendation to achieve this.¹

Several studies have supported the use of povidone iodine (PVI) in ocular surface preparation prior to cataract surgery.^{14,15} The ESCRS guidelines⁷ recommends:

“A mandatory step to reduce bacteria in the wound area is to apply povidone iodine 5-10% to the cornea, conjunctival sac and periocular skin for a minimum of three minutes prior to surgery. Where povidone iodine is contraindicated (true allergy is rare and hyperthyroidism only a relative contraindication to this singular use), aqueous chlorhexidine 0.05% may be used.”

The guidelines also state *“complete sterilization of the ocular surface should not be expected, with PVI alone, or with addition of topical antibiotic drops”*

The survey did not investigate the use of pre-operative antisepsis and it is likely that pharmacists do not know if or what antiseptic is used in eye surgery in their hospitals.

7.2.5 Use of irrigating solutions

This survey did not investigate the use of antibiotic irrigation solutions. This may also be of interest as recommendations regarding their use (or more appropriately non-use) have been made.¹

According to the 2013 ESCRS guidelines⁷, problems associated with the use of certain antibiotic irrigations, in particular aminoglycosides, are the potential risks of retinal toxicity and development of bacterial resistance. The use of irrigating solutions for prophylaxis is not recommended in these guidelines.

7.3 Prevention of inflammation post-surgery

Approximately 38% (6/16) of the respondent hospitals reported using pre-operative topical corticosteroid eye drops. The majority of hospitals (88%) reported prescription for post-surgical use. Approximately 70% of respondent hospitals reported using non-steroidal anti-inflammatory drugs (NSAIDs) topically prior to surgery and 38% used them post-surgery. (5 were a continuation of therapy and 1 was a new prescription).

Three hospitals did not routinely prescribe either corticosteroid or NSAID eye drops pre- surgery. Two hospitals did not routinely prescribe either corticosteroid or NSAID eye drops post- surgery. Four and six hospitals prescribed both corticosteroid and NSAID eye drops for pre-surgical and post-surgical use, respectively.

Both corticosteroids and NSAIDs have anti-inflammatory activity albeit by different mechanisms. The corticosteroid preparations reported to be used by the respondent hospitals, dexamethasone, prednisolone, fluoromethalone and prednisolone/phenylephrine, are indicated for '*Allergic and selected inflammatory conditions of lids, conjunctiva, cornea, iris and ciliary body, including postoperative inflammation*'¹⁶

Diclofenac, and ketorolac are two NSAID eye drops currently available for use in Australia. They may be used as an analgesic, or to prevent inflammation post-eye surgery and may be corticosteroid-sparing.¹⁶ They, along with corticosteroids, may mask ocular infections. The Australian Medicines Handbook (AMH) also states "*these agents have an insignificant effect on intraoperative miosis (marketed indication) and are used more as an alternative or adjuvant to topical corticosteroids*".¹⁶

A recent systematic review, "Post-cataract prevention of inflammation and macular oedema by steroid and non-steroidal anti-inflammatory eye drops" by Kessel et.al, compared the efficacy of topical steroids with topical NSAIDs in controlling inflammation and preventing pseudophakic cystoid macular (o)edema (PCME) after un-complicated cataract surgery.¹⁷ The authors concluded:

"Topical NSAIDs are more effective than topical steroids in preventing inflammation and reducing the prevalence of PCME after uncomplicated phacoemulsification with posterior chamber intraocular lens implantation. We did not find any indication that the use of topical NSAIDs was associated with a higher risk of adverse events than topical steroids nor was there any difference in the visual outcome. The intra-ocular pressure (IOP) was higher in patients randomised to topical steroids. We recommend using topical NSAIDs after cataract surgery to prevent inflammation and macular oedema."

The study did not review the optimal commencement of prophylactic topical NSAIDs. The authors cited other studies comparing commencement times of ketorolac¹⁸ and diclofenac.¹⁹ These studies found that pre-operative administration was "significantly more effective in controlling inflammation than administration starting the day of surgery or the day after surgery." The authors therefore deduced that "*it seems advisable to start NSAIDs at 1 to 3 days before planned surgery*." While survey responses indicated that the use of NSAIDs was more commonly commenced pre-operatively than post-operatively, it was not clear when they were commenced and this could be further explored.

The Kessel et al. study suggests NSAIDs are superior to steroid drops (regardless of the steroid potency) and are not associated with an increased risk of adverse reactions.¹⁷ Survey responses suggested that NSAID eye drops were more commonly prescribed than corticosteroid eye drops pre-surgery and corticosteroid eye drops were more commonly prescribed post-surgery. A number of hospitals prescribed both preparations before and after surgery. It is unclear whether the variation in the survey results is due to use in eye surgeries other than cataract surgery, where the evidence is more substantial.

The ESCRS is currently conducting a multi-centre study comparing the effect of topical bromfenac and dexamethasone for the prevention of PCME.

7.4 Supply of eye medicines for routine eye surgery

Although supply practices varied, approximately 73% (11/15) of respondent hospitals supplied eye medications from the hospital pharmacy. On average, each patient is supplied two medications, either as pre-labelled ward stock or by individual dispensing from pharmacy (often by standing order). This is a resource-intensive activity for hospital pharmacy departments, with frequent wastage of dispensed items as these are often returned as unused to hospital pharmacies. Respondents raised concerns regarding inadequate patient counselling.

There is potential for the dispensing load to be reduced if the guidelines recommendations are adopted by Australian eye surgeons.

7.5 Lack of clinical audit and quality improvement activities

Two hospitals provided responses relating to quality improvement initiatives for medications used for eye surgery. One hospital had initial discussions regarding appropriate antibiotic prescribing with the Head of Ophthalmology occurring as part of antimicrobial stewardship activities. Another hospital was developing patient leaflets for post-cataract surgery discharge medications, and were preparing to audit the use of chloramphenicol eye drops post-operatively for elective surgeries. Clinical audit and quality improvement activities (if required) are recommended by the Australian Commission on Safety and Quality in Health Care and can provide evidence for facility accreditation. It is recommended that routine ophthalmic surgery is not overlooked as an opportunity for quality improvement projects, particularly given the volume of patients undergoing cataract surgery.

7.6 Limitations

This survey has a number of limitations, which include: the small representative sample; lack of private hospital participation; no analysis of eye medicine use according to type of surgery was undertaken or hospital location; a lack of knowledge of respondents regarding the prescription and use of medicines for eye surgery; not all survey questions attracted responses, possibly due to misinterpretation on the part of respondents; and there may be a lack of awareness of community pharmacy involvement in dispensing of eye medications and patient counselling. Additionally, there is no patient outcome data to determine what might be the consequences to patients of the wide variation in practice and poor adherence to evidence-based recommendations.

8 Outstanding Issues

The survey results have highlighted the following issues. Suggestions for the way forward have been made in order to gauge interest. Considerations regarding funding and resourcing have not been made at this stage.

8.1 Need for promotion and/or development of Australian guidance for prevention of endophthalmitis and PCME post cataract surgery or other eye surgery

Currently there appears to be only moderate adherence to the published Australian guidance for the prevention of endophthalmitis. The Australian Commission on Safety and Quality in Health Care (ACSQHC) published Antimicrobial Stewardship Clinical Care Standard in 2014.²⁰ Quality Statement 9 states *'If a patient having surgery requires prophylactic antibiotics, the prescription is made in accordance with the current Therapeutic Guidelines (or local antibiotic formulary), and takes into consideration the patient's clinical condition.'*

Australian guidance for prevention of PCME post cataract surgery may also be useful in the future. While recent international studies have examined the use of anti-inflammatory eye medicines pre and post eye surgery, consensus is yet to be reached. Presumably the findings of the on-going multi-centre ESCRS study on the prevention of PCME can be used to inform local practice once published.

Development, promotion and implementation of Australian guidelines could have a number of benefits:

- improved patient outcomes including a potential for reduced antibiotic resistance, reduced costs to patients with reduced prescriptions of topical eye preparations and reduced complexity of therapy; and
- reduction in the number of eye medicines dispensed for patients undergoing routine eye surgery could also decrease hospital pharmacy workload, and reduce wastage and direct and indirect costs relating to this group of medicines. As cataract surgery is a widely performed procedure, any reduction in pharmacy workload or associated costs could be significant

Proposal:

- NSW TAG commences stakeholder consultations that include the ACI Ophthalmology Network NSW, the Royal College of Australian and New Zealand College of Ophthalmology (RANZCO), ACSQHC and state jurisdictions with the intent of exploring the preparation of Australian guidelines, clinical pathways and/or a position statement regarding the use of prophylactic antibiotic and anti-inflammatory eye medicines for routine eye surgery, in particular, cataract surgery. There appears to be recently published, good quality evidence to support a consistent national approach.

8.2 Lack of proprietary product for intracameral injection in Australia

A registered proprietary product is available in the UK and Europe.⁸ Intracameral (IC) administration of cephazolin for the prophylaxis of endophthalmitis post cataract surgery is an off-label indication in Australia, IC injection of cephazolin is not described in the Australian Injectable Drugs Handbook 6th Edition²¹.

Proposal:

NSW TAG investigates the potential availability of intracameral cefuroxime preparation in Australia, as this could potentially increase patient safety by reducing risk of endophthalmitis post intra-ocular surgery as well as decreasing the potential for toxic anterior segment syndrome due to risks associated with preparation of solutions of cephazolin.

8.3 Ensuring adequate patient counselling

Concerns have been raised that inadequate patient counselling may be occurring and require addressing. The ACSQHC Quality Statement 5 states *'When a patient is prescribed antibiotics, information about when, how and for how long to take them, as well as potential side effects and a review plan, is discussed with the patient and/or their carer.'*²⁰

Proposal:

- NSW TAG further investigates the adequacy of patient counselling with the potential to collaborate with and other organisations such as NPS MedicineWise for further development and/or support of patient counselling resources for eye medicines use, particularly at discharge. A clinical audit of patient counselling activities may also be useful, possibly with baseline measurement and post-intervention, providing evidence of quality improvement to continuity of medicines management processes.

8.4 Quality improvement activities

The survey respondents were generally unaware of any quality improvement activities undertaken with regard to use of eye medicines in routine eye surgery. This may not be correct but simply mean that pharmacy has not been involved with these activities. Nevertheless given accreditation requirements, hospital drug and therapeutics committees' oversight of quality improvement activities with a focus on antimicrobial stewardship and acknowledged barriers to understanding medicines use in operating theatres, it would likely be of value to further explore the use of medicines particularly antibiotics in routine eye surgery.

Proposals:

- NSW TAG and other stakeholders co-ordinate a multi-centre multidisciplinary drug utilisation evaluation project regarding the use of all antibiotic preparations in patients undergoing eye surgery in order to understand variation in practice, identify barriers and enablers to best practice recommendations, and investigate ways by which quality improvement can be achieved.

- Alternatively or additionally, that NSW TAG discusses with RANZCO the potential for antibiotic use to be incorporated into their new Cataract Clinical Audit Tool (RCAT), or develop a QUM indicator and data collection tool for eye surgery accompanied by development of strategies for quality improvement noting that National Quality Use of Medicines Indicator 2.1: *Percentage of patients undergoing specified surgical procedures that receive an appropriate prophylactic antibiotic regimen* could be modified .

9 Conclusions

NSW TAG's analysis of the survey responses highlights a number of issues that warrant further investigation: i) significant variation in practice that appears unwarranted; ii) lack of adherence to guideline recommendations for antibiotic prophylaxis for routine eye surgery, i.e. the use of topical antibiotics pre and post-surgery, insufficient use of intracameral antibiotics and when they are used, and the apparent use of non-recommended antibiotics; iii) the deficient evidence base for use of corticosteroid eye drops to prevent inflammation post-eye surgery and possible unnecessary duplicated use of anti-inflammatory products; iv) the lack of a proprietary product for intracameral injection; v) potential for harm and unnecessary costs with the use of eye medicines further compounded by inadequate counselling; and, vi) the lack of clinical audit and quality improvement activities in NSW hospitals, which should ideally include outcome data. It would seem that a greater adherence to current evidence base would result in a reduced need for the dispensing of eye drops pre- and post-surgery. Such a reduction in workload may enable opportunities for patient counselling regarding medicines use post-surgery, improved follow-up and safer and more effective medicines use with potential for improved patient outcomes as well as the capacity to implement quality improvement.

Please note that all information and policies are only current at the time the response is sent and individual hospitals should be contacted to ascertain current policies and practices. The responses received are only representative of the hospitals participating in the discussion at the time and do not necessarily indicate a complete picture of current practices. Information sharing occurs on the understanding that due acknowledgement will be given to the original source and that the information will not be quoted or used out of the context of the discussion. Permission should be sought from the original source before any policy, protocol or guideline is used or applied in another setting.

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Appendix 1: Survey Monkey questionnaire to NSW public hospitals regarding eye medicines use for routine eye surgery in NSW public hospitals

Medicines for eye surgery

NSW TAG survey: Clinical pathways & prescribed eye drops for routine ophthalmic surgery

NSW TAG has received a query from a member about current eye drop dispensing practices for those undergoing eye surgery.

Further enquiry suggested that there may be significant variation amongst hospitals regarding the type of eye preparations prescribed for patients undergoing routine eye surgery (pre- and post-surgery), that the number of eye preparations dispensed vary, as well as how and when they are supplied. For example, with respect to antibiotic prophylaxis for ophthalmic surgery, the Therapeutic Guidelines Antibiotics 2014 question the use of topical antibiotics pre-operatively and post-operatively and yet these are widely used [eTG 2015].

For the purposes of this survey, routine eye surgery includes cataract and pterygium surgeries and trabulectomy. Other eye surgeries may also be classified as routine at your hospital.

We would be grateful if you could provide:

- a) if available, a copy of your hospital's clinical pathway for eye surgery via email to NSW TAG (nswtag@stvincents.com.au), and
- b) feedback regarding prescribing and dispensing practices at your hospital for routine eye surgery.

1. What is the name of your hospital?

2. Does a Drug and Therapeutics Committee (or similar) have responsibility for formulary, oversight of standing orders and/or policies/ protocols concerning eye medicines?

- Yes
- No
- Not sure

3. Approximately how many patients undergo routine eye surgery at your hospital each week?

Medicines for eye surgery

4. Please indicate which eye surgery is **routinely** performed at your hospital, whether there is a documented clinical pathway and whether standing orders are used for the prescription of eye drops for these surgeries

	Performed	Clinical pathway	Standing orders
Cataract surgery	<input type="text"/>	<input type="text"/>	<input type="text"/>
Pterygium surgery	<input type="text"/>	<input type="text"/>	<input type="text"/>
Trabeculectomy	<input type="text"/>	<input type="text"/>	<input type="text"/>
Other routine surgery	<input type="text"/>	<input type="text"/>	<input type="text"/>

Please specify "other routine surgery"

Please supply a copy of your hospital's clinical pathway for routine eye surgery to NSW TAG at nswtag@stvincents.com.au

5. Please indicate which are the specific eye medicines most commonly prescribed for routine eye surgery under each category at your hospitals **as well as** those which are continued post-surgery. Also indicate if an alternative agent is prescribed, for example by different surgeons. **Note:** exclude local anaesthetic eye preparations in this answer.

	Antibiotics	Corticosteroids	Other eye preparations (1)	Other eye preparations (2)
Most commonly ordered pre-surgery	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Alternative (less frequently prescribed pre-surgery)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Continued by patient post-surgery	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

6. If preservative-free eye preparations are routinely manufactured for use in eye surgery, please select the sources/s of supply:

7. Please list any preservative-free eye drops that are routinely manufactured for use in eye surgery (drug, strength and volume).

8. Is intracameral administration of antibiotics used during routine eye surgery at your hospital

- Yes
- No
- Don't know

Medicines for eye surgery

Post-surgery

The answers to these questions will assess the range of practices and pharmacy workload.

9. When are eye medicines for discharge use dispensed?

	Timing of dispensing
Antibiotics	<input type="text"/>
Corticosteroids	<input type="text"/>
Other anti-inflammatories	<input type="text"/>
Other (specify below)	<input type="text"/>
Other (please specify)	<input type="text"/>

10. On average, how many eye preparations per patient are PRESCRIBED for post-discharge use?

11. On average, how many eye preparations per patient are DISPENSED for post-discharge use?

12. Please list any other medicines routinely dispensed / supplied on discharge after eye surgery (for instance, acetazolamide, oral analgesics or anti-inflammatories.)

Medicines for eye surgery

Dispensing of eye preparations pre- and post- surgery

13. For those hospitals supplying pre-labelled eye preparations to patients: please provide details how this practice is monitored.

14. Please provide examples of any systems-based approaches that your hospital have adopted to reduce the impact on pharmacy workload. (For instance: all eye-drops for use on discharge are dispensed on prescription prior to surgery)

15. Which of the following, if any, have been raised as concerns with the supply and dispensing of eye preparations for routine eye surgery? (please select any that apply to your hospital)

High workload associated with supply

High cost of eye preparations for the patient High cost of eye

preparations for the hospital Patient harm

Inappropriate use

Inappropriate prescribing

Wide variation in the prescribing practices

Inappropriate storage

Inadequate patient counselling

Other (please specify)

16. Please provide further details on the options that you have selected in question 15 (above)

17. If there have been quality improvement activities or a change to clinical practices around eye surgery and supply of preparations, please supply details.

Medicines for eye surgery

Survey end

NSW TAG thanks you for your participation in this survey. Please provide any clinical pathways, as per question 4 to nswtag@stvincents.com.au, or call 02 8382 2852.

Appendix 2: Pre- and post-surgical topical eye medicines most commonly prescribed at individual hospitals

Hospital	Pre-surgical prescription				Post-surgical prescription			
	Antibiotic	Corticosteroid	NSAID	Other	Antibiotic	Corticosteroid	NSAID	Other
1	Nil	Nil	Nil	A/cholinergic	Chloramphenicol	Dexamethasone	Ketorolac	Nil
2	Nil	Prednisolone+ phenylephrine Dexamethasone (A)	Diclofenac	Phenylephrine A/cholinergic Minims (A)	Chloramphenicol	Prednisolone +phenylephrine	Diclofenac	Nil
3	Nil	Nil	Ketorolac Minims Diclofenac Minims(A)	Phenylephrine + A/cholinergic Minims	Chloramphenicol	Prednisolone	Nil	Nil
4	Chloramphenicol	Dexamethasone	Nil	Nil	Chloramphenicol	Dexamethasone	Nil	Nil
5	Chloramphenicol Ciprofloxacin (A)	Dexamethasone Fluoromethalone (A)	Ketorolac Diclofenac (A)	Phenylephrine	Nil	Nil	Nil	Nil
6	Nil	Nil	Nil	Nil	Chloramphenicol	Prednisolone + phenylephrine	Nil	Nil
7	Nil	Nil	Nil	Nil	Chloramphenicol	Dexamethasone	Nil	Nil
8	Chloramphenicol	Dexamethasone	Diclofenac	Phenylephrine	Chloramphenicol	Dexamethasone	Nil	Nil

9	Nil	Nil	Diclofenac Diclofenac minims(A)	Phenylephrine + A/cholinergic Minims	Nil	Nil	Nil	Nil
10	Chloramphenicol Ciprofloxacin (A)	Dexamethasone	Nil	Nil	Chloramphenicol	Dexamethasone	Nil	Nil
11	Chloramphenicol	Prednisolone	Diclofenac	Nil	Chloramphenicol	Prednisolone	Diclofenac	Nil
12	Ofloxacin	Nil	Ketorolac	Phenylephrine + A/cholinergic Minims	Ofloxacin	Prednisolone + phenylephrine	Nil	Nil
13	Ciprofloxacin Chloramphenicol (A)	Nil	Ketorolac	Phenylephrine + A/cholinergic Minims Phenylephrine (A)	Ciprofloxacin	Prednisolone + phenylephrine	Ketorolac	Nil
14	Ciprofloxacin Chloramphenicol (A)	Nil	Ketorolac	Phenylephrine + A/cholinergic Minims	Ciprofloxacin	Prednisolone + phenylephrine	Ketorolac	Nil
15	Ciprofloxacin	Nil	Ketorolac	Phenylephrine +A/cholinergic Minims	Ciprofloxacin	Prednisolone + phenylephrine	Ketorolac	Nil
16	Nil	Nil	Diclofenac		Chloramphenicol	Prednisolone + phenylephrine	Ketorolac (not routine, on occasion)	Nil

** Alternative (A); Responses received between April and September 2015