Best Practice

Intravitreal injections: safely and sustainably

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NOG NEDERLANDS OOGHEELKUNDIG GEZELSCHAP

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1. Summary: advice intravitreal injections (IVI)

In the Netherlands the number of IVIs has increased from 100,000 in 2012 to 450,000 in 2022 (ref: Nederlandse Zorg Autoriteit). If we would only use essential ways of working and materials, we would save on cost, waste, and CO_2 emissions. One has to therefore look at what is used in IVIs, and where necessary, change practice. We advise to use the following:

Essential
- Face mask (injector and assistant)
- Sterile gloves for injector*
- Topical anesthetic drops
- Iodine 1-5%
- Cotton buds for prepping skin and eyelids
- Sterile speculum

Optional
- Hat
- Marker
- Cotton bud for massage
- Ointment

* *As a result of the SRI guideline " Desinfectie huiden slijmvliezen plus puncties" of 2024. The NOG is in talks with the SRI group about a separate modile on intravitreal injections to challenge the use of gloves.*

Not required

- Drape
- Forceps
- Surgical scrub (for injector and patient)
- Trolley drape
- Pre and post IVI antibiotics

Tips:

- Iodine can be poured over swabs/ cotton buds instead of put in a container
- Use bottles of anesthetic instead on minims
- Minims can be used for more than one patient, if used non touch
- Use pack wrapping instead of separate drape.

2. Why this Best Practice?

Intravitreal injections of medications was introduced in 2003. Following this, IVI numbers exploded. In the Netherlands the number has increased from 100,000 in 2012 to over 450,000 in 2022. There is no alternative for this mode of very successful but labour intensive treatment in the foreseeable future.

Main complications are endophthalmitis, lens capsule perforation, corneal abrasion and subconjunctival hemorrhages. Endophthalmitis is the most feared complication, and this happens in 0,01 of cases (Patel, 2021). Guidelines are meant to be focussed also on minimising this complication.

The aim of this Best Practice document is to advise practitioners in the Netherlands on how to safely and sustainably perform these injections. Not using certain materials and instruments has the most impact on sustainability, followed by re-use, and finally recycling of materials (the reduce, reuse, recycle adage). Considering the huge numbers of this procedure, small changes can have a major impact on cost, waste and CO_2 emissions. Thus, it is important to only use essential materials and instruments, and not use anything that does not add value.

3. What do current guidelines say?

In the Netherlands, we follow the LDM guidelines. The 2014 version on this topic is contained within it's set, updated in 2023.

In 2024 an overriding guideline on "skin, mucosa, and incisional disinfection" in the head, neck, and eye chapter was introduced in the "Samenwerkingsverband Richtlijnen Infectiepreventie" (SRI), which is an all encompassing infection prevention guideline. IVIs are not in fact mentioned at all.

4 risk categories are distinguished in this guideline, where IVI are classed in risk profile 2: low risk, with serious consequences. This category proscribes hand hygiene, mask, and sterile gloves.

This guideline diverges from the LMD-guideline where sterile gloves were only optional. Until an exception is made for IVIs in the "skin, mucosal and incisional disinfection" guideline, risk profile 2 prescription needs following.

Logistics
Bilateral IVIs is possible, according to the LMD guideline. Each injection should be treated as a new procedure, with new instruments, packing, prep, etc. Patients should be informed of the possibility of bilateral endophthalmitis. The advantage of immediately sequential procedure is the reduction in travel for the patient, and it's consequent reduction in CO_2 emissions.

Rooms
There are differences in the required sterile environments of rooms used between countries.

In US and Canada often, intravitreal injections are done in office rooms/consultation rooms, whilst in other countries treatment rooms are used, or even theatre rooms. Is there any variation in endophthalmitis rates in between these different environments? In the US we see incidences of between 0.029%-0.057%. Theatre use is reflected in rates of 0.009%-0.021%. Comparative studies could not establish a statistically significant difference. Neither was there an effect in air treatment (Dossarp 2015)

The Euretina panel concluded: "theatre, treatment room or office are all recommended for IVIs".

Anesthetic
Tetracaine, proxymetacaine, lidocaine drops can be used, without there being a significant difference. Cotton buds, soaked in these drops was also not found to make a difference in patient comfort.

Infection control
As described above under 3) What do current guidelines say?: apply iodine 1-5% at least twice on the ocular surface, as well as application of iodine 1-10% on the skin around the eye. In case of iodine allergy, use aqueous chlorhexidine (0,05%).

Peri-operative antibiotics and dilation
The LMD guidelines of 2013 stipulates that neither is required in case of intravitreal injections.

Injection location
There is international agreement on locating the injection site at 3.5-4 mm behind the limbus. In US survey respondents, only 56% claimed to measure this distance, mostly with a marker. No mention is made of the need for markers.

Speculum
The need for a speculum has been proven when IVIs were started in a pegabtanib placebo controlled prospective trial (Mansour et al 2012). Alternatives have been looked at, but the consensus is that is should be used as standard. There is no preference for a particular type of speculum, be it single use or reusable.

A recent german study among 8 clinics looked at endophthalmitis risk and variations in IVI technique: optional speculum use was not found to make a difference (Birtel et al, 2023).

Attire, drapes, gloves

As per above, the generic 'super guideline' Skin, Mucosa, and Incisional disinfection of the Samenwerkingsverband Richtlijnen Infectiepreventie " (SRI) has recently been published. It contains advice in relation to injections, without mentioning specifically Intravitreal Injections.

4 risk categories are distinguished. In category 2 (low infection risk, serious consequences) we find IVIs. It contains guidance on gloves, masks and hand hygiene. It diverges from the LMD-guideline which mentions sterile gloves as optional. Until a specific exception has been made for IVIs, sterile gloves are advised.

In relation to drapes, there have been no prospective studies in Intravitreal Injections. The US expert panel (Avery 2014) mentions drapes optionally. An opaque ophthalmic drape can cause distress with patients. It also takes time, and was, in a Cochrane review, in 5 randomised trials found to cause more infections (Tailor 2011; Webster 2013). It is therefore better not to use ophthalmic drapes.

A recent german study in 8 eye clinics was looking at reducing various steps in IVIs. This included the option of drapes: no difference was found regarding post procedure infections.

Mask

The LMD guideline of 2023 advises a mask during the whole procedure: to be worn by the injector and assistant, but not the patient. It can be worn for the whole session, as long as the treatment room has not been left, the mask has not become wet, and the mask has not been removed.

Patients should not be talking during the procedure, as oral flora may spread.

Hats and gowns are not mentioned, but seem to convey little in terms of infection control.

Eye pad

No mention is made in the US or European guidelines on eyepads post procedure. There seem to be no medical reasons, as the wound is sealed off. Patient comfort might be the only reason for applying one.

4. Conclusion

Given the huge numbers of IVIs performed, it is important to only use the absolute essentials for the procedure only.

For reasons of cost control, waste, and CO_2 emissions it is worthwhile to re-assess the use of materials in your practice, and consider changing. This Best Practice aims to help in this process.

5. Example of cost control

At University Hospital Utrecht, the use of a disposable IVI set was standard for years. It contained a plasticated drape, metal speculum, 2 plastic cotton buds for disinfection of skin, 1 cotton bud for anesthetic application, a plastic marker, a gallipot for the iodine, and a plastic container for all this. It's weight was 135.5 gram. This was adapted in accordance with Best Practice.

2 plastic containers were taken off, a much smaller paper trolley drape, and a smaller container resulted in weight reduction to 66.5 gram. Recycling the paper and plastic resulted in a CO_2 emission reduction from 0.68 KG CO2e to 0.17 CO2e (table 5).

If 75 % reduction in CO_2 could be obtained to 450,000 IVI nationwide, this would reduce CO_2 emissions by 229,500 Kg.

6. About the standing of Best Practice documents

It is important to state that this Best Practice is advisory, and not mandated: it is not a guideline. It is ment to make practice more sustainable. A guideline is more or less binding, though one can diverge based on sound reasons. Best Practices are built on the foundation of guidelines, evidence based, and approved by the Quality Commission of the NOG, in consultation with the Medical Retina group.

Thus: one can diverge from Best Practice guidelines, though it is encouraged to implement these in your practice.

In future all guidelines will contain sustainability paragraphs.

Disclaimer:

- *None of the authors have declared conflicts of interest*
- *This advice has been collated based on evidence available at the time of writing*
- *This Best Practice is meant to support current processes, but is not a guideline*
- *Even though care has been taken to put this document together, the NOG cannot be held liable for it's contents.*

7. References

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8. Figures and tables

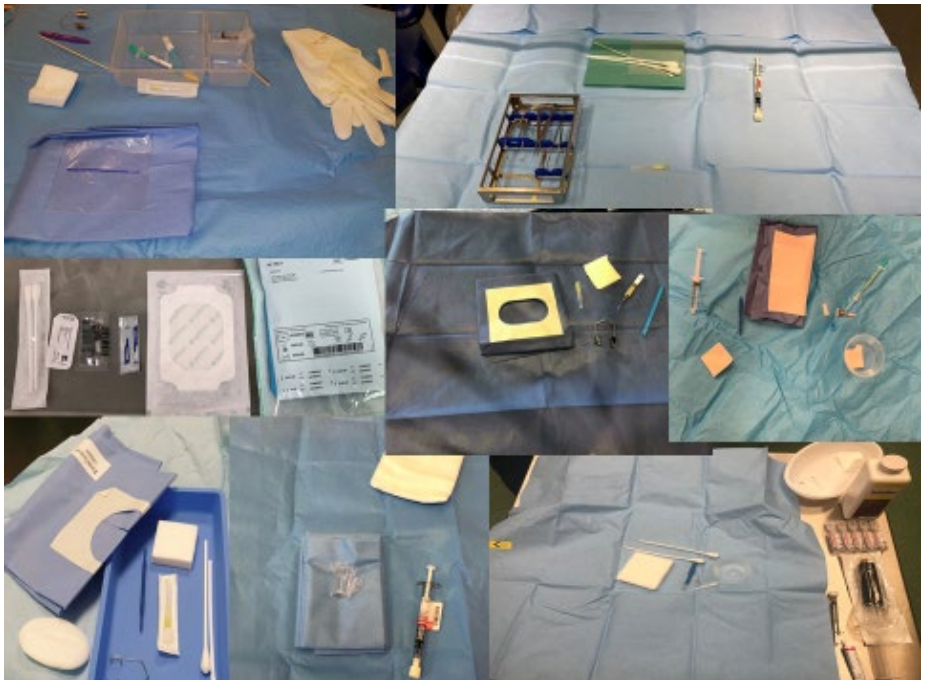

Figure 1
Various IVI sets in the Netherlands.

Table 2. Areas of General Agreement by Committee Members

Povidone–iodine (5–10%) should be the last agent applied to the intended injection site before injection. If a gel anesthetic is used, povidone–iodine should be applied both before and after application of gel, as retained gel may prevent povidone–iodine from contacting the conjunctival surface of the injection site
Pre-, peri-, or postinjection topical antibiotics are unnecessary
There is no evidence to support the routine use of a sterile drape
Avoid contamination of the needle and injection site by the eyelashes or the eyelid margins
Avoid extensive massage of the eyelids either pre- or postinjection (to avoid meibomian gland expression)
Use adequate anesthetic for a given patient (topical drops, gel, and/or subconjunctival injection)
Use of sterile or nonsterile gloves as consistent with modern office practice, combined with strong agreement regarding the need for handwashing before and after patient contact
Either surgical masks should be used or both the patient and providers should minimize speaking during the injection preparation and procedure to limit aerosolized droplets containing oral contaminants from the patient and/or provider
Monitor IOP both pre- and postinjection
Routine anterior chamber paracentesis is not recommended

Table 3. Areas With No Clear Consensus by Committee Members

Need for povidone–iodine application to the eyelids, including the eyelashes and eyelid margins. All agreed that when povidone–iodine is applied to the eyelashes and eyelid margins, eyelid scrubbing or eyelid pressure adequate to express material from the meibomian glands should be avoided
Use of a speculum (some prevent contact between the needle/injection site and the eyelashes and eyelids with manual lid retraction)
Need for pupillary dilation and postinjection dilated examination of the posterior segment (although some viewed the return of formed vision as sufficient, others routinely dilate the pupil and examine the posterior segment after injection)
Use of povidone–iodine flush (most preferred drops only and saw no benefit to allowing the povidone–iodine to dry before injection)

Figure 2
From Avery et al, 2014

Table 1. Expert consensus recommendations on intravitreal injections (IVI)

Subject	Recommendations
Clinical setting for IVI	Operating theater, adequate room or in-office setting
Anesthetics	Topical anesthesia No recommendation for a specific substance or technique
Topical antisepsis	Topical administrations of 5% povidone-iodine over at least 30 s into the conjunctival sac. Chlorhexidine for patients with local irritation due to povidone-iodine
Perioperative antibiotics	Not recommended
Pupil dilation	No concluding recommendation, but it might be advisable for beginners in order to be able to immediately examine the retinal vessel perfusion after IVI
Globe softening	No recommendation Might be considered in vulnerable eyes
Lid speculum	Sterile speculum is recommended
Needle gauge and length	30-gauge or thinner needles are recommended for liquid injections whereas larger needles should be used when necessary
Injection location	Inject through the pars plana, between 3.5 and 4 mm from the limbus Switch injection sites if patients receive repeated IVI
Feasibility of bilateral injections	Handle each injection as separate procedure
Gloves/draping	Gloves are recommended Draping may not be essential
Use of facial masks	Face masks recommended

Figure 3
From Grzybowski et al, 2018.

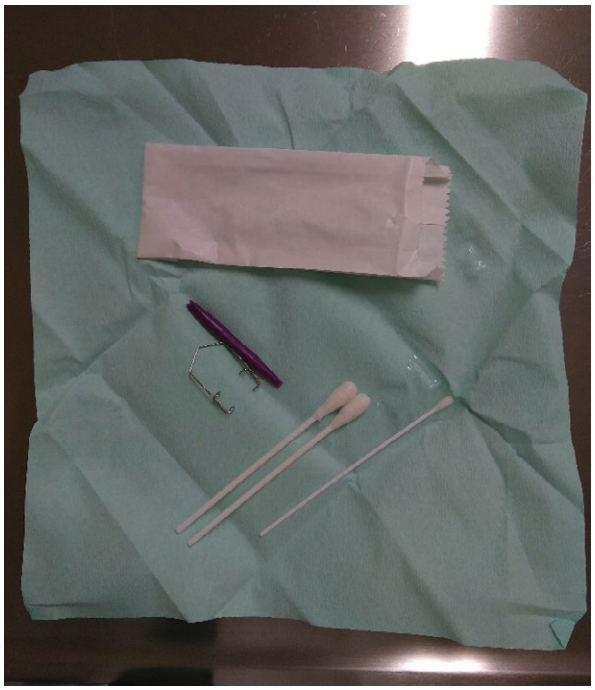

Figure 4
Minimum disposable IVI set. See paragraph 5.

	Total waste	Residual waste	CO_2 footprint
Baseline	135.5 g	135.5 g	0.68 kg CO_2
After reduction and reuse	66.5 g	66.5 g	0.36 kg CO_2
After recycling	66.5 g	34.5 g	0.17 kg CO_2
Reduction per injection	69 g (-50.9 g)	101 g (-74.5 g)	0.51 kg CO_2 (-75%)
Reduction per 50 injections	3.45 kg	5.05 kg	25.5 kg CO_2
Reduction per 300,000 injections	20,000 kg	30,300 kg	153,000 kg CO_2

Figure 5
Waste of disposable IVI sets in UMC hospital, split by weight, waste, and CO_2 emissions.