NHSEI National Eye Care Recovery & Transformation Programme

Efficient intravitreal injections

How to guide

Version	Date	Change Description / Highlights
1	15/02/2022	

Contents

1. Background

Intravitreal injections have revolutionised the treatment of several common ophthalmic conditions including wet age-related macular degeneration (AMD), diabetic macular oedema (DMO) and retinal vein occlusion (RVO). As a result, their use has increased significantly over recent years with a study from Moorfields finding that the number of injections increased nearly 11-fold from 2009 to 2019 with 44,924 performed in 2019 in this one unit. They also expect this to continue to increase with nearly 83,000 injections forecast for 2029, if the current agents and protocols remain as standard of care[1]. This places significant financial pressure on the health service, with NHS England estimating intravitreal drugs current annual cost at £400million which is expected to rise to £588million by 2026/7 representing 16% of the total spend on eye care.

The high-volume of intravitreal injections also provides an opportunity as they can be performed using a highly standardised process, to create an extremely efficient service with large numbers of injections given per 4-hour session. This can free up staff and estates to care for other eye conditions and improve care for all patients, reducing the burden on the HES. The move towards this approach for injections, and the methods used to drive improvements, are similar to those seen in the shift to high volume low complexity (HVLC) cataract surgery. In addition, as patents expire on the original innovator drugs, biosimilar agents may provide cheaper alternatives allowing significant cost savings to be realised and reinvested into eye services. Switching patients requires additional capacity in the service for things like retaking informed consent and, in some cases a change in injection frequency, and so implementing a highly efficient injection service now means that these future benefits are more likely to be realised. As new drugs emerge, the hope is that these will have a better effect on disease control allowing longer treatment intervals and reduced treatment burden, freeing up much more capacity.

This 'how to' guide provides useful information on how to design and implement a highly efficient dedicated intravitreal injection service with links to informative resources and case studies. The resource primarily concentrates on the established drugs and pathways, as has not covered in detail use of the new drugs. For example, units do need to consider how, if they are using Brolucizumab, to incorporate the need for a doctor to assess for intraocular inflammation and OPTOS imaging to exclude vasculitis. As further new drug products emerge, new steps in the pathway may need to be incorporated. However, the same principles to drive efficiency, in terms of standardised process, team working to drive improvements and explicit local protocols, applies for the introduction and ongoing use of such new drugs.

2. Existing policy and guidance

When setting up an intravitreal injection service, there are several policy documents that can help and ensure that this is done safely. The Royal College of Ophthalmologists (RCOphth) produced an ophthalmic service guidance on intravitreal injections in 2018 which provides an overview of how to deliver the injections[2]. The GIRFT ophthalmology report has suggestions and case studies setting out how to improve the efficiency of the service[3] and the UK Ophthalmology Alliance (UKOA) also has guidance including a detailed description of how Moorfields implemented a highly efficient service[4].

In 2020 a steering committee of retinal specialists from a variety of UK NHS hospital ophthalmology departments published a paper titled 'Providing a Safe and Effective Intravitreal Treatment Service: Strategies for Service Delivery' which provides an extremely useful guide for how to deliver a highly efficient service[5]. These guidance documents recommend that routine intravitreal injections not only can be performed by non-medical health care professionals (HCPs) but that this is necessary and desirable to be able to provide adequate care for the population given the significant increase in the number of injections that are required.

3. Developing the wider workforce

Although the licence for some of the common intravitreal drugs is for administration by an ophthalmologist, several policy documents have recommended that intravitreal injections can be delivered by non-medical HCPs provided certain conditions are met[5,6,7,8]. The RCOphth state that training nurses to perform intravitreal injections offers a solution to increased pressure on retinal services and issued a statement in 2013[9] indicating that The College considered it reasonable for non-medical HCPs to administer intravitreal drugs so long as certain stipulations are met. Since that time, GIRFT and the NECRTP have recommended that intravitreal injections should primarily by administered by non-medical HCPs[3,10]. The new NOD national AMD audit should provide real world large data evidence to allow comparisons of the safety and productivity of medical and non-medical injectors.

Creating a large pool of suitably trained HCP staff is important as this allows the service to run effectively, with appropriate cover for sickness and leave as well as ensuring that there are sufficient staff to provide additional sessions if required. It also reduces the frequency with which individual injectors are delivering high volume repetitive procedures and frees up medical clinical staff for other clinical activity such as outpatient clinics and surgery. Additional thought should be given as to whether some of the HCP injectors should also be developed as clinical decisions makers for face to face or virtual care of medical retina conditions. For example, Bristol Eye Hospital has nurse and orthoptist injectors who deliver the majority of the injection service and undertake clinical decisions; Leeds has developed non-medical injectors who work alongside consultants to make treatment and follow-up decisions as well as deliver injections. This requires systems in place for continuous learning and development including image interpretation and autonomous decision making. In addition, nurses and optometrists can also undertake independent prescribing qualifications and then can independently prescribe anti-VEGF injections[11].

Standards for non-medical HCP injecting and related training

The original RCOphth standards for HCP injectors from 2013 are[9]:

- The patient remains under the care of a named consultant ophthalmic surgeon at all times
- The HCP is fully trained in the rationale for the treatment, its effects, and possible complications both intra operative and post-operative.
- The HCP is fully trained in the technique of injection by an ophthalmic specialist doctor. *(note many units have more recently moved to cascade training by more senior HCP injectors overseen by a consultant)*

- The HCP giving the injection has immediate access to advice from an ophthalmic specialist doctor at all times whilst giving injections and that an ophthalmic specialist doctor is immediately available to manage any complications.

- There is a continuous audit of the injection service provided by HCPs. There should also be regular patient feedback. Further training must be available to the HCP if required.

- The hospital trust management is fully aware of, and supports the initiative, and all personnel are covered by appropriate indemnity.

- Consent. GMC-Guidance must be followed. This, including guidance on delegation of consent, and can be found at https://www.gmc-uk.org/ethical-guidance/ethical-guidance-for-doctors/consent (accessed 19.11.2018)

- The training of ophthalmic doctors in the giving of intra-ocular injections is essential. It must not be compromised by the injection service provided by HCPs.

More recently, the UKOA has produced consensus guidance which highlights that different clinical staff groups are able to develop additional skills and perform intravitreal injections with an outline provided for how to undertake a focused training course for this, stating[12]:

To be eligible for undertaking the procedure staff must have a minimum time of 1 year's post registration working experience, ideally in ophthalmology, and be:

- *Registered nurse (RN) at band 6 or above who must either hold an ophthalmic nursing qualification or have sufficient ophthalmic experience to be judged by their manager and lead retinal nurse/consultant ophthalmologist as competent to commence training,*
- *Registered orthoptist at band 6 or above who has sufficient ophthalmic experience to be judged by their manager and lead retinal nurse/consultant ophthalmologist as competent to commence training;*
- *Registered optometrist at band 6 or above who have sufficient ophthalmic experience to be judged by their manager and lead retinal nurse/consultant ophthalmologist as competent to commence training.*

Suitable staff members at band 5 level may commence training for an extended role in intravitreal injection clinics and progress to higher banding on completion of their training.

The guidance also sets out expectations for how to acquire this competency which is expected to take around 3 months. This can be provided entirely in-house however there are also courses available which provide non-medical HCPs with training in the delivery of intravitreal injections[7]. However, variations on the exact details of experience, supervised and performed cases before sign-off exist around the country and continue to develop as more experience is gained. The important thing is to ensure an agreed, safe but efficient process for the local department which is followed.

It is also worth noting that units with highly efficient pathways use lower banded nurses, technicians or health care assistants (HCAs) /Health Care Support Workers (HCSWs) to support their non-medical injectors in the pathway – to escort patients in and out of the room, aid them getting onto a couch,

supporting record keeping and safety checks, dealing with any issues. This way the injector can concentrate on the clinical and injection process – in the same way that efficient cataract surgery flow uses the theatre team so that the surgeon just operates. The potential for the use of technicians in the delivery of eye injections is currently being explored by the NECRTP.

4. Maximising efficiency

Having an efficient service is good for patients, to minimise visits and spend less time in the department on the day of the appointment, whilst also freeing up scarce staff time and space to care for other eye conditions. Below are several core recommendations, that look at the use of space and process mapping through to discharge of patients who no longer require treatment with further tips provided in appendix 1:

- Arrange estates to facilitate efficient patient flow within the department, with the vision room, waiting area and injection room close to each other and laid out in a way that facilitates flow e.g. a unidirectional flow pathway. It is also important to consider whether you need imaging or a clinical assessment room and, if so, these should be nearby and quick to access.

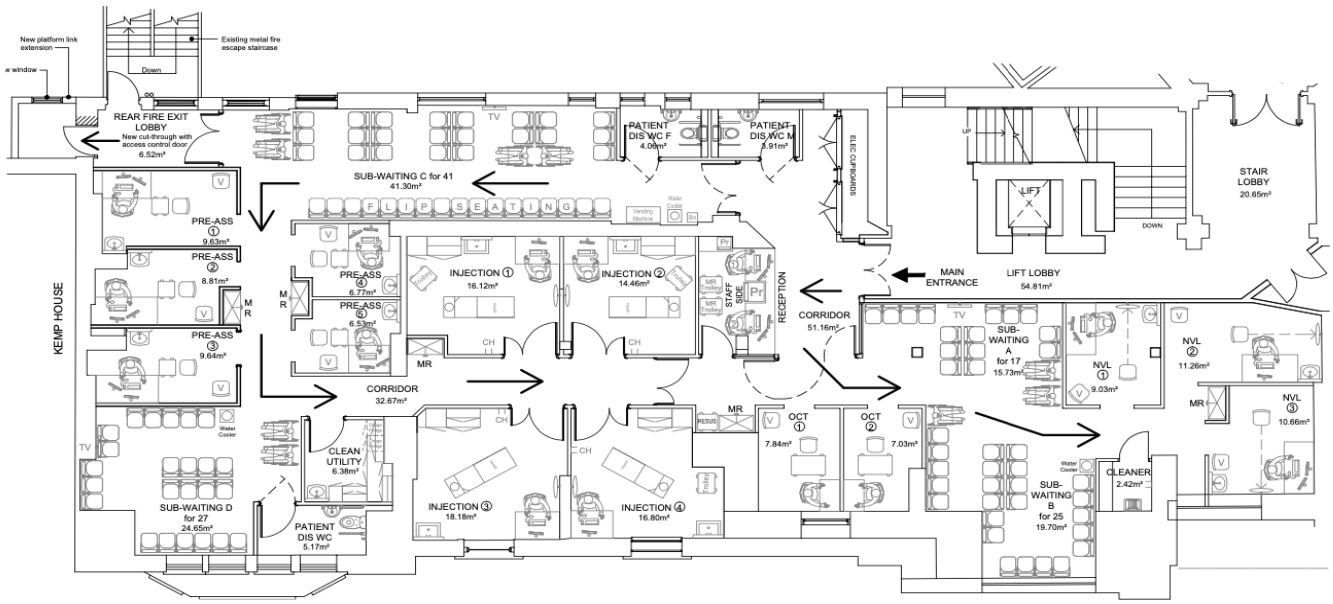

Figure 1: Floor plan from Moorfields eye hospital showing how patients move through the department in a circle creating an efficient flow whilst additional requirements such as OCT scans are close by if needed.

- Depending on the number of injections that need to be performed and the staffing available it could be useful to use two rooms per injector, as per the floor plan below, to increase numbers per injector. In this model an HCA or nurse gets the next patient in, ensures consent is up to date and signed, puts in iodine drops, does safety checks and ensures medication ready so injector only does a quick time out and injects. If the department has a backlog of patients requiring injections and adequate staffing a higher number of injections could be performed by running both rooms simultaneously with an injector in each. However, having

two rooms does then mean patients and staff having to move around more and there are units such as Frimley who are able to deliver high volume of injections with just one room for both checks and injections. There are many units who would, if they had two rooms, put an injector in each room every week.

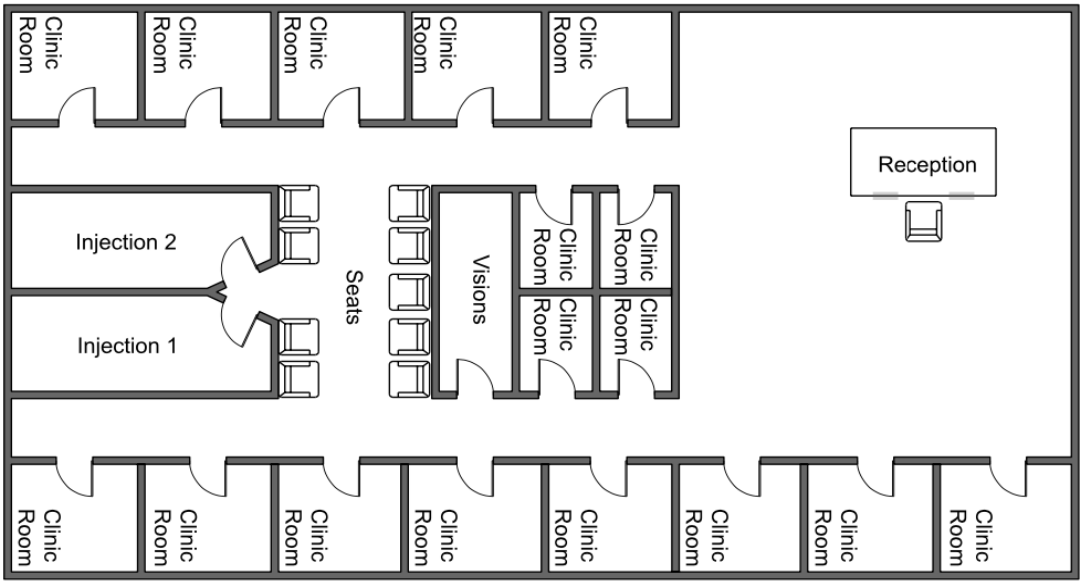

Figure 2: Floor plan showing how two injection rooms can be placed next to each other allowing a patient to be prepped in one room whilst the injection is performed in the other with the vision lane and seating area nearby

- Have a short SOP or protocol for pre-, during- and post-injection steps which is laminated and in an easy place for all staff to read (see appendix 2 for example injection SOP from the Oxford Eye Hospital)
- Working with the pharmacy team to have medication which is quickly and easily available
- Designing the pathway so that, when indicated, patients can have their first injection along with the initial diagnosis appointment as a 'one stop shop'. This requires adequate time for informed consent which can be achieved in different ways such as a remote consultation in advance to discuss the risks and benefits, provision of written and video information. Some units prefer a full face to face assessment and counselling on the first attendance to ensure the patient is well prepared for then a considerable time within virtual and injection-only attendances.
- Ensure the treatment plan is standardised and very clearly recorded, so everyone knows what the patient is due to have. For example, at the end of paper or EPR record the consultant might write "PLAN: right Eylea x3 4/52 apart and FU 8 weeks later with IVI + virtual review". One of the biggest hold ups is when the plan is not clear and HCP staff have to find a senior doctor to sort it out.
- Virtual clinics, when the patient has imaging which is reviewed later by the clinician, can be used for triage of new patients and for monitoring. This can be in conjunction with any treatment regimen and although is better for the patient with Treat & Extend (T & E) than PRN as the patient only has one visit rather than having to come back after the review for an injection if this is required[5]
- Consider your injection regimen as a T & E pathway may result in superior visual outcomes compared with a *pro re nata* (PRN) protocol. It may also have a lower treatment burden compared with a fixed

protocol, which is likely to improve service capacity. Lastly the predictable nature of a T&E approach compared with a PRN service may aid capacity planning for the future wet AMD treatment demand[13]

- When suitable for the patients' treatment plan, offer bilateral injections, as this saves visits for the patient and time spent getting the patient into the room and positioned
- For ongoing treatment, when retinal imaging is required, this should ideally be combined with the injection appointment to reduce visits for the patient. The images can however be reviewed later by the clinician to make service delivery easier and more flexible, but it remains a 'one-stop shop' for the patient. Alternatively, the images can be reviewed with the patient and if an injection is required the reviewing clinician is able to mark the eye and take consent if required
- Ensure that consent is for a course of treatment and then just reconfirmed briefly on the day of treatment although consent should be resigned after a locally agreed timeframe such as annually
- Consent should be taken in clinic or by staff outside the injection room to ensure this doesn't slow down the procedure. Consider using the specific intravitreal consent form developed by the UKOA and RCOphth[14]
- Ensure there are efficient safety checks to avoid wrong eye/patient/drug injections. A number of units use a triangulated process with HCA and doctor checking the patient and procedure (stop points for safety), not just done by the HCA and injector.
- Having adequate nursing or HCA support to prep patients so that the injector time is spent as efficiently as possible
- Topical antibiotics are not required routinely post intravitreal injection although iodine is essential to reduce the chance of endophthalmitis. If topical antibiotics are still being used this should be discussed locally as removing these can reduce the number of steps whilst saving money and plastic and reducing the threat of anti-microbial resistance[6]

Points to Consider for Effective Virtual Clinics; a Consensus View Based on the Experience of All Members of the Working Group

Redesign of Invitation-To-Appointment Letters	Patient Outcome Letters	Patient Information Leaflets	Nurse/Technician Triage for Comorbidities in Virtual Data Collection Clinics	Clarification of Management Practice and Key Performance Indicators
Explain to patients that an update of diagnosis may not be given on the date of attendance at a virtual clinic - specialists will review the data and then plan the next appointment.	May facilitate service tariffs (ie claiming reimbursement for virtual assessments). Outcome letters reassure patients with low-grade pathology that an urgent review is not needed. For example, patients that have been referred as fast-track nAMD but who actually have a low-grade epiretinal membrane (ERM), can be booked routinely into VR clinics.	Traditionally given out at baseline in most patient pathways. Patients in virtual clinics may have less time to ask questions and have reduced access to senior staff members. So patient information leaflets may need distributing frequently later on in the pathway. Patients need to understand the virtual clinic is no less rigorous than a face to face visit, Consider using a different term to describe these clinics eg Digital Assessment.	Helps to pick up problems that could impact on treatment, such as recent cerebrovascular accident (CVA) or ocular infection. Consider compiling a list of FAQs for nurses in these clinics. EPR can facilitate this if available. For example, symptoms of a recent CVA, signs and symptoms of conjunctivitis.	Virtual clinic staff are often re-deployed to face-to-face services to cover sick leave or peaks in activity. Consider protecting staff against this with a formal policy that might include locally agreed internal key performance indicators (KPIs) for virtual review timings. For example, 48 hours for data review from a virtual clinic event in order to protect reviewing staff.

Figure 3: Additional points to consider (taken from: Amoaku W, Bailey C, Downey L, et al. Providing a Safe and Effective Intravitreal Treatment Service: Strategies for Service Delivery. *Clin Ophthalmol*. 2020;14:1315-1328. Published 2020 May 15. doi:10.2147/OPTH.S233061 – Published by Dove Medical Press and reprinted with permission.

- It is important to consider stopping treatment in patients with stable disease or who are unlikely to get any functional improvement as per NICE guidance[15] Having policies in place to stop treatment when indicated is good for patients through reduced risk of harm and fewer visits whilst also reducing the number of intravitreal injections performed by the department.
- Do not lost sight of the patient as a person needing support, discussion and visual impairment support. The role of the ECLO is absolutely key to this and patients need to be able to access ECLO and other support throughout the injection or virtual assessment pathway.

5. Case study

The NECRTP has written up a case study demonstrating how an efficient injection service delivering 25 or more injections per injector in a 4-hour session in two rooms was implemented and can be found at the following link on the Eye Care Hub.
https://future.nhs.uk/NationalEyeCareHub/view?objectId=117128965

The key to the success of this service was having a team involving clinicians and managers, process mapping all the steps followed by developing standardised policy and guidance documents which removed any additional and unnecessary steps. In addition, the clearly defined in-house route for training non-medical HCP injectors means that there is a suitable pool of staff to be able to provide injections five days a week with additional sessions put on as required. Further case studies are being developed and will be added in updates to this document soon.

6. Looking ahead

It is anticipated that, as innovator drug patents expire, many of the commonly used intravitreal drugs will have a biosimilar equivalent available[16]. This provides an opportunity for considerable cost saving which can be reinvested into eye care. Implementing an efficient injection service with well worked up local policies now provides the best chance of having the capacity and ability to switch patients over to biosimilars as they become available.

As a result, the NECRTP have identified implementing a highly efficient injection service now as a priority area both for elective recovery but also to realise savings for reinvestment in the future.

Appendix 1 – Top tips for efficient intravitreal injections

Sources: RCOphth Ophthalmic Service Guidance: Intravitreal injection therapy 2018
UKOA: Staff and services transformation study- Moorfields Eye Hospital Intravitreal Pathway

General

- Have a dedicated admin team who are used to booking injections in order to space patient's regimen correctly and anticipate demand. In addition, experience in completing funding requests and complying with CCG guidance will improve the process.
- Provide HCA or nursing support to staff performing intravitreal injection lists, whether doctor or non-medical injector, to speed up checks and patient turnaround and to provide more support for patients.
- Take consent outside the injection room or prior to the injection day and do a brief reconfirmation on the day. Ensure consenting includes what to expect on the day, what to expect afterwards in terms of process and how eye feels, and a written information leaflet with emergency contact details.
- Take consent for a course of treatment rather than for each injection – but reconfirm briefly on the day
- Use a procedure specific leaflet and pre-printed (or electronic) procedure specific consent form
- Consider a paper or electronic proforma that can include prescription for 12 months of treatment and recording for any required checks of patient identity, site and drug to support a year of care delivery.
- Staff in injection lists should not be covering other work or answering phone queries
- MDT staff to visit other high-volume units to get inspiration for how to be more efficient – or invite them to come and watch your lists.
- Have clearly laid out and properly and legibly completed records or forms for preop clinical assessments – paper or electronic
- Clean room and injection lists should not be interrupted by other staff coming to obtain items or with queries.
- Work out what staffing model and equipment model works best – try different models and see which is more productive for you.
- Have a short simple protocol for on the day pre-, during and post-injection steps which is clear for all staff. Have a summarised laminated copy or related flow chart on the wall which is large enough and clear enough to be easily read and followed.
- Think carefully whether one stop (more convenient for patients but can be slower and unpredictable injection numbers) or dedicated injection lists (less convenient for patients but faster and more predictable) is the right model for you and regularly review this.
- A dedicated area for MR and injections is ideal, even better if it can be designed bespoke for your service and efficiency throughput
- Ensure well trained staff are confident to undertake high volume injection lists and clinics before independent high-volume practice
- Benchmark teams/units and individual injectors efficiency against each other with transparency to drive improvement

- Have an agreed benchmark for the number of cases on an injection list – the national average from GIRFT was 16 per injector biu more recently units are starting to deliver more than this per injector.
- Regularly audit timings for injection lists and clinics, analyse and learn as a team
- Run MDT team clinical governance sessions to analyse performance, safety and outcomes of intravitreal injections and use to drive improvements. As the new NOD AMD national audit starts to make data available, including variation in baseline acuity, care processes and adjusted visual acuity outcomes and complications, use this for benchmarking.
- Provide management and leadership support and time to drive improvement
- Provide rewards and incentives for productivity
- Ensure issues such as patients with mobility issues, patients needing extra anaesthesia, patients who might be allergic or sensitive to iodine are identified and issues dealt with and a plan for action recorded before the day of injection. Have written guideline to deal with these issues consistently.
- Consider whether it is more efficient to separate injection pathways for DMO and RVO etc from AMD as there is a different approach to loading phases and the pathway of assessment and injection. If services are very tight/COVID restricted, AMD patients should be the priority cohort.

Tips for gaps (empty theatre time) in injection room

-Late starts:

- Start any pre-list "ward round" early enough to start injections on time
- Start the team brief early enough to start on time – it should finish 5 minutes at least before the start of the injecting time.
- Agree all the necessary requirements or issues during the team brief
- Other staff can complete the procedure notes for confirmation by the injector
- Never change the first patient on the list - "the golden patient"

- **Other gaps (empty injection room)**
  - Ensure waiting areas are nearby the injection room. Have the next patient ready right outside or next to the injection room for rapid turnover.
  - Do not use theatres routinely for injections – use a clean room in the outpatient setting
  - Ensure your room is big enough to accommodate the couch, staff, patients and wheelchairs, storage, bins and trolleys required and allow all to comfortably move around
  - The clean room should have storage cupboards for clinical stock and injection packs, a compliant hand wash basin or surgical trough, waste disposal bins (including sharps), a medicine fridge and computer desk/notes area.
  - For those with EPRS, consider having a large screen projecting records, images and consent forms in the injecting room.
  - Must have terminals to check and enter data and procedure records in the injection room.
  - Have standardised, simple and clearly laid out data entry forms on paper or electronically for injection procedure notes. If possible, have these pre-populated on EPR with the "usual" data to be edited if any changes.

Longer time patient in the room:

- Do not take consent in the injection room but reconfirm it as part of the WHO check
- Use a lean and consistent intravitreal pack used by all injectors (eg the UKOA national pack) to minimise waste and time spent disposing of unnecessary equipment
- Regularly review your pack contents and agree what is really needed and what is not. Minimise regular opening of extras – any extra item used >50% of the time probably needs to be in the pack.
- Use an ophthalmic specific mini checklist which allows rapid but thorough safety checks
- Hand rub rather than washing between cases can be more rapid.
- Eliminate unnecessary steps eg antibiotics, eye pads, IOP checks for every patient

Longer procedure times

- Consider not using a drape – lashes can be kept back with lash tape or certain wide blade speculums very effectively
- Consider using an injection device e.g. Invitrea
- Give patients a hand to hold during the injection
- Do bilateral injections if appropriate and safe
- Do not routinely use pre or post procedure topical antibiotics.

Appendix 2 – Example SOP for performing intravitreal injection from Oxford Eye Hospital

Procedure for intravitreal injections

1. Patient check performed by the Nursing Assistant is to read out loud to the injector the patient wrist band label name and date of birth. This is confirmed directly with the with patient and cross check with their records.
2. Injector to check patient records regarding eye to be injected and drug to be used and confirms with patient
3. Injector to mark the eye to be injected cross checking with consent form and verbal agreement with the patient
4. Injector to put on surgical mask
5. Nursing assistant to instil 0.5% proxymetacaine hydrochloride eye drops as per signed PSD
6. Injector to decontaminate hands following hand hygiene policy and using chosen antiseptic
7. Dry hands thoroughly and apply sterile gloves
8. Nursing assistant will then instil 5% povidone iodine eye drops into the marked eye for injection and on the eye lashes / the lid margin. Drops should be instilled in the region of the injection site and allowing adequate contact time (3 minutes). Drops are administered as per signed PSD
9. The skin around the marked eye should be cleaned with 5% povidone iodine eye drops
10. Insert speculum
11. Use calliper to mark distance for injection
12. Inject preferably into the inferotemporal quadrant, or other when indicated
13. Check patient has count fingers/hand movement vision immediately after the injection
14. Flush the eye with BSS
15. Remove speculum
16. Dry skin by wiping with gauze
17. Remove used Intravitreal Injection pack and ensure that the needle and any other sharps are disposed of directly into the sharps container.
18. Used sterile gloves and surgical mask to be discarded in clinical waste bag together with all other clinical waste.
19. Hand decontamination to be undertaken prior to continued patient care and documentation of procedure
20. Dressing trolley to be wiped down with detergent and disinfectant between patients by nurse assistant
21. Ask patient if they experienced any discomfort and score
22. Nurse assistant gives patient written aftercare advice sheet with the contact telephone number on it explaining why so that in case they have any cause for concern, such as severe pain, dramatic drop in visual acuity they will contact the OEH. Inform patient they can contact on-call ophthalmologist at Oxford Eye Hospital if they experience any problems.
23. Nurse assistant ensures patient knows that date / time of their next appointment.

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