# Guidance on Switching from Intravenous Immunoglobulin (IVIg) to Subcutaneous Immunoglobulin (SCIg) Therapy

## Version 3.0 / June 2018

**This guidance has been prepared on behalf of the National Plasma Product Expert Advisory Group (NPPEAG) to support the transition of patients to SCIg in response to a national shortage of IVIg. Contact for queries: Dr Rachel Green (Rachel.Green3@ggc.scot.nhs.uk )**

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## 1. Introduction

This document has been prepared as general guidance for the transitioning of patients from intravenous (IV) Immunoglobulin (IgG) to Subcutaneous (SC) IgG and local practice and procedures may vary. This is a template Standard Operating Procedure (SOP) which is consistent with the recommendations of the "Good Practice Statement For The Preparations Of Injections In Near-Patient Areas, Including Clinical and Home Environments" issued by the Scottish Executive Health Department (2002).

Patients will be shown how to self administer SCIg for possible treatment in their own home, following appropriate nurse training. The patient can have a treatment partner at home willing to administer the injection/infusions if they wish. Some patients will not be suitable for home therapy and will receive SCIg in hospital.

Hizentra®/Cuvitru®/HyQvia® SCIg are all licensed for the treatment of patients with primary and secondary immunodeficiency. Hizentra® is also licensed for chronic inflammatory demyelinating polyneuropathy (CIDP), but all SCIg products can be considered for neurological and rheumatological conditions, although this is out with the marketing authorisation of each product.

Hizentra®/Cuvitru® is available as a ready-to-use 20% liquid preparation of polyvalent human immunoglobulin G (IgG) and is administered subcutaneously. HyQvia® is a product with subcutaneous IgG 10% and hyaluronic acid which allows the infusion of product in larger volumes. All are derived from pooled human plasma (approximately 60,000 healthy donors) and contain a wide variety of antibody specificities available in the human population. The medication will provide immunodeficient patients with protective antibodies against numerous commonly encountered pathogens including influenza, tetanus, hepatitis B, polio and diptheria.

At completion of the training period and where treatment is going to take place at home, a contact number for patients (contact numbers /e-mail address contacts) should be available for patients to access 24/7 support. Patients/treatment partners must be aware of all emergency contacts whom they should contact should they require emergency assistance.

Due to the demanding training schedule, and the specific criteria for eligibility into the training programme, patients/treatment partners should be supervised and monitored by a senior nurse. In cases where the treatment partner is supporting/undertaking the injection administration, they must also attend all the mandatory training sessions including the theory session. Hizentra®/Cuvitru®/HyQvia® SCIg medication doses should be individualised for each patient and patient preference of the administration plan is paramount. Patient information leaflets on SC therapy are available from manufacturers for their individual products. All patients should have the proposed treatment discussed with a member of the medical team and a Consent Form completed.

Patients commencing Cuvitru®/HyQvia® can receive up to a maximum of six training sessions provided by Shire. These training sessions can be with a training partner where available. Once assessed and deemed competent to administer the treatment safely in the home environment the

treatment can cross to Homecare provision. Patients commencing Hizentra® will need to be trained by nurses at a local level as there is no agreement from Shire to support these patients. If the patient is self-administering without support at home, they must provide the department with the name of a responsible adult, "treatment buddy", who is willing to act as a contact for the patient. This person must confirm in writing to the senior nurse in the Out Patient Area that they are happy to be contacted by the patient before and after any medication is administered.

Adverse reactions may occur more frequently in patients who receive immunoglobulin for the first time or, in rare cases, when the product is switched, or when treatment has been interrupted for more than eight weeks. In the hospital setting, patients should be monitored for one hour after the first injection and for thirty minutes after all subsequent injections. HyQvia® has a side effect profile which is more similar to IVIg than SCIg, but in general SCIg has fewer side effects than IVIG. Mild local reactions at infusion site are common and can cause erythema, oedema, pain and pruritis. In some cases, the patient may experience a severe reaction to subcutaneous immunoglobulin treatment, however this is exceptionally rare. *All significant adverse reactions should be recorded in the National Immunoglobulin Database.*

True hypersensitivity reactions are rare. They can particularly occur in patients with anti-IgA antibodies, and these patients should be treated with caution.

## 2. Contraindications

Hypersensitivity to any of the components of the product or known allergy to immunoglobulin or hyaluronic acid. Refer to Summary of Product Characteristics for each product.

## 3. Materials

Medicines:

- Hizentra® (20% SCIg) medication 1g/5ml, 2g/10ml, 4g/20ml, 10g/50ml vial
- Cuvitru® (20% SCIg) medication 1g/5ml, 2g/10ml, 4g/20ml, 8g/40ml vial
- HyQvia® (10% SCIg) medication 5g/50ml, 10g/100ml, 20g/200ml, 30g/300ml vial

Equipment and ancillaries:

- Luer lock syringe 5ml or 10ml
- Subcutaneous 24ga Safety System with Y adapter
- Blunt needles
- Deadender (caps)
- IV 3000 sterile dressing
- Alcohol swabs for skin
- Alcohol swabs for equipment
- Infusion pump for HyQvia® (preferably a pump that can achieve 300mls/hr rate/ and have pump pressures adjusted to 600 mmHg)
- Tape
- Gauze swabs
- Trolley
- Spot monitor
- Thermometer
- Sharps bin
- Clinical waste bag
- Dressing pack/sterile dressing sheet
- Alcohol hand gel
- Clinitex multi surface wipes (or similar)

*Documentation*

- Patient Information Leaflet ( Product related)
- NHS Scotland Immunoglobulin Request Form

- GP letter (to be handed into GP practice by patient when training sessions completed)
- Subcutaneous Immunoglobulin (SCIg) Home Therapy Patient Competency Record and diary

- NHS Consent to treatment
- NHS Prescription chart/drug kardex (for training programme and regular inpatients)
- NHS NEWS chart (For training programme and clinic review appointments)
- If using homecare:
  - Homecare Prescription Form
  - Homecare Registration and Patient Consent form

## 4. Staff

All registered nursing staff involved in teaching patients/treatment partners to undertake this procedure must be appropriately trained. The nurses must have evidence of completion of all mandatory training including Aseptic Non Touch Technique (ANTT), e-anaphylaxis and Basic Life Support (BLS). They must be experienced in administration of intravenous medication including immunoglobulin. First request for medication prescriptions must be signed by a doctor or pharmacist. Repeat requests can be requested by a senior staff nurse.

## 5. Dosing Schedules

### *5.1 For patients requiring replacement doses e.g. secondary immunoglobulinaemia in myeloma, CLL etc.*

Using a 1:1 conversion of IVIg:SCIg, calculate the patient's new weekly dose by dividing the total IVIg dose by the treatment interval in weeks.

*For example:* If a patient receives 30g every 3 weeks the SCIg dose equivalent would be 30g divided by 3 so 10g delivered weekly. The dose should be rounded down to the nearest vial size and changes to the dose altered in response to trough levels or response.

Cuvitru® and Hizentra® can be administered by self push or using an infusion pump. HyQvia® requires administration via infusion pump.

For Cuvitru®, a maximum dose of 48g (240ml) can be given in one day as 12g (60ml) injected per site in 4 separate sites. For Hizentra® up to 50ml can be administered per site. This may allow some patients to receive their dose subcutaneously once every two weeks. The dose can be given flexibly i.e. smaller doses daily up to a larger dose two weekly.

For Cuvitru®, the recommended starting rate of infusion is 10ml/hr/site. If well tolerated, this may be increased at intervals of at least 10 minutes to 20ml/hr/site for the initial two infusions. If this infusion speed is tolerated, the rate can be increased to 60ml/hr/site can be used. Some centres are increasing this rate to 10ml over 5 minutes in patients who are well established on therapy.

For Hizentra®, the recommended initial infusion rate depends on individual needs of the patient and should not exceed 20ml/hr/site. If well-tolerated, the infusion rate can then gradually be increased to 35ml/hour/site for the following two infusions. Thereafter, the infusion rate can be increased further as per patient's tolerability.

For patients wishing to be retained on a 3-4 weekly regimen, HyQvia® may be a suitable alternative. Patients already on 3 weekly infusions may now go onto a 4-weekly regimen depending on trough levels. With HyQvia®, the recombinant human hyaluronidase must be infused sequentially through the same needle as in the table below.

*Table 1: Infusion rates for HyQvia®*

| | **Subjects < 40 kg** | | **Subjects ≥ 40 kg** | |
|---|---|---|---|---|
| **Interval/Minutes** | First Two Infusion (ml/hour) | Subsequent 2-3 Infusions (ml/hour) | First Two Infusions (ml/hour) | Subsequent 2 to 3 Infusions (ml/hour) |
| **10 minutes** | 5 | 10 | 10 | 10 |
| **10 minutes** | 10 | 20 | 30 | 30 |
| **10 minutes** | 20 | 40 | 60 | 120 |
| **10 minutes** | 40 | 80 | 120 | 240 |
| **Remainder of infusion** | 80 | 160 | 240 | 300 |

**5.2 For patients on immunomodulatory doses e.g. Neurology and Rheumatology**

Patients established on regular long term IVIg can be safely transitioned to SCIg. Hizentra® is licensed for chronic inflammatory demyelinating polyneuropathy (CIDP) but all SCIg products can be considered for neurological and rheumatological conditions. Many units in the UK have experience of HyQvia® and 20% SCIg use in this population.

Cuvitru®/Hizentra® can be given flexibly i.e. smaller doses daily up to a larger dose two weekly. HyQvia® can be administered as frequently as the previous IVIg dose. Cuvitru® and Hizentra® can be administered by self push or using an infusion pump. HyQvia® requires administration via infusion pump. SCIg is usually infused into the upper abdomen, thighs or both.

Choice of SCIg is dependent on several factors including patient lifestyle as well as dose and frequency of previous IVIg infusion. Cuvitru® /Hizentra® may be more appropriate in patients who are on smaller weekly doses and who wish to self push the infusion. HyQvia® is suitable for patients who were on a higher IVIg dose administered less frequently. Cuvitru®/ Hizentra® should be stored at room temperature (below 25°C) and HyQvia® requires refrigeration (2-8°C).

**A. Cuvitru® or Hizentra® (20% solution for injection/infusion)**
Using a 1:1 conversion of IVIg:SCIg, calculate the patient's new weekly dose by dividing the total IVIg dose by the treatment interval in weeks, rounded up or down to the nearest vial size (e.g. 12.5g rounded to 12g).

*For example:* A patient receiving 120g every 8 weeks would now receive 15g (75ml) weekly. Patients can receive up to 48g (240ml) weekly (administered in 1-4 sites) if tolerated. This can often be managed by self push/bolus depending on the strength in their fingers.

**Option 1: Immediate switch**
The new weekly SCIg dose is given one week after the last dose of IVIg. This may not be suitable for patients who are on a high weekly dose as they may not tolerate such a high volume being infused in a single session. A gradual transition is preferred in this case.

**Option 2: Gradual transition**
On the same day as the last IVIg dose, give the first SCIg dose at:
Week 1: 25% of new weekly SCIg dose
Week 2: 50% of new weekly SCIg dose
Week 3: 100% of new weekly SCIg dose

For Cuvitru®, up to 12g (60ml) can be infused per site and up to 4 sites can be used, although in reality, two sites will be used. The weekly dose can be divided into smaller doses and administered by a desired number of times per week. For example: 15g weekly (75ml) could be administered as 5g (25ml) thrice weekly.

The recommended starting rate is 10ml/hr/site. If well tolerated, this may be increased at intervals of at least 10 minutes to 20ml/hr/site for the initial 2 infusions. If this infusion speed is tolerated, a maximum of 60ml/hr/site can be used.

**B. HyQvia® (10% solution for infusion)**

HyQvia® can be administered at the same dose and frequency as their previous IVIg treatment. For patients who are receiving infrequent IVIG (e.g. 3 monthly), or who do not tolerate Cuvitru® or Hizentra®, HyQvia® should be considered. HyQvia® has been developed specifically to provide the possibility to infuse a full monthly dose of immunoglobulins (e.g. every 3-4 weeks) in as little as 1 or 2 sites subcutaneously, in one session. This minimises the number of needles, the frequency of the treatment, sparing the necessity for venous access and allowing for home treatment (including self administration by the patient after appropriate training).

It is possible to infuse up to 60g (600ml) of solution per infusion site at a flow rate of up to 300ml/hr if tolerated. However, it is recommended to test the tolerability of the infusion volume and speed of infusion beforehand in order to ensure the patient's experience is satisfactory. Use of 2 sites may be preferable. One potential option is to split the total volume of infused product in 2 or more sites (for example with a bi- or tri-furcate subcutaneous needle) which not only divides the volume of product in more than one site but in addition it accelerates the total duration of the infusion.

First, the full dose of recombinant human hyaluronidase solution is infused at a rate of 1 to 2 ml/minute per infusion site or as tolerated. Infuse the full dose per site immunoglobulin 10% through the same subcutaneous needle set within 10 minutes of the recombinant human hyaluronidase.

For infusion rates please see Table 1 above. If the patient tolerates the initial infusions at the full dose per site and maximum rate, an increase in the rate of successive infusions may be considered at the discretion of the physician and the patient.

**Worked example**

Usual IVIG dose 150g every 4 weeks administered as 80g and 70g on two consecutive days. Patient could theoretically receive HyQvia® in 2 sites simultaneously e.g. 400ml+400ml on the first day and 350ml+350ml on the second day (at an infusion rate of 300ml/hr) providing that the patient and health care professionals are happy with the tolerability) at the same monthly frequency as for the IVIG solution. Administration of HyQvia® subcutaneously reduces the duration of administration compared to an intravenous regimen.

HyQvia® can be started when the patient's next IVIg dose would have been due, or can be started around 2 weeks after the last IVIg dose if a gradual titration is required.

Example for 3-weekly regimen:

Week 1: 1/3 of full dose (over 2 days)
Week 2: 2/3 of full dose (over 2 days)
Week 3: Week off
Week 4: Full dose (over 2 days)

For an 8-weekly regimen, give full dose on week 9. For a 12-weekly regimen, give full dose on week 13 etc.

## 6. Standard Operating Procedure

### 6.1 Order Immunoglobulin Medication

6.1.1 NHS Scotland Immunoglobulin Request Form should be used to order immunoglobulin for ward/inpatient use. For patients on home therapy, a prescription should be sent to the nominated homecare provider to facilitate supply.

### 6.2 Preparation of Equipment and Documentation

6.2.1 Ensure all documentation is available:

- 6.2.1.1 Signed Consent Form
- 6.2.1.2 Prescription chart
- 6.2.1.3 News record

6.2.2 All sterile equipment MUST be checked for a valid expiry date and must not be used if the expiry date has been exceeded or the equipment has been contaminated in any way.

6.2.3 SCN/SSN should collect the SCIG medication from the fridge. It should be double checked. Confirmation should be made against the NHS Prescription Chart. Patients name, CHI number, product type and dose should be confirmed before the medication is transferred onto the prepared.

6.2.4 The patient/treatment partner and trolley should be taken to a suitable area for teaching sessions. Sufficient time should be allowed to complete the preparation and administration of treatment, and disposal of consumables.

### 6.3 Preparing the Patient

6.3.1 NHS patient name band should be placed onto the patient's wrist.

6.3.2 It is good practice to check baseline virology before a change of product – this would include HBV and HCV ( By pcr).

6.3.3 At every clinical visit, pre and post treatment baseline recordings, including temperature, pulse, and blood pressure should be recorded. The patient's weight should be recorded at the initial consultation and again at 3 or 6 monthly clinic review appointment. An ideal body weight should be used for all dosing.

6.3.4 Regular blood samples are required for monitoring patients with Secondary Immune Deficiency. Trough immunoglobulin (IgG) levels should be measured prior to commencing SCIg treatment and then once stable every 6 months.

### 6.4 SCIg Medication

6.4.1 Cuvitru® /Hizentra® come as a ready-to-use 20% solution in single-use vials. It contains no preservatives; therefore the product must be used as soon as possible after opening the vial. HyQvia® comes as Recombinant Hyaluronidase and 10% Immunoglobulin in single use vials.

6.4.2 Cuvitru® /Hizentra®
Do not store above 25°C. Do not freeze the product.

6.4.3 HyQvia®
Store in a refrigerator (2°C – 8°C). Do not freeze. The product should be brought to room temperature before use.

6.4.4 The solution should be clear and pale-yellow or light brown in colour. Do not use if the solution is cloudy or has particulate matter. If there are any problems with the vial, patients/treatment partners should keep the vial and contact the OPD/Ward.

### 6.5 Checking Procedure

6.5.1 Prior to the injection, the product must be checked by at least one Senior Staff nurse with a Staff Nurse competent in the administration of IVIg as the second checker. The patient must confirm their identify to both nurses prior to the checks taking place.

6.5.2 Checks should be made against the patient's NHS Prescription Chart to ensure it is the correct product type/dose, expiry date, and batch numbers.

6.5.3 The product should be visibly checked and must not be used if:-

**a) The liquid in the bottle looks cloudy, contains particle, or has changed colour;**
**b) The bottle is cracked or broken;**
**c) The protective cap is missing;**
**d) The expiry date has been exceeded**

**Vaccines Pharmacy should be informed immediately if there are any issues.**

6.5.4 Both nurses should sign and date the Prescription sheet on completion of all checks.

### 6.6 Preparing the Medication

6.6.1 Wash hands and use alcohol gel as per Board Hand Hygiene protocol. Aseptic Non-Touch Technique (ANTT) should be utilised throughout.

6.6.2 Clean the trolley with multi surface wipes.

6.6.3 Place the required dose of Hizentra®/Cuvitru®/HyQvia® on the trolley surface (outside the sterile area) and remove the plastic protective cap(s). Wipe the rubber bung(s) with an alcohol swab for equipment, for at least 30 seconds. Leave the vial(s) in the same position until ready to draw up the medication.

6.6.4 Remove the dressing pack from the packaging. Place the paper drape flat on the trolley to make a sterile surface. Open all the required equipment onto the paper drape without touching the sterile area. The needle set should be checked at this point to make sure that the bevel on the needle is facing upwards, and the dimpled side of the wings will touch the skin when taped down.

6.6.5 Attach the blunt needle, a wide bore needle which eases drawing up the liquid, to the syringe. Gently draw back the plunger to the exact amount of medication required inserting air into the syringe. With the vial still on a flat surface, hold the vial with the free hand and insert the needle into the centre of the rubber bung.

6.6.6 Keeping the same hold, check that the tip of the needle is NOT in the liquid then push down on the plunger. The air will enter the space in the vial.

6.6.7 Carefully turn the vial upside down and release the plunger to allow it to naturally draw the medication into the syringe. Should this fail to happen, gently pull on the plunger and fill the syringe manually to the required amount of medication.

6.6.8 On completion of step 5.6.7, if there is air/bubbles present, gently push the liquid up towards the base of the needle. Expel any additional air /bubbles by gently tapping on the

syringe. Always re-check that there is no air/bubbles present before injecting any medication.

6.6.9 Remove the blunt needle and discard in the sharps container. Sharps containers should always be placed close to the point of preparation. A cap (deadender) should be attached to the syringe end as soon as the blunt needle has been discarded.

*Repeat steps 6.6.5 to 6.6.9 if more than one vial is required.*

### 6.7 Preparing the Safety System

6.7.1 When all syringes are prepared, the first syringe should be attached to the Y adapter on the needle set.

6.7.2 Gently push the syringe plunger and observe the medication moving into the tubing, 'priming'.

6.7.3 Stop priming the line just before the medication reaches the end of the tubing. Clamp the tubing approximately two centimetres from the needle.

6.7.4 It is important that the drug does not reach the needle tip as this can cause localised skin irritation if inserted into the skin. However, if the medication does reach the tip, it should be easily removed with the needle sheath prior to insertion.

### 6.8 Inserting the Subcutaneous Needle

6.8.1 Wash hands and use alcohol gel as per Board Hand Hygiene protocol. Always dry hands thoroughly after washing. Aseptic Non Touch Technique (ANTT) should be utilised throughout.

6.8.2 Select an appropriate site avoiding moles, bruises, scars, stretch marks or any other areas that are not suitable for subcutaneous injections. The diagram below shows suitable subcutaneous injection sites for this treatment. Rotation of sites is important when administering subcutaneous injections.

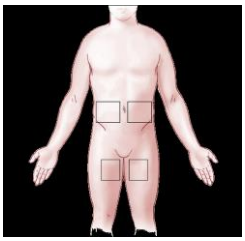

*Diagram 1: Suitable Injection sites for IVIg*

6.8.3 Clean the injection site using an alcohol swab for skin. Wipe in a circular motion allowing the area to dry before inserting the needle.

6.8.4 Remove the needle sheath, pinch skin and push the needle into injection site at an angle of between 45 and 90 degrees.

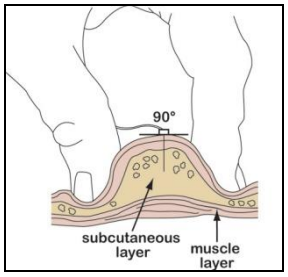


*Diagram 2: Injection Technique*

6.8.5 Tape the subcutaneous needle in place, and gently pull the guide wire out. Draw back on the syringe plunger to check for back flow of blood. If the liquid remains clear, secure the needle further by applying a IV 3000 dressing. If blood is present in the liquid, remove the complete needle set, detach the syringe and place a deadender onto the syringe end. Discard the needle set in the sharps container immediately. The used syringe can be used to prime a new needle set. Repeat steps 6.8.2 to 6.8.5.

### 6.9 Injecting SCIg Medication

6.9.1 The rate of Infusion is dependent on the product and the condition being treated – see under dosing.

6.9.2 Patients may feel slight discomfort when the injection starts but this should not be/or continue to be painful. The injection should not be continued if there is continual pain another site should be chosen.

6.9.3 Patient's often experience a localised reaction with slight redness and swelling at the needle insertion site. They may also experience local cold or heat, bruising, rash at site, area white in colour, dimpled like an orange peel or white with an outer blue tinged ring. These reactions are usually mild and short lived.

6.9.4 Chills, headache, fever, vomiting, nausea, arthralgia, hypotension, pruritis, and moderate low back pain are also undesirable side effects of this treatment. These should be treated appropriately but patients should have a supply of paracetamol and antihistamines available should they require them. A separate handbook on managing adverse reactions with these products is available.

### 6.10 Completion of Treatment

6.10.1 Wash hands and use alcohol gel as per the Board Hand Hygiene protocol. Always dry hands thoroughly after washing. Aseptic Non Touch Technique (ANTT) should be utilised throughout.

6.10.2 Confirm that the final syringe is empty and clamp the tubing. Gently remove the dressing and tape. Place a swab over the injection site. Close the plastic needle wings together and remove the complete needle set with syringe attached. Place directly into the sharps container.

6.10.3 Apply pressure to the needle entry point for at least 2 minutes to minimise leakage of blood or medication then cover with a clean folded swab and tape.

6.10.4 All consumables should be disposed of appropriately and the trolley should be cleaned with Clinitex multi surface wipes (or similar).

6.10.5 All documentation should be completed by the senior nurse. Patients should document the relevant injection information in their diary. Tear off labels on the vial(s) should be placed in the appropriate diary page.

6.10.6 Patients should remain in the clinical area for a period of observation of one hour after completion of the first subcutaneous SCIg injection. Following subsequent injections, the patient is observed for at least thirty minutes in the clinical area.

6.10.7 When the observation period is complete, blood pressure, temperature, pulse must be obtained. If there is no adverse reaction, and the patient feels well, they can be discharge from the department.

6.10.8 Follow up appointments should be given to the patient prior to discharge.

### 6.11 Discharge

6.11.1 When the patient/treatment partner is deemed competent to undertake treatment at home, the completed prescription chart should be scanned onto the patients electronic record. All other documentation should be stored.

6.11.2 Patients should be given Paracetamol and Chlorpheniramine to have available at home to manage reactions. An advice leaflet is available for patients.

6.11.3 Following discharge to Home Therapy, patients must attend twice for three monthly clinic review appointments which can then be increased to six monthly clinic review appointments if the Consultant and SCN/SSN are confident the patient can be unsupervised for a six monthly period.

6.11.4 At each clinic review appointment, the patient/treatment partner must attend and complete an observed treatment with the senior nurse. The patient must bring their own treatment with them to these appointments.

6.11.5 Patients must produce their infusion diary at all appointments. The diary must provide evidence that patients remain compliant with their treatment plan. All information, including side effects or illness, must be recorded correctly.

6.11.6 Senior nurse continues to monitor results and address any problematic results accordingly with medical staff.

**Troubleshooting**

**Slow flow:** Initial treatment may take longer than expected depending on how well the patient's tissues absorb the SCIg medication. The body may need to create space in the subcutaneous layers in order to absorb at a reasonable rate.

**Subcutaneous swelling, pain or redness at the site:** Try to insert the needle when the tip is dry as SCIg medication can irritate the skin. Make sure that the needle is long enough to reach the subcutaneous layer. Make sure that the needles are not too long, as they may be in muscle. Consider the site location and ensure that the sites are rotated.

## 7 References

Summary of Product Characteristics (includes company contact details for medical information queries:

Cuvitru®, Baxalta UK Limited/ Shire Pharmaceuticals. Last updated 15/08/2017. (link)
HyQvia®, Baxalta UK /Shire Pharmaceuticals Limited. Last updated 24/05/2017. (link)
Hizentra® CSL Behring UK Limited. Last updated 08/03/2018. (link)

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## 8 Acknowledgments

This guidance is based on a SOP prepared by Dr Khan, NHS Grampian.