NHS GGC Adult, Mental Health, Paediatric and Neonatal Services

Administration of Intravenous (IV) Medicines and Flush Policy (version 1)

Important Note:

The Intranet version of this document is the only version that is maintained.

Any printed copies should therefore be viewed as 'Uncontrolled' and as such, may not necessarily contain the latest updates and amendments.

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Introduction

The aim of this policy is to inform healthcare practitioners working in NHS Greater Glasgow and Clyde (NHSGGC) of their responsibilities in safe and effective intravenous (IV) medicines administration to reduce the risk of harm. This may include IV bolus, intermittent or continuous infusion administrations via a vascular access device (VAD).

For the purposes of this policy all health care practitioners are accountable for maintaining competence in accordance with the code of conduct and guidance of their professional body, to ensure they have the knowledge and skills to deliver safe and effective practice (Nursing and Midwifery Council (NMC) (2015), Health and Care Professions Council (HCPC) (2016), General Medical Council (GMC) (2013).

Prescriptions must be written on the current approved prescribing documentation, or prescribed electronically, in accordance with current local procedures.

The previous NHSGGC Acute Service Division Intravenous Flush Policy (2017) has now been incorporated into this policy. Details can be found on p14. This section outlines the exceptions relating to the administration of sterile 0.9% Sodium Chloride as an IV flush. There may be other specific exceptions for local areas which should be detailed in local standard operating procedures (SOPs).

For the purposes of this policy, VADs include peripheral venous catheters (PVC), midlines, all types of central venous catheter (CVCs) and implantable ports. It is the responsibility of individual practitioners to ensure that they are competent in accessing and managing VADs. This will require additional competencies to be achieved. Information on care and maintenance of VADs can be found in NHSGGC Vascular Access Device Procedure and Practice Guideline (2019). Further advice is available from Practice Development, the Vascular Access Service, specialist nurses and / or infection control nurses.

Scope

For the purpose of this policy the term practitioner will include all registered health care professionals (registered nurses / midwives / operating department practitioners (ODPs) / advanced nurse practitioners (ANPs), allied health care professionals (AHPs) and medical staff) within NHSGGC Acute Services Division who are required to administer IV medicines (including IV flush) as part of their role. This includes bank and agency practitioners.

This policy outlines the responsibilities of medical staff as practitioners. However, medical staff will work in clinical situations where it is not possible to adhere rigidly to an independent second check as outlined throughout this policy. In these situations, a paused single check is permissible, and individual medical staff are accountable to ensure patient safety is not compromised.

Implementing the Future Nurse / Midwife Standards:

From September 2021 – this will also include **student midwives** in part 2 and part 3.

From September 2022 – this will also include **student nurses** (all fields) in part 3.

As part of the updated NMC standards, student nurses and midwives can participate in calculations, checking, preparation, administration and monitoring of IV medicines via **peripheral venous route only**. This **must be** under the **direct supervision** of a registered healthcare practitioner who is competent in IV medicine administration.

Prior to this, student nurses and midwives must complete online theoretical modules and simulated practice within the Higher Education Institution (HEI) as part of the pre-

registration programme. If student nurses / midwives are involved in the IV medicine administration process, they **must** use the NHSGGC's IV Medicine Administration competency document and certification process.

Although student nurses and midwives can be involved in the checking, preparation and administration of IV medicines and flush via peripheral route, consideration should be given to the complexity of calculations, experience of the supervising registered nurse / midwife and the available VAD. In some instances, 2 suitably prepared and competent registered staff will be appropriate. In all instances, the registered nurse(s) has professional accountability of the process.

This policy should be used in conjunction with other relevant guidelines and standards referred to Appendix 1.

Staff in specialist clinical areas caring for particularly vulnerable patient groups may have local standard operating procedures (SOP) in use which should be referred and adhered to.

Roles and Responsibilities

For the administration of IV medicines, all practitioners must be appropriately trained and supervised until considered competent. A practitioner can be described as competent if they have had the necessary training, clinical experience, skills and knowledge to undertake a task safely.

Before any practitioner can commence IV medicines administration education they must be competent in the administration of medicines via other routes e.g. oral / subcutaneous / per rectum; and in the care of patients with a VAD in accordance with the requirements of their professional role. The NHSGGC Non IV Medicine Proficiency Framework (2016) should be utilised where newly qualified practitioners start a substantive or bank contracts and for all new registered nurses and midwives starting employment within NHSGGC. The framework should be completed within 2 weeks.

Independent Check

In NHSGGC all IV medications are required to be checked by 2 competent practitioners prior to administration with ideally, *both* practitioners competent in IV medicine administration. However, it is acknowledged that in practice this may often not be possible. Under such circumstance, providing that one of the practitioners is IV trained, the second checker can be a competent practitioner who has not completed the NHSGGC IV medicine administration competency programme (or equivalent e.g. part 2 student midwives and part 3 student nurses). Both practitioners checking the medication should be aware of its use, side effects, recommended route and method of administration prior to the administration of the medicine. Both practitioners **must independently** check:

- The prescription is valid
- The medication matches the prescription
- Appropriate diluents
- Calculations
- Correct patient

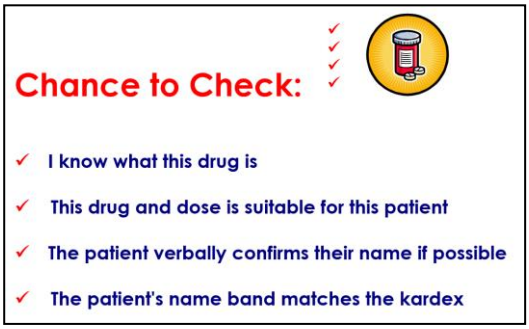
This independent check should be undertaken at the same time. If this is not practically possible, both practitioners are responsible and accountable to ensure good communication with each other, and raise discrepancies and concerns.

If either practitioner is concerned or unsure about any aspect of the prescription, knowledge of medication or skills they should not administer the medicine, inform the patient's medical practitioner and seek support.

Medicines should be administered immediately following preparation, where practically possible. Two competent practitioners **must independently** confirm that:

- The medicine prescription kardex / infusion prescription chart is fully completed
- The patient is not allergic to the medicine prescribed
- The correct patient has been identified and is wearing a name band (NHSGGC Acute Services Division Patient Identification Policy (2015))
- The prescribed medicine / dose and infusion fluid is appropriate for the patient
- The medicine(s), any diluent / reconstituting fluids and flushing agents are within their expiry dates and compatible with one another and with any IV fluids being administered at the same time. If compatibility is unknown seek pharmacist and / or medical staff advice
- The scheduled dose has not already been administered; supplementary charts / documentation / 'once only' section of the prescription kardex must be checked
- Independent calculations **must be** performed by each practitioner to confirm that the prescribed dose is correct and that the end volume / concentration / rate to be administered are correct. Discuss any discrepancies prior to medicine administration with the prescriber and seek advice from pharmacy if required
- The solution to be administered is free of visible particles and is of the correct colour
- Pump rate set correctly by 2 practitioners

'Chance to Check' is an initiative which highlights the importance of the correct administration of medications. It raises awareness of what administration practices are acceptable and uses four key statements as part of a checking process. Chance to Check also reinforces the need for staff administering medications to take the time to ensure the task is carried out efficiently, without interruption or delay.



Registered practitioners who have **not** completed the NHSGGC IV medicines competency programme or equivalent:

- **Cannot** administer IV medicines or flush VADs – unless as part of supervised practice for completion of NHSGGC competency programmes
- Can be the second checker for IV medicines preparation or administration
- Can be second checker for IV controlled medicine administration
- Can be the first checker for IV fluids (e.g. 0.9% sodium chloride, 5% glucose, hartmanns) but not any fluids with additives e.g. potassium chloride

IV Medicine Administration Education

The administration of IV medication is carried out by practitioners who have a certificate to demonstrate that they have successfully completed the NHSGGC IV medicines administration competency programme, or equivalent.

If a practitioner has completed an IV medicines administration course out with NHSGGC, and has evidence of achieving competence (certificate or competency assessment documentation) they **do not** need to repeat the programme in NHSGGC. The practitioner undertakes supervised practice to demonstrate safe and effective practice using appropriate NHSGGC documentation.

If a practitioner has successfully completed an adult IV medicine administration competency programme and moves to paediatric / neonatal services, they must undertake a paediatric IV medicines administration competency programme.

The practitioner will:

Attend and complete the recognised NHSGGC (or equivalent) IV medicine administration competency programme; which includes education on:

- Professional aspects of IV medicine administration
- Infection control aspects of IV medicine administration
- Pharmaceutical aspects of IV medicine administration, including antimicrobial stewardship
- Theoretical aspect of IV medicine administration
- Calculations and a calculations assessment

From September 2021 student midwives will complete the equivalent theoretical aspects in part 2 of the pre-registration programme.

From September 2022 student nurses (all fields) will complete the equivalent theoretical aspects in part 3 of the pre-registration programme.

The practitioner / student nurse / midwife will then complete supervised practice and achieve competence in the preparation and administration of IV medicines in their clinical area.

On successful completion of the competency based programme, a certificate will be sent to the practitioner as evidence of completion. This should be retained in their portfolio.

Infection Control

Standard Infection Control Precautions (SICPs): Current local and national guidance advise that SICPs should be embedded into all aspects of care delivery including care of patients receiving IV medicines. The principles of SICPs should be used **by all** staff **in all** care settings **at all** times **for all** patients whether infection is known to be present or not. The application of SICPs ensures the safety of patients, staff and visitors and is determined by the degree of risk encountered including the task / level of interaction and/or the level of exposure to blood or other body fluids.

There are 10 elements which make up SICPs, 6 of which must be applied for all procedures within this policy:

Hand hygiene: Practitioners must undertake hand hygiene at key moments to reduce the risk of contamination and infection.

Choice of Personal Protective Equipment (PPE): Before undertaking any procedure, practitioners must assess any likely exposure to blood and / or body fluids and ensure that PPE is worn to provide protection for the practitioner. A minimum of disposable apron and non-sterile nitrile gloves must be worn. Gloves should be changed if they become visibly contaminated and / or a perforation / puncture is suspected. In addition, staff should consider the need for a surgical mask / eye protection if splashing of blood or body fluids is anticipated. Control Of Substances Hazardous to Health (COSHH) guidelines should also

be adhered to in all aspects of the preparation and administration process.

Additional precautions may be necessary for different types of VADs e.g. sterile gloves may be required if there is risk of contamination of sterile key parts / sites**.** It is the practitioner's responsibility to undertake a risk assessment and choose appropriate equipment for personal and patient protection. All PPE must be removed on completion of task and immediately placed in a clinical healthcare waste bin after which hand hygiene **must** be undertaken**.**

Management of care equipment: All reusable care equipment should be clean at point of use. Further information can be found here.

Management of blood and body fluid spillage: All blood and body fluid spillage should be cleaned.

Management of waste: All waste should be disposed of in an appropriate clinical waste bag or sharps bin:

Occupational risk: Appropriate procedures and guidance should be followed to reduce the risk of occupational hazards (e.g. needle stick injuries). Needlesafe equipment (e.g. safety hypodermic needles) should be used to reduce the risk of needlestick injury.

Aseptic Non Touch Technique (ANTT®): A non touch technique should be adopted when administering IV medications to maintain asepsis. This involves not touching the key parts / sites such as the tip of a syringe or a needle free access device / access port once it has been decontaminated. The needle free access device or access port must be cleaned with 2% chlorhexidine in 70% isopropyl alcohol for 30 seconds and allowed to dry before administering IV medicines / flush. The risk of contamination of these key parts/sites must be assessed to choose the appropriate level of precaution. For example, non sterile gloves are acceptable in the majority of circumstances when accessing VADs using a non touch technique, however, sterile gloves may be chosen in more complex procedures to reduce risk of contamination. The clinician should risk assess each procedure, bearing in mind the condition and location of the patient, to decide the approach / equipment required. Access to the NHSGGC Aseptic Non Touch Technique (ANTT®) guideline can be found here.

Needle Free Access Devices (NFAD): A NFAD is a capless valve that is attached to a VAD. The purpose of NFAD is to reduce the risk of catheter related blood stream infections and needle stick injuries. These should be attached to VADs, unless these connectors are inappropriate for use with a particular VAD.

All NFADs, whether single or multiple, with or without extension sets, must be primed before use with sterile IV 0.9% sodium chloride. There are a variety of different NFADs available and practitioners should choose a NFAD appropriate to the patient's need and VAD requirements.

Cleaning of access ports / NFAD: When accessing any VAD, care should be taken to adequately clean the access port or NFAD for 30 seconds with a 2% chlorhexidine in 70% isopropyl alcohol wipe ('*scrub the hub'*) and allow to air dry. Port protectors (alcohol impregnated) may also be considered as part of a strategy to reduce the risk of catheter related blood stream infections (CRBSI).

IV medicines / fluids / flush should be administered via the NFAD. The top port of the PVC should **not** be used to routinely administer IV medication in clinical practice. This area cannot be cleaned adequately and therefore the risk of introducing infection is high. The

top port of the PVC should **only** be used on sterile (brand new) PVC (immediately following insertion) and in emergency situations.

Consent for Treatment

Consent is required before practitioners undertake any care for a patient. This may be informal (verbal) or formal (written) for more complex procedures. If there is evidence of impaired capacity, either temporarily or permanently, an adult with incapacity form (AWI) should be completed by medical staff to allow health care practitioners to provide treatment that is required. In emergency situations, practitioners should use clinical judgement as to whether the risks of delaying a procedure outweigh the need for formal consent. The patient should be fully informed about treatment and potential side effects; and provided with patient information leaflets where necessary.

Children and young people: Those under 16 years have legal capacity to consent (or refuse) treatment on their own behalf, if they are deemed capable of understanding the nature and possible consequences of treatment. A parent or legal guardian may consent to medical treatment ***if*** the child lacks decision-making capacity.

NHSGGC Consent policy of healthcare assessment, care and treatment should be referred and adhered to.

Prescriptions

Medicines must be prescribed by a registered Doctor/ Dental Practitioner or a practitioner who has successfully completed a professionally recognised prescribing course to allow independent prescribing.

All prescribers will follow the guidance laid out in the NHSGGC Safe and Secure Handling of Medicines in Hospitals Wards and Theatre Departments (2008).

Permitted abbreviations:

Kg = kilogram

g = gram

mg = milligram

L = litre

ml = millilitre

There are **no** permitted abbreviations for **microgram, nanogram** or **international unit** and these should be written in full.

Standardised NHSGGC documentation should be used where possible. Samples of charts are available on StaffNet.

Prescription records may include, but are not limited to:

- Main medicine prescription chart (Kardex)
- Insulin prescription form
- Gentamicin prescription form
- Vancomycin prescription form
- Electronic prescription record (e.g. Hospital Electronic Prescribing and Medicine Administration (HEPMA) Chemocare or CareVue)
- Intravenous infusion fluid prescription charts

- Parenteral nutrition prescription
- Discharge prescription
- Patient Controlled Analgesia (PCA) chart
- Continuous infusion pump chart
- Patient Group Directive (PGD)

It is the responsibility of the individuals involved in the prescription and administration process to ensure that the correct prescribing and monitoring documentation has been commenced. This may include more than one of the prescription documents listed above. Adult and paediatric versions are available and there may be differences between these documents.

Administration of medications without a written prescription: Medicines must only be administered without a written prescription in emergency situations. A verbal instruction to administer medicines via telephone is not acceptable, unless in exceptional circumstances and must be approved by the practitioner in charge. Telephone orders must only be accepted for medicines that have been previously prescribed on the medicine kardex / charts. Process and requirements for obtaining verbal and telephone prescriptions are outlined in NHSGGC Safe and Secure Handling of Medicines in Hospitals Wards and Theatre Departments (2008) (Section 14.6 and 14.7).

General information on the administration of IV medicines

If there is another patient with the same or similar name, a yellow warning sticker should be applied to all prescription records to indicate this.

Individual patient condition is fundamental in decision making regarding a suitable method of IV medicine administration e.g. IV bolus administration / intermittent infusion or continuous infusion. Consideration must be given to patient's clinical condition, available VAD and the medicine being administered. Practitioners should be aware of the IV medicine monographs / injectable medicine administration guide which are available both online and hard copy format in acute clinical areas providing guidance for staff on correct method of IV medicine administration.

Pre prepared solutions / medicines should be used in preference to preparing medicines at ward level e.g. crystalloids with potassium chloride.

Any change to the IV prescription, resulting in partially filled syringes, bags or bottles must be discarded immediately and not be stored for later use. This fluid / medication is no longer safe to use and must be disposed of following the Pharmaceutical Waste guideline.

Monitoring: Regular monitoring of the infusion site(s) and volume(s) of fluid infused must be recorded using the appropriate documentation, for example VAD care plan / bundle, fluid prescription and fluid balance charts.

The VAD and insertion site must be checked for patency and signs of phlebitis before, during and after the administration of any IV flush or medicine. If the VAD is not being used for continuous infusions, then the patency of the device should be assessed at least once per day (unless the central VAD has been appropriately 'locked' – see Vascular Access Device guideline for more information).

If the visual inspection phlebitis score (VIP) is 2 or more then the PVC should be removed, documented on PVC care plan / bundle and re sited if required. A PVC / CVC care plan / bundle is required to be completed at least twice per day. Frequency of VAD checks by a healthcare practitioner is dependent on clinical area, patient's clinical condition and types

of IV medicines being administered e.g. patients receiving irritant medications may have increased frequency checks.

If a medicine is administered IV using an infusion pump, the pump must be checked hourly to ensure that the correct rate of infusion is being administered. A record of the rate set and volume infused will be recorded by the practitioner using the IV infusion monitoring form (pump chart) or equivalent documentation. For example, in paediatric services this information, with addition of a pressure check, will be documented on the Royal Hospital for Children fluid balance chart.

When using a volumetric infusion pump (not a syringe device), the infusion device shall be confirmed as administering fluid by:

- Observing drops falling within the mini-drop chamber of the infusion line
- Cross-referencing the volume delivered and the volume left in the container (increments are seen at the edge of the printed side of the containers)
- Examining the infusion line and any extension set to confirm that they are connected to the patient and that any lumen clamps (of VADs / NFADs) are open to allow the delivery of fluid / medication

When using syringe pumps, the flow of fluid can only be seen as being delivered to the patient by confirming the movement of fluid from the syringe to the patient. This will be performed by:

- Cross-referencing the volume delivered and the volume left in the syringe
- Examining the infusion line and any extension set to confirm that they are connected to the patient and that any lumen clamps (of VADs / NFADs) are open to allow the delivery of fluid / medication

Volume to be infused limits or drop sensors must be set on the infusion pump whenever possible to minimise the risk of:

- Over or under infusion of fluid / medication
- Air being drawn into the infusion line upon the completion of a reservoir of infusion fluid / medication

Medical staff must be informed when the infusion of medication is not completed due to difficulty with vascular access and this must be documented.

Infusion devices do not alarm in the event of infiltration or extravasation. Hence, the requirement for site inspection and documentation of VAD insertion site.

If a fluid balance chart is required for patient monitoring, it should be available to record the amounts of all fluid volumes infused, with a continuous total maintained for each 24-hour period. This should be documented once the fluids have been administered, rather than when the IV fluid infusion is commenced.

Additional patient monitoring may be required (e.g. ECG monitoring) when administering some IV medications. Consideration should be given to type of IV medication, individual patient clinical condition and duration of infusion.

Method of preparing and administering IV medicines: The following information sources should be used whenever possible for the preparation and administration of medicines:

- **NHSGGC adult and paediatric IV medicine monographs**. Available as hard copy on all wards. Electronic copies available via 'clinical info' section via StaffNet. Username and password are detailed on the StaffNet page, or contact pharmacy for

details. All clinical areas should have an IV monograph folder and are responsible for ensuring that these are kept up-to-date by having an allocated person responsible for liaising with pharmacy services

- Neonatal drug formulary (WoS)
- The medicine manufactures information leaflet
- British National Formulary (BNF) / British National Formulary for Children (BNFC)
- Pharmacy medicine information department or the clinical pharmacist (within working hours – contact via switchboard)
- On call pharmacist (out with working hours - contact via switchboard)
- NHSGGC Therapeutics Handbook

Advanced preparation of multiple medications, for different patients, increases the risk of error. All practitioners involved in the administration of IV medication must be aware of these patient safety risks throughout the process and strategies should be implemented to minimise the occurrence of error.

All IV medicines must be clearly identifiable at all stages during preparation and administration.

Luer-locking administration sets must be used for all infusion systems. This will include luer-lock syringes for use on syringe pumps and devices.

Anti-siphon valves should be considered and syringe pumps positioned in the line with the patient to reduce the risk of inadvertent free flow.

When accessing fluid from a rigid container e.g. a glass bottle, the IV administration set will need an air inlet to allow filtered air into the bottle before liquid can easily leave the container. If the air inlet is not integral to the administration set, a separate air inlet should be used. If the liquid is particularly viscous and not easily leaving the container, a sterile air inlet needle which has a filter can be used BUT the administration sets in-line air inlet, if present, must then be put to the closed position as liquid may leak out at this point. This could increase risk of bacterial contamination, liquid could spill onto the electric infusion pump and risk injury and under administration of IV medication.

During IV medicine administration practitioners should check solutions for signs of crystallization / discolouration / abnormalities.

Labelling: All infusions with medicines added at ward level must have a yellow label completed legibly to identify the following:

- Patient name, CHI number and ward number
- Added medication and dose
- Diluent and volume
- Date and time of preparation
- Date and time of expiry for continuous infusions
- Initials of the two practitioners involved in the preparation of medication

The label will be attached securely to the infusion bag / syringe in such a fashion that it does not obscure any other writing/printing or fluid levels. If the label is illegible, smudged, torn or detached from the container, the medicines should not be administered and be discarded.

Pharmacy aseptic units will follow their own nationally agreed standards for labelling.

Where multiple infusions are in progress, individual labels identifying the name of medication / infusion fluid must be applied to the infusion line, near the VAD connection point.

When a patient is receiving various infusion therapies via other routes, e.g. IV, epidural and subcutaneous infusions, each infusion line should be clearly marked with a label to identify the route of administration.

Priming and changing infusion systems

All infusion systems must be fully primed prior to attaching to VAD / NFAD. If an infusion device is being used, this prime function should be utilised.

IV administration sets must be changed every 72 hours. This may be different for certain medications – some administration sets are changed every 12 or 24 hours. For example:

- If the medicine manufacturer's guidance on stability (or the IV monograph) states that the infusion must be changed more frequently than 24 hours
- When blood/blood products are used. The system should be changed on completion of transfusion or every 12 hours, whichever is soonest

  Check local policy and guidelines.

All infusion bags and syringes prepared at ward level / clinical area must be changed at least every 24 hours.

Appropriate documentation should be accurately completed.

Bacterial filters may be used according to local policy and guidelines.

When an administration set is connected to a VAD, it is essential, that a **closed system** is maintained, avoiding unnecessary disconnection. When the closed system is interrupted it is essential to observe a non touch technique to maintain asepsis. Administration sets are single use and should be discarded once disconnected. In some clinical situations, it may not be possible to avoid disconnection of administration sets due to the type of treatment being administered to the patient. The practitioner should assess the rationale for the disconnection. If it is essential for patient care that the treatment / equipment cannot be disposed of, a strict non touch technique should be adhered to throughout the procedure, the VAD should be flushed an appropriate volume for the VAD in use of 0.9% sodium chloride (NaCl) in a 10ml syringe, and the administration set sealed with a sterile protective cap. Flush volumes will vary depending on the VAD in use. Flush volume should be large enough to flush the full length of the VAD. Smaller volumes of flush may be considered in neonates and paediatric services.

Infusion pumps and infusion charts

An IV infusion prescription record (e.g. a pump chart) must be correctly completed by the prescriber and identify the patient and the fluid / medication regime. The volume infused, volume remaining and rate of infusion must be documented hourly on the IV pump chart or equivalent documentation. For example, in paediatric services this information, with addition of a pressure check, will be documented on the Royal Hospital for Children fluid balance chart.

Discontinuation of infusions should be documented on IV infusion prescription record and the prescription kardex.

All syringe pumps need to be calibrated to a specific brand of syringe, therefore it is vital to ensure that the correct brand of syringe is used. Incorrect brand of syringe can lead to errors in the rate of the infusion.

On commencement of continuous infusion of IV medication two practitioners must check and sign to confirm the correct patient and prescription. Initial medicine preparation checks, rate of infusion and further infusion rate changes must be checked and documented by 2 practitioners on the IV infusion prescription record.

Good Practice Points

An individual patient's IV medicines should be prepared at one time to reduce the risk of error.

IV medication should not be prepared in advance of administration, unless there is a clinical rationale, as this increases the risk of bacterial contamination, incorrect medication being administered and may affect stability of the medicine.

Practitioners **must** only administer IV medicines that they have either prepared or checked themselves, have been prepared by pharmacy aseptic unit or which are supplied as ready to use preparations (NHSGGC Safe and Secure Handling of Medicines in Hospitals Wards and Theatre Departments (2008).

All VADs **must** be removed when no longer clinically indicated. Practitioners should review the need for intravenous therapy on a daily basis and consider IV to oral switch over (IVOST) if appropriate.

VADs that are not in daily use, e.g. central VADs and dialysis CVCs, may require to be 'locked' to reduce the risk of occlusion. Sterile sodium chloride 0.9% solution should be used to flush and lock VADs. In the event that heparinised saline and taurolidine citrate is used, this must be clearly documented as an exception to normal practice. Consideration should be given to the type and strength of 'lock' that is in place to decide on whether aspiration of 'lock' is required. For example, sodium chloride would not normally require to be aspirated and discarded however, heparin / taurolock **must** be aspirated and discarded to avoid the administration of the 'lock' to the general circulation of the patient as this will significantly increase the risk of coagulopathy.

The practitioner responsible for the clinical area must be informed of:

- any change in the patient's condition
- any change in the VAD insertion site and / or IV in-line pressure monitoring, which cannot be accounted for
- any medication incident or near miss that has occurred. Medical staff must be informed when a medication incident has occurred and a Datix report completed. The patient involved with the medication error / incident must be informed

IV Flush

Situations where IV flush solutions are administered include, but are not limited to:

- On insertion of a VAD e.g. peripheral venous cannula (PVC) or central venous catheter (CVC), to ensure patency
- At specified intervals for patients with a VAD, to maintain device patency
- Before and after the administration of an IV medicine via VAD
- In between each administration when multiple IV medicines are being administered

- Following blood sampling from a VAD, to maintain device patency

Legal background for IV flush

Both sodium chloride 0.9% and glucose 5% injection are classified as Prescription Only Medicines (POMs) due to their intended IV route of administration. Medicines legislation and the NHS Greater Glasgow and Clyde (NHSGGC) Safe and Secure Handling of Medicines (2008) policy stipulate that all POMs for administration to patients must be prescribed by an appropriate authorised practitioner and a record of their administration should be made and retained using authorised records (e.g. Medicine Prescription and Administration Form, commonly referred to as the Kardex, or electronic equivalent). However, to facilitate safe and timely administration of IV flush solutions the accepted practice in NHSGGC is described below.

NHSGGC accepted practice for IV flush solutions

Within NHSGGC Adult, Mental Health and Paediatric services (**excluding neonatal and SCBU areas**) it is accepted practice for IV flush solutions to be administered without a formal prescription or administration record as part of the routine care and maintenance of VADs. This is an authorised *exemption* to the normal practice for other POMs, as described in the NHSGGC Safe and Secure Handling of Medicines (2008) policy.

IV Flush – core statements

- The fluid administered as an IV flush is sterile sodium chloride 0.9%
- Recommended flush volume is dependent on the VAD being used, and should be a sufficient volume to remove blood or medicine residue. Normally this is twice the internal diameter of the VAD. For PVCs, normal flush volumes would be:
    - Adults and children > 1 year 2.5mls - 5mls
    - Children ≤ 1 year 2.5mls
- All flushes, regardless of the volume of flush used, should be drawn up using a safety hypodermic needle and syringe which is at least 10ml in size, and administered immediately using a push/pause with positive pressure technique. This syringe size will reduce this risk of excess pressure being applied on the cannula or vein and / or to prevent VAD fracture / rupture. This technique reduces the risk of backflow of blood into the VAD and / or prevents VAD blockage
- All flush solutions should be independently checked with another practitioner prior to administration
    - Medical staff may work in clinical situations where it is not possible to adhere rigidly to an independent second check. In these situations, a paused single check is permissible, and individual medical staff are accountable to ensure patient safety is not compromised
- A flush will be administered to all patients on insertion of a VAD and at routine time intervals thereafter to maintain and ensure device patency
- A flush will be administered before and after the administration of an IV medicine and between the administrations of multiple IV medicine
    - In some instances, additional glucose 5% may be used if it is more suitable for use due to compatibility with the IV medicine being administered. Glucose 5% should also then be flushed with sterile 0.9% sodium chloride to avoid

sticky residue remaining in the VAD and maintain device patency

- Flush solutions for **adult** patients do not require to be prescribed by an authorised practitioner or the administration recorded
- Flush solutions for **paediatric patients (under 16 years of age)** do not require to be prescribed by an authorised practitioner, but a record of the volume administered should be recorded on the fluid balance chart or other appropriate documentation by the practitioners administering the flush. **NB – the IV flush policy does not apply in neonatal intensive care units or special care baby units**
- Health Care Support Workers (HCSWs) may only administer a flush as part of the PVC insertion process in adults and children > 1 month of age. They must have completed appropriate NHSGGC training and assessed as competent to undertake this skill
- This policy includes flush solutions administered within CT scan environments – in these areas only, local guidelines should be followed with respect to the flush volume / flow rate and size of syringe to use. Within CT areas, no individual flush should exceed 10mls

IV Flush compatibility with medicines

The IV monographs will indicate compatibility issues of the particular medicines and 0.9% sodium chloride, in which case 5% glucose may be required in addition to the sodium chloride flush e.g. order of administration being 0.9% sodium chloride (to ensure VAD patency), 5% glucose (to prevent compatibility issues), prescribed medication, 5% glucose (to avoid compatibility issues) then 0.9% sodium chloride (to remove residue and maintain VAD patency).

All flushes, regardless of the volume used should be drawn up using a sterile safety hypodermic needle and administered via a syringe which is at least 10ml in size using a push / pause technique that ends with positive pressure by depressing the syringe plunger before clamping the line or disconnecting the syringe. This technique prevents backflow of blood into the VAD reducing incidence of blockage, limits the amount of pressure which can be exerted on the VAD and can minimise the risk of catheter fracture.

The volume of IV flush should be at least twice the volume of the lumen / VAD to be flushed. Consideration should be given to individual patient weight and clinical condition e.g. neonates.

Additional notes for students on placement administering IV flush

Student doctors / nurses /midwives may only administer an IV flush as part of the development of clinical skills (e.g. PVC insertion or IV medicine administration) under **direct supervision** during a practice-based placement. Medical, nursing or midwifery students must be supervised by NHSGGC staff who are trained and competent in flush administration.

Under the direct supervision of a registered healthcare practitioner who is competent in peripheral venous cannulation (PVC) insertion and/or administration of IV medicines:

From September 2021:

Part 2 student midwives can undertake the preparation and administration of IV 0.9% Sodium Chloride flush on PVC insertion, as part of routine PVC care and maintenance, and as part of IV medicine administration.

From September 2022:

Part 3 adult field student nurses can undertake the preparation and administration of IV 0.9% Sodium Chloride flush on PVC insertion, as part of routine PVC care and maintenance, and as part of IV medicine administration.

Part 3 child field student nurses can undertake the preparation and administration of IV 0.9% Sodium Chloride flush as part of IV medicine administration.

Prior to these dates all students must complete online theoretical modules and simulated practice within the HEI as part of the pre-registration programme. If sufficient learning opportunities are available during these practice placements, students can use the health board's cannulation competency document certification process

Review of policy: The policy will be reviewed every 2 years.

Procedure for preparation and administration of an IV bolus medication

Equipment requirements:

Prescription chart

PPE (minimum consideration of disposable apron and nitrile gloves)

Clean tray / trolley / appropriate surface

Appropriate size leur lock syringe(s)

21G safety hypodermic needle / or blunt filter needle

Medication vial(s) / ampoule(s)

IV 0.9% sodium chloride (NaCl) in a 10ml leur lock syringe(s) – for flush

2% chlorhexidine in 70% isopropyl alcohol wipes

Clinical waste bag

- Perform hand hygiene
- Correctly identify patient, explain process to patient / child +/- parent. Gain consent
- Visually inspect VAD for patency, signs of infiltration, infection or phlebitis
- Perform hand hygiene
- Independently check medicine, reconstitution agent, diluents, flush, prescription and calculation with another practitioner
- Perform hand hygiene
- Apply PPE
- Clean top of vial(s) or ampoule(s) with 2% chlorhexidine and 70% alcohol wipe for 30s. Allow to dry
- Using an aseptic non touch technique, prepare medicine(s) as per the monograph and prescription chart. Label appropriately
- Scrub the hub of needle free access device (NFAD) for at least 30s using 2% chlorhexidine and 70% alcohol. Allow to dry

*NB * Aspirate to remove VAD 'lock' if necessary (check patient notes / care plan / bundle). Attach syringe, unclamp lumen if required, aspirate, re apply clamp and detach syringe. Discard.*

- Using an aseptic non touch technique, attach 10ml syringe with 0.9% NaCl to NFAD. Unclamp lumen if required, flush the VAD using a push / pause technique. Reapply clamp and disconnect syringe whilst maintaining positive pressure on syringe plunger

*NB * Neonates / paediatric may require a smaller volume of flush*

- Flush should be administered with ease. If there are signs of resistance, infiltration, extravasation or inflammation discontinue
- Using an aseptic non touch technique, attach syringe, unclamp lumen if required and administer medicine at a rate in accordance to IV medicine monograph
- If patient complains of discomfort or shows signs of reaction, discontinue and call for help
- Repeat administration process, if multiple bolus administrations are being given, with additional flush between each medicine administration to prevent compatibility issues

When administration is complete

- Reposition clamp if required and detach syringe
- Using an aseptic non touch technique, attach 10ml syringe of 0.9% NaCl to NFAD. Unclamp lumen if required, flush VAD using a push / pause technique. Reapply clamp whilst maintaining positive pressure on syringe plunger. Disconnect syringe

- Scrub the hub of needle free access device (NFAD) to remove any medicine residue for at least 30s using 2% chlorhexidine and 70% alcohol. Allow to dry
- Discard all disposable equipment
- Remove PPE and discard as healthcare waste
- Perform hand hygiene
- Both practitioners document medicine administration on appropriate prescription charts

Procedure for adding and administration of medicines via a volumetric pump

Equipment requirements:

PPE (minimum consideration of disposable apron and nitrile gloves)

Clean tray / trolley / appropriate surface

Appropriate size leur lock syringe(s)

Medication vial(s) / ampoule(s)

Prescription chart

21G safety hypodermic needle / or blunt filter needle

IV 0.9% sodium chloride (NaCl) in a 10ml leur lock syringe – for flush

Appropriate volume of diluent (e.g. 100ml 5% glucose)

IV administration set

Yellow medicine additives label

Volumetric pump should use when possible

2% chlorhexidine in 70% isopropyl alcohol wipes

Clinical waste bag

- Perform hand hygiene
- Correctly identify patient, explain process to the patient / child + / - parent. Gain consent
- Visually inspect VAD for patency, signs of infiltration, infection or phlebitis
- Perform hand hygiene
- Independently check medicine, reconstitution agent, diluent, flush, prescription and calculation with another practitioner.
- Complete medicine additive label
- Perform hand hygiene
- Apply PPE
- Clean top of vial(s) or ampoule(s) and injection port of fluid bag (diluent) with 2% chlorhexidine and 70% alcohol wipe for 30s. Allow to dry
- Using a aseptic non touch technique, prepare medicines as per the monograph and prescription chart
- Using an aseptic non touch technique, inject reconstituted medicines slowly into fluid bag (diluent) via additive port. Invert bag 3 to 4 times. Label appropriately
- Using a aseptic non touch technique, attach bag to an appropriate IV administration set and prime line
- Scrub the hub of the needle free access device (NFAD) for at least 30s using 2% chlorhexidine and 70% alcohol. Allow to dry

*NB * Attach syringe, unclamp lumen if required and aspirate to remove 'lock' if necessary (check patient notes / care plan / bundle). Re apply clamp and detach syringe*

- Using an aseptic non touch technique, attach 10ml syringe with 0.9% NaCl to NFAD. Unclamp lumen if required, flush the VAD using a push / pause technique. Reapply clamp and disconnect syringe whilst maintaining positive pressure on syringe plunger

*NB * Neonates / paediatric may require a smaller volume of flush*

- Flush should be administered with ease. If there are signs of resistance, infiltration, extravasation or inflammation discontinue process
- Using an aseptic non touch technique, attach the IV administration set to the NFAD, unclamp lumen if required and infuse medicine at an appropriate rate in accordance to IV medicine monographs. A volumetric pump should be used where possible

- If patient complains of discomfort or shows signs of a reaction, discontinue and call for help
- Discard all disposable equipment
- Remove PPE and discard as healthcare waste
- Perform hand hygiene
- Both practitioners document medicine administration on appropriate prescription charts (including pump chart) and commence ongoing infusion checks / monitoring

When administration of medicine is complete

- Perform hand hygiene
- Apply PPE
- Re position clamp if required

Consider that when the infusion bag is empty the administration set and tubing will still contain an amount of medicine. Volumetric pump and gravity infusion sets' generally hold a volume range of 20- 30mL, this varies depending on the type and length of the set.

If disconnecting the administration set:

- Detach the administration set
- Using an aseptic non touch technique, attach 10ml syringe with 0.9% NaCl to NFAD. Unclamp lumen if required, flush the VAD using a push / pause technique. Reapply clamp and disconnect syringe whilst maintaining positive pressure on syringe plunger.

*NB * Neonates / paediatric may require a smaller volume of flush*

- Scrub the hub of the needle free access device (NFAD) to remove any medicine residue for at least 30s using 2% chlorhexidine and 70% alcohol. Allow to dry
- Discard all disposable equipment
- Remove PPE and discard as healthcare waste
- Perform hand hygiene
- Both practitioners document medicine administration on appropriate prescription charts (including pump chart) and commence ongoing monitoring

If leaving the administration set attached to administer the remaining medicine:

- Using an aseptic non touch technique, remove the completed infusion bag and attach a 50ml or 100ml bag of compatible infusion fluid to the administration set
- Set the pump to administer a minimum of 20 – 30mls set at the same rate as the medicine was running at

*NB * Neonates / paediatric may require a smaller volume of flush*

- Infusion should be administered with ease. If there are signs of resistance, infiltration, extravasation or inflammation discontinue process
- Discard all disposable equipment
- Remove PPE and discard as healthcare waste
- Perform hand hygiene
- Both practitioners document medicine administration on appropriate prescription charts (including pump chart) and commence ongoing monitoring

When administration is complete

- Perform hand hygiene

- Apply PPE
- Re position clamp if required
- Detach IV administration set
- Using an aseptic non touch technique, attach 10ml syringe with 0.9% NaCl to NFAD. Unclamp lumen if required, flush the VAD using a push / pause technique. Reapply clamp and disconnect syringe whilst maintaining positive pressure on syringe plunger.
- Discard all disposable equipment
- Remove PPE and discard as healthcare waste
- Perform hand hygiene
- Document administration on appropriate charts (including pump chart) and commence ongoing infusion checks / monitoring

Procedure for adding and administration of medicines via syringe pump

Requirements

PPE (minimum consideration of disposable apron and nitrile gloves)

Clean tray / trolley / appropriate surface

Appropriate size leur lock syringe(s)

Medication vial(s) / ampoule(s)

Prescription chart

21G safety hypodermic needle / or blunt filter needle

IV 0.9% sodium chloride (NaCl) in a 10ml syringe - for flush

Appropriate volume of diluent (e.g. 0.9% NaCL)

IV infusion line

Yellow medicine additives label

Syringe pump

2% chlorhexidine in 70% isopropyl alcohol wipes

Clinical waste bag

- Perform hand hygiene
- Correctly identify patient, explain process to patient / child + / - parent. Gain consent
- Visually inspect VAD for patency, signs of infiltration, infection or phlebitis
- Perform hand hygiene
- Independently check medicine, flush, diluent, prescription and calculation with another practitioner
- Complete medicine additive label
- Perform hand hygiene
- Apply PPE
- Clean top of vial(s) or ampoule(s) for 30s with 2% chlorhexidine and 70% alcohol wipe. Allow to dry
- Using an aseptic non touch technique, prepare medicines as per the monograph and prescription chart
- Using an aseptic non touch technique, draw the reconstituted medicine with any diluents required into the leur lock syringe ensuring that correct end volume is achieved. Label appropriately
- Attach syringe to an appropriate IV infusion line
- Insert syringe into syringe pump, set up according to manufacturer's instruction. Use the syringe pump to purge the infusion line of air
- Scrub the hub of the needle free access device (NFAD) for at least 30s using 2% chlorhexidine and 70% alcohol. Allow to dry

*NB *Attach syringe, unclamp lumen if required and aspirate to remove 'lock' if necessary (check patient notes / care plan / bundle). Re apply clamp and detach syringe*

- Using an aseptic non touch technique, attach 10ml syringe with 0.9% NaCl to NFAD. Unclamp lumen if required, flush the VAD using a push / pause technique. Reapply clamp and disconnect syringe whilst maintaining positive pressure on syringe plunger

*NB * Neonates / paediatric may require a smaller volume of flush*

- Flush should be administered with ease. If there are signs of resistance, infiltration, extravasation or inflammation discontinue process
- Using an aseptic non touch technique, attach the IV infusion line to the NFAD, unclamp

lumen if required and infuse medicine at an appropriate rate in accordance to IV medicine monographs

- If patient complains of discomfort or shows signs of a reaction, discontinue and call for help
- Discard all disposable equipment
- Remove PPE and discard as healthcare waste
- Perform hand hygiene
- Document administration on appropriate charts (including pump chart) and commence ongoing infusion checks and monitoring

When administration is complete

- Perform hand hygiene
- Apply PPE
- Re position clamp if required

Consider that when the syringe is empty the infusion line will still contain a small amount of medicine. Syringe infusion lines hold a small volume of solution, generally around 2mL, depending on the type and length of the line. Further consideration should be given as to whether this small volume should be administered.

If disconnecting the infusion line:

- Detach IV infusion line
- Using an aseptic non touch technique, attach 10ml syringe with 0.9% NaCl to NFAD. Unclamp lumen if required, flush the VAD using a push / pause technique. Reapply clamp and disconnect syringe whilst maintaining positive pressure on syringe plunger

**Neonates / paediatric may consider a smaller volume of flush*

- Scrub the hub of the needle free access device (NFAD) to remove medicine residue for at least 30s using 2% chlorhexidine and 70% alcohol. Allow to dry
- Discard all disposable equipment
- Remove PPE and discard as healthcare waste
- Perform hand hygiene
- Document administration on appropriate charts (including pump chart) and commence ongoing infusion checks / monitoring

Appendix 1 – Related NHSGGC policies and guidance / guidelines (hyperlinks to documents / webpages)

NHS Greater Glasgow and Clyde (2008) NHS Greater Glasgow and Clyde Safe and secure handing of medicines in hospital wards, theatres and departments

Vascular Access Procedure and Practice Guidelines (2019)

Control of Substances Hazardous to Health (COSSH)

Pharmaceutical Waste Guidance

Food, Fluid and Nutrition

Infection prevention and control guidelines

NHSGGC IV Flush Policy

NHSGGC Management of occupational and non occupational exposures to blood borne viruses including needle stick injuries and sexual exposures policy

Medicine prescription charts - NHSGGC approved in-patient charts

Injectable medicines guide IV Medusa monographs

Core prevention policies and SOPs (including SICPs)

Patient Identification Band Policy

Medicine Proficiency: Non Intravenous

Consent policy on healthcare assessment, care and treatment

Paediatric guidance:

Haemato-oncology patient's fluid and electrolytes management (Schiehallion)

Intravenous fluid guidance for previously well children aged 7 days to 16 years

Intravenous fluid therapy in children and young people in hospital
West of Scotland Cancer Network Extravasation in Practice Guidelines (policy and tools)

Appendix 2 - Additional resource list

Aseptic Non Touch Technique: The international standard for aseptic technique

British National Formulary (BNF)

Clinical Resource and Audit Group (2002) Good practice statement for the preparation of injections in near-patient areas, including clinical and home environments. NHS Scotland: Edinburgh.

Dougherty, L. and Lister, S. (2011) *The Royal Marsden Hospital Manual of Clinical Nursing Procedures*. Wiley Blackwell: Oxford.

General Medical Council (GMC) (2013) Good medical practice

Health and Care Professions Council (HCPC) (2016) Standards of conduct, performance and ethics

Loveday HP, Wilson JA, Pratt RJ, Golsorkhi M, Tingle A, Bak A, Browne J, Prieto J and Wilcox M (2014) Epic3: National evidence-based guidelines for preventing healthcare-associated infections in NHS hospitals in England. *Journal of Hospital Infection*. Vol 86 (Supplement): S1-S70.

National Infection Prevention and Control Manual

National Institute for Clinical Excellence (2015) Intravenous fluid therapy in children and young people in hospital *(NG 29)*.

National Institute for Clinical Excellence (2017) Healthcare-associated infections: prevention and control in primary and community care (*CG139)*.

National Infusion and Vascular Access Society (NIVAS) Intravenous Administration of Medicines to adults: Guidance on “line flushing” -Version 3 2021

Nursing and Midwifery Council (2015) The code: professional standards of practice and behaviour for nurses and midwives. London: NMC.

Rowley, S. and Clare, S. (2011) ANTT: a standard approach to aseptic technique. Nursing Times Vol. 17 (36), pp. 12-18.

Rowley, S., Clare, S., Macqueen, S., Molyneux, R. (2010) ANTT v2: An updated practice framework for aseptic technique *British Journal of Nursing.* Vol 19(5) (Supplement): S5-11.

Royal College of Nursing (2016) Standards for infusion therapy

Scottish Government (2000) Adult and incapacity (Scotland) Act 2000

Taxis K and Barber N. (2003) Ethnographic study of incidence and severity of intravenous medicine errors. *British Medical Journal. Vol.* 326, pp. 684-687.