Provisional
Infusion Therapy
Standards of Practice

March 2012
Intravenous Nursing New Zealand
Incorporated Society

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Disclaimer
The Provisional Infusion Therapy Standards of Practice is intended to reflect current knowledge and practices for the clinical speciality of infusion therapy. Clinical practice is continually evolving based on research; therefore users should complete an independent assessment on the appropriateness and applicability of a standard in any specific circumstance, and within the context of New Zealand laws and regulations.

The risks associated with infusion therapy are complex and each situation must be judged on its own merits; readers should not simply follow instructions in the standard without proper assessment of individual circumstances.

IVNNZ Inc. is not responsible for any consequences that may result from decisions made upon the basis of the advice given herein.
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Acknowledgements

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In particular, thank you for the comments provided by:
BD
New Zealand Blood Service (NZBS)
New Zealand Hospital Pharmacists’ Association (Inc) (NZHPA)
New Zealand Nurses Organisation (NZNO) Sections:
  - Critical Nurses Section (CCNS)
  - National Division Infection Control Section (NDICS)

NEW ZEALAND LEGISLATION
When interpreting the Infusion Standards it may be helpful to refer to the relevant legislation and their amendments, which include but are not limited to:

Health & Disability Commissioner Code of Health and Disability Services
Consumers’ Rights Regulation 1996
Health and Disability Commissioner Act 1994
Health (Retention of Health Information) Regulations 1996
Health Act 1956
Health and Disability Services (Safety) Act 2001
Health and Safety Employment Act 1992
Health Information Privacy Code 1994
Health Practitioners Competence Assurance Act 2003
Human Rights Act 1993
Medicines Act 1981
Medicines Regulations 1984
Privacy Act 1993
Foreword

(Foreword to be added by Mary Alexander, CEO, Infusion Nurses Society, USA)
Preface

The Intravenous Nursing New Zealand Incorporated Society (IVNNZ Inc.) is an affiliated international member of the Infusion Nurses Society (INS) and is dedicated to Best Practice Recommendations and Standards for Infusion Therapy. The IVNNZ Inc. mission statement is: A commitment to excellence in intravenous nursing practice with ongoing quality improvement to patient care.

This provisional Infusion Therapy Standards of Practice, developed by IVNNZ Inc. in collaboration with INS Standards of Practice and in consultation with other multi-professional organisations, integrates best evidence and research into each standard.

The standards are written to provide criteria for actions and accountability, while the practice criteria provide guidance for implementation of the standard. The standards are written to be applicable in all patient settings and address all population groups, which can be readily incorporated into local infusion-related policies and procedures, performance improvement programmes, performance evaluations, and educational approaches.

Each of the standard statements and practice criteria is supported by the latest available research, and the evidence is ranked as per the INS Infusion Standards of Practice (2011) ranking system. The ranking system incorporates a range of levels, from Level I meta-analysis, systematic reviews and guidelines based on randomised controlled trials to Level V, which includes clinical articles, reports, and generally accepted practices. In addition, the practice criteria allow for more detailed explanations for specific patient populations and practice settings.

The Provisional Infusion Therapy Standards of Practice will be invaluable to guide clinicians in decision making and developing patient-focused plans of care.

Conclusion

The Provisional Infusion Therapy Standards of Practice are intended to assist clinicians and relevant healthcare workers to ensure that their patients receive the most appropriate care for their individual circumstances.
Strength of the Body of Evidence

Evidence that is research based is preferred; however, it may come from a variety of sources as required. The strength of evidence in this document reflects the body of evidence available and retrievable at the time of review. It includes:

I. Meta-analysis, systematic literature review, guideline based on Randomised Controlled Trial (RCT), or at least 3 well-designed RCTs.
   I. A/P Includes evidence from anatomy, physiology, and pathophysiology as understood at the time of writing.

II. Two well-designed RCTs, 2 or more multicentre well-controlled trials without randomisation or systematic literature review of varied prospective study designs, and non-randomised controlled trials and retrospective studies.

III. One well-designed RCT, several well-designed clinical trials without randomisation, or several studies with quasi-experimental designs focused on the same question. [This category includes 2 or more well-designed laboratory studies.]

IV. Well-designed quasi-experimental study, case control study, cohort study, correlational study, time series study, systematic literature review of descriptive and qualitative studies, narrative literature review, or psychometric study. [This category includes 1 well-designed laboratory study.]

V. Clinical article, clinical/professional book, consensus report, case report, guideline based on consensus, descriptive study, well-designed quality improvement project, theoretical basis, recommendation by accrediting bodies, and professional organisations, or manufacturer recommendations for products or services. [This category includes standard of practice that is generally accepted, but does not have a research basis (for example, patient identification).]

Regulatory
This indicates regulations and other criteria set by agencies with the ability to impose consequences, such as the Ministry of Health, NZ Blood Service, and statutory parameters of health practitioners’ professional groups.

Organisational policies and procedures should be developed and implemented based on the standards and the practice criteria.

Abbreviations
The following organisations are referred to by abbreviations throughout this document:

CDC Centers for Disease Control and Prevention
INS Infusion Nurses Society
HPCA Health Practitioner Competence Assurance Act
MoH Ministry of Health
NCNZ Nursing Council of New Zealand
NHMRC National Health and Medical Research Council of Australia
NICE National Institute for Clinical Excellence
NPSA National Patient Safety Agency
NZBS New Zealand Blood Service
NZNO New Zealand Nurses Organisation
RCN Royal College of Nursing
WHO World Health Organisation
STANDARDS OF PRACTICE
Clinical Practice

Practice setting

Standard
1. Infusion therapy standards of practice shall be applied in all practice settings where infusion therapy is administered.
2. Administration of infusion therapy shall be established in organisational policies, procedures and/or practice guidelines.
3. Administration of infusion therapy shall be in accordance with rules and regulations promulgated by the health professional regulatory bodies.

Neonatal and paediatric patients

Standard
1. The clinician providing infusion therapy for neonatal and paediatric patients shall have clinical knowledge and technical expertise with respect to this population group.
2. Clinical management of neonatal and paediatric patients shall be established in organisational policies, procedures, and/or practice guidelines.
3. The clinician shall verify that there has been a process for informed consent for the treatment of neonatal and paediatric patients and that this process is documented.

Practice criteria
A. The clinician should provide care to neonatal and paediatric patients that is individualised, collaborative, and age appropriate – those people from birth to 12 years. (V)
B. The clinician providing infusion therapy to neonatal and paediatric patients should have knowledge and demonstrated skill competency in the areas of:
   i. Anatomic characteristics and their effect on physical assessment, vascular access device site selection, insertion procedures, site rotation, and use of specialised infusion-related equipment. (V)
   ii. Physiologic characteristics and their effect on medicine and nutrient selection; administration set selection; dosage and volume limitations according to age, height, weight, or body surface area. (V)
   iii. Pharmacologic actions, interactions, and side-effects; monitoring parameters; and response to infusion therapy. (V)
   iv. Growth and developmental stages, including implications related to promoting comfort and reducing pain and fear associated with infusion therapy procedures, i.e. play therapy or kangaroo cuddles and oral sucrose. (V)
   v. Interactions with parents, whanau or a nominated (identified) caregiver as members of the patient’s healthcare team. This includes patient education that is provided that is appropriate to age, developmental level, culture, and language preferences. (V)
   vi. Safe and appropriate setting for patients receiving infusion therapy, e.g. hospital, primary healthcare setting, school, or home care.
   vii. Obtaining consent from school-age or adolescent patient according to the Code of Health and Disability Services Consumers’ Rights (Health & Disability Commissioner, 1996).

References:

Older adult patients

Standard
1. The clinician providing infusion therapy for older adult patients shall have clinical knowledge and technical expertise with respect to this population.
2. Clinical management of older adult patients shall be established in organisational policies, procedures and/or practice guidelines.

Practice criteria
A. The clinician should provide individualised collaborative and age-appropriate care to older adults – those people who are 65 years and older. (V)
B. The clinician providing infusion therapy to the older adult should have knowledge and demonstrate skill competency in the areas of:
   i. Anatomic changes related to the older adult and their effect on physical assessment, vascular access device site selection, insertion procedures, site rotation, and use of specialised infusion related equipment. (V)
   ii. Physiologic changes related to the older adult and their effect on medicine and nutrient...
selection; administration set selection; dosage and volume limitations according to age, height, weight, or body surface area. Awareness of potential for adverse events and medicine interactions in the older adults who may take multiple prescribed medicines. (V)

iii. Pharmacologic actions, interactions, and side-effects; monitoring parameters and response to infusion therapy.

iv. Changes in cognitive ability and dexterity: communication methods, including vision, hearing, and verbal changes; as well as psychosocial and socioeconomic considerations. (V)

v. Interaction with family members, whanau or identified caregivers, as members of the patient’s healthcare team, with consent of the patient or as necessary due to mental status. (V)

vi. Safety in environmental considerations related to older adults receiving infusion therapy and effective management of those considerations. (V)

References:

Ethics

Standard
1. Ethical principles shall be the foundation for decision making in patient advocacy.
2. Guidelines and resources for ethical issues shall be outlined in organisation policies, procedures and/or practice guidelines.
3. The clinician shall act as a patient advocate: maintain patient confidentiality, safety, and security.
4. The clinician shall respect, promote, and preserve human autonomy, dignity, rights, and diversity.
5. Principles of beneficence, non-maleficence, fidelity, protection of patient autonomy, justice, and veracity shall dictate nursing action.

Practice criteria
A. Ethical principles should be integrated into all areas of clinical practice. (V)
B. The clinician should use professional ethical resources appropriate to their profession and or regulatory body, e.g. Nursing Council (NCNZ). (V)
C. The clinician should assess and raise issues related to potential ethical problems, act as a role model for ethical care, and contribute to resolving ethical issues related to patients, colleagues, or the healthcare system. (V)
D. The clinician should use organisational ethics resources to support clinical participation when dealing with ethical issues, e.g. ethics organisation committees. (V)

Scope of practice

Standard
1. The scope of practice for each type of clinician involved with the delivery of infusion therapy shall be organised to support patient safety and protection. Practice settings shall clearly define roles, responsibilities; tasks, and accountability for all clinicians involved in the delivery of infusion therapy.
2. All clinicians involved with the delivery of infusion therapy shall practice within their defined professional scope of practice.
3. The clinician shall be accountable for patient safety in the delivery of any infusion therapy.

Practice criteria
A. The nurse bears responsibility for becoming competent to practice nursing and maintaining that competence throughout her or his career.
B. Competency validation is a dynamic process that changes based on organisational requirements.
C. A variety of different methods could be used for, but not limited to, competency validation, including written tests, online learning and clinical assessment.

Registered Nurses Scope of Practice (NZNC, 2010)
Registered nurses utilise nursing knowledge and complex nursing judgment to assess health needs and provide care, and to advise and support people to manage their health. They practise independently and in collaboration with other health professionals, perform general nursing functions and delegate to and direct Enrolled Nurses, healthcare assistants and others. They provide comprehensive assessments to develop, implement, and evaluate an integrated plan of health care, and provide interventions that require substantial scientific and professional knowledge, skills, and clinical decision making. This occurs in a range of settings in
partnership with individuals, families, whanau, and communities. Registered nurses may practise in a variety of clinical contexts depending on their educational preparation and practice experience. Registered nurses may also use this expertise to manage, teach, evaluate, and research nursing practice. Registered nurses are accountable for ensuring all health services they provide are consistent with their education and assessed competence, meet legislative requirements, and are supported by appropriate standards. There will be conditions placed on the scope of practice of some registered nurses according to their qualifications or experience, limiting them to a specific area of practice.

Other NCNZ (2010) regulated groups work under direct supervision of the registered nurse and within their professional scope of practice.

References:

Competence and competency validation

Standard
1. The clinician shall be competent in the safe delivery of infusion therapy within their scope of practice.
2. The clinician shall be responsible for attaining and maintaining competence with infusion therapy as defined in their scope of practice.
3. Competency validation is the responsibility of the clinician and employing organisation. Validation is performed initially and/or reviewed as required.
4. Competency validation is set by the individual clinician’s regulatory body.

Practice criteria
A. The clinicians’ competence is set in part by Health Practitioners Competence Assurance Act 2003 (HPCA) and the individual clinician’s regulatory body.
B. The HPCA Act (2003) ensures every clinician has a scope of practice. Professions regulated include nursing, midwifery, medicine, pharmacists, physiotherapists, and a range of other allied health professions. (V, Regulatory)
C. Healthcare workers such as healthcare assistants, mental health support workers, phlebotomists, physician’s assistants, ambulance officers, and paramedics are not regulated by the HPCA 2003.

There are no legal requirements surrounding the competence of these individuals. (V, Regulatory)

D. The clinicians undertaking the insertion of vascular access devices will have undergone theoretical and practical training in the following:
- Anatomy and physiology of the arm (and, where appropriate, central vessels) including veins, arteries, and nerves, the feel and appearance of healthy veins including the presence of valves and junctions.
- Assessment of patient vascular access, therapy, and quality of life needs.
- Improving venous access, for example the use of tourniquets and ultrasound technology.
- Selection of veins and problems associated with venous access due to thrombosed, inflamed, or fragile veins, and the effects of aging on veins, disease process, previous treatment, lymphoedema, or presence of infection.
- Selection of device and other equipment
- Infection prevention issues (hand hygiene, skin preparation).
- Pharmacological issues (use of local anaesthetics, management of anxious patients, management of haematoma, phlebitis, etc.).
- Patient’s perspective on living with a vascular access device.
- Risk management in order to reduce the risk of blood spills and needlestick injury.
- Professional and legal aspects (consent, professional guidance, knowledge and skill, maintenance, and documentation).
- Performing the procedure.
- Prevention and management of complications during insertion (nerve injury, haematoma, etc.).
- Monitoring and care of the site (flushing, dressing removal, etc.).
- Product evaluation.
- Patient information and education.
- Documentation.
- Specific training for insertion of vascular access devices in certain groups, for example neonates, children, and oncology patients.

E. Clinicians undertaking the administration of infusion therapy and care and management of vascular access devices will have undergone theoretical and practical training in the following aspects:
   a. Legal, professional, and ethical issues.
   b. Anatomy and physiology.
   c. Fluid balance and blood administration.
   d. Mathematical calculations related to medicines.
e. Pharmacology and pharmaceutics related to reconstitution and administration.

f. Local and systemic complications.

g. Infection prevention issues.

h. Use of equipment, including infusion equipment.

i. Medicine administration.

j. Risk management/health and safety.

k. Care and management of vascular access devices.

l. Infusion therapy in specialist areas covered separately (paediatrics, older adult patients, oncology, parenteral nutrition, transfusion therapy).

F. All staff have a professional obligation to maintain their knowledge and skills. It is also the responsibility of the organisation to support and provide staff with training and education.

References:


Quality improvement

Standard

1. The clinician shall participate in quality improvement activities that advance patient care, quality, and safety.

2. A quality assurance and performance improvement strategy should be established in an organisation.

Practice criteria

A. Quality improvement activities include: evaluating patient or clinical outcomes; identifying clinical indicators, benchmarks, and areas for improvement; providing best evidence; recommending and implementing changes in structures or processes; analysing data and outcomes against benchmarks; considering the use of cost analysis; minimising and eliminating barriers to change and improvement.

B. The quality improvement programme should create a culture that fosters the reporting and analysis of quality and safety indicator outcomes, near-misses, errors and adverse events. The programme should focus on systems and process that promote individual accountability within a no-blame culture. (V)

C. The knowledge gained through this process should be shared internally and externally with other healthcare providers and organisations. (V)

D. The audit and benchmarking programme should be in line with national and professional standards of practice.

E. Audit should be an ongoing process in order to monitor, maintain, and improve clinical practice in infusion therapy. Identified deficiencies should be documented and evaluated, and form the basis of an action plan for performance improvement.

References:


Research and evidence-based care

Standard

1. The clinician shall use research findings and current best evidence to expand clinical knowledge in infusion therapy, to validate and improve practice, to advance professional accountability, and to enhance evidence-based decision making.

2. The clinician shall obtain approval for research and research-related activities in accordance with ethics regulatory bodies, professional standards, and criteria set by organisational policies, procedures, and/or practice guidelines.

3. The clinician shall develop and revise organisational policies, procedures, and/or practice guidelines based on research findings and current best evidence.

4. The clinician shall integrate evidence-based knowledge with clinical expertise and the patient’s preferences and values in the current context when providing infusion therapy.

5. The scope of practice for registered nurses clearly states that registered nurses may practise in a variety of clinical contexts depending on their educational preparation and practice experience.
Practice criteria
A. The clinician should actively participate in infusion therapy research activities that advance clinical knowledge relevant to their job responsibilities, education, experience and practice setting, and/or key performance indicators. This may include participating on a research team or journal club, or conducting systematic literature reviews in relation to the clinician’s education and experience. (V)
B. The clinician should actively participate in critically evaluating, interpreting, and implementing research findings and/or current best practice into clinical practice. This includes, but is not limited to, policy and procedure development and review; product technology selection; practice guideline implementation; or abstraction of data from published papers in relation to the individual’s education and experience. (V)
C. The Code of Health and Disability Services Consumers’ Rights (Health & Disability Commissioner, 1996) protects the rights of patients to receive a uniformly high standard of care, which takes into account their needs, values and beliefs of different cultural, religious, social and ethnic groups, including the needs, values, and beliefs of Maori.

References:

Policies, procedures, and/or practice guidelines

Standard
Infusion policies, procedures, and/or practice guidelines shall describe the acceptable course of action, including performance and accountability, and provide a basis for clinical decision making.
Infusion policies, procedures, and/or practice guidelines must be compliant with government legislation and professional standards.
Infusion policies, procedures, and/or practice guidelines must be written, reviewed at established intervals, and approved in a formal organisation process.
Infusion policies, procedures, and/or practice guidelines shall be readily available and accessible to clinicians.

Practice criteria
A. Infusion policies, procedures, and/or practice guidelines should encompass all applicable areas of infusion therapy and should ensure patient safety, as well as minimise or mitigate patient harm. (V)

B. Infusion policies, procedures, and/or practice guidelines should be developed in accordance with criteria set forth in this document in collaboration with other healthcare disciplines, patients, and industry recommendations; in keeping with specific needs of the organisation; and according to criteria set forth by regulatory and non-regulatory organisations. (V)
C. The organisation should have a process to develop policies, procedures, and/or practice guidelines that are evidence-based, maintain the same standard of care throughout the organisation, and include all stake holders.

References:
Standard
1. Infusion therapy shall be initiated, changed, or discontinued upon the order of a prescriber.
2. The clinician shall verify that the prescription is clear, concise, legible, and complete prior to initiation, change, or discontinuation of infusion therapy.
3. The clinician shall verify that the prescription is complete by inclusion of patient identification, fluid type, volume, and specific infusion rate; specific medicine, dosage, route, and frequency of administration; and any special considerations.
4. Use of verbal and telephone orders shall be established in organisational policies, procedures, and/or practice guidelines.
5. The clinician shall accept only those abbreviations approved by the organisation.
6. Appropriateness and accuracy of the prescribed therapy shall be assessed and documented.
7. Medicine reconciliation shall be implemented as recommended by the Health Quality and Safety Commission.

Practice criteria
A. Introduction of information technology should incorporate the principles of patient safety and involve all stakeholders in implementing the technology and required processes. (III)
B. The organisation should advocate for standardisation of infusion therapy equipment. (IV)
C. The clinician shall accept verbal orders from prescribers only when medically necessary, and should adhere to a standard “read-back” process when accepting verbal or telephone orders in accordance with organisational policies, procedures, and/or practice guidelines. (IV)
D. A prescription medicine may be administered to any person only in accordance with the directions of the authorised prescriber who prescribed the medicine or a standing order. (Regulatory – Medicines Act 1981, Section 19)
E. All patient medicines where possible should be reconciled at the time of admission, transfer within or between healthcare systems, and discharge.

References:
spillage precautions, and management and recognition of allergic/anaphylactic reactions.

References:


Informed consent

**Standard**

1. The clinician shall confirm that the patient’s informed consent was obtained for the defined procedure as identified in organisational policies, procedures, and/or practice guidelines, and in accordance with legislation.

2. Consent shall be obtained by the clinician who will perform the procedure and shall include full details of the procedure, risk and benefits, alternatives, and complications associated with the treatment or therapy in a language that the patient, caregiver, or whanau can understand.

3. The clinician shall advocate for the patient’s or legal representative’s right to accept or refuse treatment.

**Practice criteria**

A. According to Right 7 of the Code of Health and Disability Services Consumers’ Rights, services may be provided to a consumer only if that consumer makes an informed choice and gives informed consent. This consent may be written or verbal.

B. Where informed consent to a healthcare procedure is required, it must be in writing if

- The patient is to participate in any research, or
- The procedure is experimental, or
- The patient will be under a general anaesthetic, or
- There is a significant risk of adverse effects on the patient.

References:


Documentation

Standard
1. Documentation must contain accurate, factual, and complete information in the patient’s clinical records regarding the patient’s infusion therapy and vascular access.
2. Documentation shall be legible, timely, accessible to qualified personnel, and readily retrievable.
3. Documentation shall include factors relating to initial and ongoing assessment, nursing diagnosis or problem, intervention, and the patient’s response to that intervention.
4. Documentation shall reflect the continuity, quality, and safety of care.
5. Documentation guidelines and the confidentiality of the patient’s permanent clinical records shall be established in organisational policies, procedures, and/or practice guidelines, according to the scope of practice for personnel, standards of care, accrediting agencies, and legislation.

Practice criteria
A. Documentation should be done by appropriate clinical personnel, and identify the person providing the care. (V)
B. Documentation should include, but not limited to, the following:
   1. Patient, caregiver, or legally authorised representative’s participation in understanding of therapy, interventions, patient education, and evidence of informed consent.
   2. Vessel health assessment: how many visible and palpable vessels were located on the patient, and whether ultrasound was required.
   3. Specific site preparation, infection prevention, and safety precautions taken, using a standardised tool for documenting adherence to recommended practices. (IV)
   4. For all infusion devices, type, length, and gauge/size of vascular access device (VAD) inserted; for central vascular access devices (CVADs) and all long-term infusion devices, include the manufacturer and lot number. (V)
   5. Date and time of insertion, number and location of attempts, functionality of device, local anaesthetic (record name, strength, and amount, if used), and the insertion methodology, including visualisation and guidance technologies. (V)
6. Identification of the insertion site by anatomical descriptors, laterality, landmarks, or appropriately marked drawings. (V)
7. For midline (ML) and peripherally inserted central catheters (PICCs): external catheter length, effective length of catheter inserted.
8. Confirmation of the anatomic location of the catheter tip for all CVADs prior to initial use and as needed for evaluation of catheter dysfunction. (V)
9. Condition of the site, dressing type of catheter stabilisation, dressing change, site care, patient’s report of discomfort or pain on device insertion and with each regular assessment of the access site, and patient report of changes related to the VAD or access site.
10. Standardised assessment, appropriate for age-specific patient populations, for phlebitis, infiltration, or extravasation that allows for accurate and reliable assessment on initial identification and with each subsequent site assessment. (INS, 2011) (V)
11. Type of therapy, medicine, dose, rate, time, route, and method of administration; include condition of venepuncture or access site prior to and after infusion therapy, as well as patency. (V)
12. Pertinent nursing diagnosis (problem), initial and ongoing assessment, and vital signs as appropriate; patient’s response to insertion and therapy, including symptoms, side-effects, or complications; laboratory test results as appropriate; and barriers to patient education or care (V)
13. Daily assessment of the need for continuation of the VAD. (IV)
14. Upon removal: condition of site, conditions of the catheter and length, reason for device removal, nursing interventions during removal, dressing applied, patient response, patient education, date/time of removal). (IV)
15. If cultures are obtained, document source of culture(s). (V)
16. When multiple access devices or catheter lumens are used, documentation should clearly indicate what fluids and medicine are being infused through each pathway. (V)

References:
Serious and sentinel event reporting

**Standard**

1. The clinician shall report and document serious and sentinel events in practice as a result of infusion therapy according to organisational policies, procedures, and/or practice guidelines.

2. Reporting of serious and sentinel events shall be defined in organisational policies, procedures, and/or practice guidelines in accordance with New Zealand Health and Disability Services National Reporting Events Policy and the Health and Disability Services Standards NZS8134:2008.

**Practice criteria**

A. Patient safety incidents should be reported locally using a centralised risk management system and nationally via the New Zealand Health Care and Disability Services National Reportable Events policy.

B. All reported incidents must be graded, investigated and analysed in accordance with local and national organisational policies and procedures.

C. Serious untoward incidents should be reported to the Health & Disability Commissioner.

D. All adverse events and near-misses rated 1, 2, 3, or 4 on the Severity Assessment Code (SAC) that occur, or have the potential to occur, to any person as a result of, or related to, the provision of health and disability services should be monitored.

E. Any adverse incident involving a medical device must be reported to Medsafe using the Adverse Incident Reporting System.

F. Improvement strategies that aim to reduce risk to future patients should be implemented and monitored by the healthcare provider.

G. Adverse events/medications interactions should be reported to the Centre for Adverse Reaction Monitoring (CARM) and defects with medicines should be reported directly to Medsafe.

H. In the event that an incident involving any medical device or medicine causes harm to the patient, an ACC injury Claim Form (ACC 45) and/or a Treatment Injury Claim (ACC 2152) must be completed and submitted to ACC.

**References:**


**Product evaluation, integrity, and defect reporting**

**Standard**

1. Medical devices are regulated by Medsafe. All medical devices must meet international standards of Good Manufacturing Practice (GMP) required for their type of product. If the product is classified as a device for registration in Australia, the company needs to comply with ISO09001/EN46001. Other device manufacturers should be aware of ISO9002/EN46002 or ISO 13488 if they manufacture sterile devices, bandages and dressings, soft contact lenses, implants, or dental restorative materials.

2. All product defects must be reported in writing to the appropriate department within the organisation, and the manufacturer. It may be necessary to report such defects to national regulatory agencies such as Medsafe.

3. Product evaluation, integrity, defect reporting, and product recall shall be in accordance with
organisational policies, procedures, and/or practice guidelines, and comply with Medsafe regulations.

4. All infusions equipment and supplies shall be inspected for product integrity before, during, and after use.

5. Product integrity shall be determined by verification of expiration date, if applicable, and visual inspection of the product.

6. The clinician shall verify that functional and electrical testing has been performed on infusion equipment being used.

Practice criteria

A. Any product not meeting the requirements should be withdrawn from use, retained for examination, and reported to the appropriate regulatory agency, e.g. Medsafe.

B. Product complaints should include any suspected damage, incorrect labelling, packaging damage, or tampering.

C. Any contaminated product must be dealt with and decontaminated in accordance with the organisational policy.

D. Product reports should include details of the complaint, the effect of the defect on the procedure, if any, and the lot number, serial number, and other identifying information such as model number or expiration date of the product.

E. All adverse incidents must be reported as soon as possible to Medsafe via the most appropriate method and should contain as much relevant detail as available.

Labelling

Standard

1. The clinician shall identify and verify use of the correct product and/or medicine by reviewing the label for the name, dosage, concentration, expiration date, sterility state, route of administration, flow rate, and any other special instructions.

2. The clinician shall trace all catheters/administration sets/add-on devices from the patient to the point of origin before making additional connections or administering medicines.

3. The process of medicine and product verification shall be established in organisational policies, procedures and/or practice guidelines.

Practice criteria

A. Clear, accurate labelling should be used for product and medicine identification.

B. The clinician shall avoid writing directly on the IV bag or using a marking pen to label the IV bag. There is the possibility that certain chemical components of the inks used in marking pens may permeate the plastic sheeting and compromise the contained solution.

References:


Infection Prevention and Safety Compliance

Infection prevention

**Standard**

1. Infection prevention protocols shall be in accordance with organisational policies, procedures, and/or practice guidelines and government legislation and regulations.

2. The clinician shall be competent in procedures to prevent infusion- and vascular/nonvascular access device-related infections.

3. Standard precautions shall be used and appropriate personal protective equipment (PPE) shall be worn during all infusion procedures that potentially expose the clinician to blood and body fluids.

4. Maximal sterile barrier precautions shall be required for insertion of central vascular access devices (CVADs) and all methods of central vascular catheter exchange and repair.

5. Appropriate hand hygiene shall be performed.

6. Single-patient-use items shall be used whenever possible and disposed of in the appropriate container upon discontinuation.

7. Quality improvement programmes shall monitor and provide feedback on infection prevention practices to minimise healthcare-associated and community-acquired infections, and infection rates for Central Line Associated Bloodstream Infections (CLABSIs), and to provide corrective action when necessary.

8. The clinician shall educate the patient and caregiver about procedures and actions to prevent infection and signs and symptoms of infection to report to the healthcare provider.

9. Surveillance for central line associated blood stream infections (CLABSIs) shall be undertaken in accordance with organisational and national quality improvement programmes.

**Practice criteria**

A. Bundling of evidence-based interventions for CVAD insertion and maintenance, such as hand hygiene, use of maximal sterile barrier precautions, use of >0.5% chlorhexidine gluconate and 70% alcohol as a skin antiseptic, optimal selection of catheter site, and daily review of the necessity of a CVAD should be used to reduce risk of CLABSI. (II)

B. The clinician should use a checklist at the time of CVAD insertion to ensure compliance with sterile technique and protocol. The clinician checking the insertion should be empowered to stop the insertion procedure if any step(s) is/are not performed. (III)

C. Infusion clinicians should be involved in the organisation’s infusion-related infection prevention programme and surveillance for CLABSI. The goal is 0% infection rate.

D. The CLABSI goal should be a 0% infection rate. Standardised definitions that align with national surveillance programmes should be used to determine CLABSI. A standard formula should be used to measure the incidence of CLABSI (as shown below). (V)

\[
\text{Number of CLABSI} \times 1,000 = \text{CLABSI rate}
\]

Total number of CVAD days

E. Infusion-related infection surveillance data should be analysed to serve as one component of a quality improvement plan of action. (V)

F. The clinician should reduce the manipulations of all the components of the entire infusion system (e.g. administration set junctions, catheter hub) to as few as needed to deliver the infusion therapy. (V)

**References:**


Hand hygiene

Standard
1. Hand hygiene shall be a routine practice established in organisational policies, procedures, and/or practice guidelines.
2. Hand hygiene shall be performed as per the WHO “5 Moments for hand hygiene”, both before and immediately after clinical procedures, and before putting on and after removing gloves, before and after patient contact.
3. Alcohol based hand rubs (ABHR) and liquid soap (non-antiseptic and antiseptic) shall be provided in all clinical areas.

Practice criteria
A. The 5 Moments for hand hygiene includes hand hygiene both before and immediately after clinical procedures, and before putting on and after removing gloves, before and after patient contact.
B. Alcohol-based hand rubs are preferred for routine hand hygiene unless hands are visibly soiled. (II)
C. If the clinician’s hands are visibly contaminated with blood or body fluids or hands have been exposed to spore-producing pathogens, hand hygiene should be performed with either non-antiseptic or antiseptic liquid soap and water.
D. Chosen hand-hygiene products should provide high efficiency with low potential for skin irritation. Towelettes and non-alcohol-based hand rubs should not be used for hand hygiene. Hand-hygiene products should be used according to the manufacturer’s directions for use. (V)
E. Proper hand hygiene should be taught to the patient and caregivers involved in care of the patient. (V)
F. Dispensers of liquid soap or antiseptic solutions are recommended. Containers should be filled, discarded, and replaced according to organisational policies, procedures, and/or practice guidelines and should be accessible at the point of care. (V)
G. Single-use soap scrub packets or waterless antiseptic products should be used when clean running water is not ensured or is unavailable. (V)
H. The clinician should be involved with hand-hygiene product evaluation to assess for product feel, fragrance, and skin irritation. Clinicians who have sensitivity to a particular product should be provided with an alternative. Other products for skin care such as gloves, lotions, and moisturisers should be assessed for compatibility with hand antisepsis products. (V)
I. Hand hygiene is a key component of a group of evidence-based interventions to promote better outcomes for patients with intravascular catheters. (V)
J. The clinician should not wear artificial nails or nail products when performing infusion therapy procedures. Artificial nails have been associated with transmission and outbreaks of infection. (V)
K. All wrist and hand jewellery should be removed at the beginning of each clinical shift and cuts and abrasions covered with a waterproof dressing.

References:
Personal protective equipment (PPE)

**Gloves**

**Standard**
1. Disposable gloves shall be available in all clinical areas.
2. Gloves shall be used when performing infusion procedures.

**Practice criteria**
A. The use of gloves is not a substitute for hand hygiene. (See hand-hygiene standard.)
B. Gloves are not able to be decontaminated by washing or use of ABHR – gloves should be discarded between patient use and/or when required.
C. Gloves do not provide protection against needlestick injury, but they should be worn to protect hands from contamination by organic matter, micro-organisms, and toxic substances, and to reduce the risk of cross-contamination to both patient and staff.
D. For clinicians and patients who are sensitive to natural rubber latex, alternative gloves should be made available and their use should be supported in the local policies and procedures.
E. Powdered and polythene gloves should not be used for infusion procedures.
F. Gloves should be well fitting; gloves that are too small may be punctured by the wearer’s fingernails, while gloves that are too large may impede manual dexterity.
G. Following removal, gloves must be discarded in an appropriate waste bag.
H. The indications for use of sterile or non-sterile glove type are based on the procedure and not the diagnosis of the patient.
I. When undertaking Aseptic Non Touch Technique (ANTT) then non-sterile gloves can be worn for peripheral and central venous access device management as long as there is no necessity to touch the key parts of the procedure directly.

**References:**

**Aprons and gowns**

**Standard**
1. Disposable plastic aprons should be worn in accordance with organisational policies and procedures, and/or practice guidelines.
2. The type of apron or gown required depends on the degree of risk, including the anticipated degree of contact with infectious material, and the potential for body substance to penetrate through to clothes or skin.

**Practice criteria**
A. A clean non-sterile apron or gown is generally adequate during routine procedures and/or patient care activities.
B. A fluid-resistant apron or gown should be worn when there is a risk that clothing may become contaminated with blood, body substances or secretions.
C. Aprons and gowns must be changed between patients.

**Sterile gowns**

**Standard**
1. The wearing of a sterile gown shall be part of the optimal aseptic technique during midline catheter and central venous access device insertion.

**Practice criteria**
A. The risk of infection during insertion of midline catheter and central vascular access devices is significantly higher than for short peripheral cannulae, and wearing a sterile gown should reduce this risk.

**References:**

**Face mask, caps and eye protection, maximal sterile barrier**

**Standard**
1. Use maximal sterile barrier precautions, including the use of a cap, surgical mask, sterile gown, sterile gloves, and a sterile full body drape, for the insertion of CVCs, PICCs/midlines, or guidewire exchange.
2. The wearing of a surgical face mask and cap is not essential during the performance of infusion procedures.
3. Face shield or mask and protective eyewear should be worn when the clinician is at risk from splashes of substances or body fluids.

Practice criteria
A. To prevent possible infection of staff, face masks, caps, and eye protection should be worn when there is a risk that the procedure could cause hazardous substances or body fluids to splash into the face, eyes, or mouth.

References:

Reconstitution of medicines

Standard
1. A list of medicines that the clinician may reconstitute shall be developed in collaboration with or under the direction of the pharmacy and shall be congruent with standards set by the clinician’s regulatory agency.

Practice criteria
A. Protocol for reconstitution should be established by and conducted under the direction of the pharmacy. (V)
B. Immediate-use medicine should be used within 1 hour of preparation or discarded. (V)
C. Whenever possible the clinician should administer pharmacy-prepared or commercially available products. (V)
D. The clinician should use appropriate technique to withdraw medicine from glass ampoule using a 5 micron filter needle or filter straw. The filter needle/straw should be replaced with a new sterile needle after the medicine is withdrawn from the ampoule, and both the top and the bottom of the ampoule should be discarded into a sharps container.
E. The clinician should label any multidose vials that are used with the date opened, and the vials should be stored according to the manufacturer’s directions for use. Multidose vials should be used for single patients only; use of commercially prepared sterile product, such as prefilled syringes or pharmacy-filled syringes, is strongly preferred when available. (V)
F. The clinician should cleanse the tops of multidose vials and the neck of glass ampoules with 70% alcohol before inserting the needle or breaking the ampoule. (V)
G. Cleaning procedures should be established to disinfect and remove pyrogenic and endotoxic ingredients from work surfaces. (Regulatory)
H. The clinician should have a thorough knowledge of the principles of reconstituting, including, but not limited to, aseptic technique, compatibility (physical, chemical and therapeutic), stability, storage, labelling, interactions, dosage and calculations, and appropriate equipment. Reconstituting procedures and safeguards should be congruent with standards set by Medsafe and the manufacturer’s guidelines.
I. Prepared medicines should not be stored even for a short period without being labelled and labels should include the name of the medicine, its strength, route, diluents and final volume, the patient’s name, the expiry date and the name of practitioner preparing the medicine.
J. A registered pharmacist should be consulted on issues of compatibility.
K. Adequate flushing using a syringe no smaller than the diameter equal to a 10ml should be performed between each medicine to prevent incompatibilities from occurring. (V)
L. Use of multilumen catheters can help to reduce the risk of medicine incompatibilities.

References:
Scissors

**Standard**

1. The use of scissors in the presence of vascular access and nonvascular access devices shall be limited to suture removal and during the procedure of catheter repair.
2. Scissors shall not be used to remove vascular and nonvascular access device dressings, tape, or stabilisation devices due to the potential of severing the catheter or administration set and patient injury.
3. Use of scissors shall be established in organisational policies, procedures, and/or practice guidelines.

**Practice criteria**

A. Sterile disposable scissors or sterile stitch cutter should be used for suture removal.
B. Sterile, disposable scissors should be used for catheter repair; non-disposable scissors have been found to harbour bacteria and may potentially contribute to transmission of micro-organism. (IV)
C. Shortening of PICCs is not recommended as it can result in rough irregular surfaces. The manufacturer’s directions for use for altering the device length should be followed if the device requires trimming.

**References:**


**Safe handling and disposal of sharps, hazardous materials, and hazardous waste**

**Standard**

1. All used disposable sharp items - including, but not limited to, needles or styles and surgical blades - shall be disposed of in a non-permeable, puncture-resistant, tamper-proof biohazard container which complies with NZS 4304 standards.
2. Sharps must not be resheathed, broken or bent.
3. All hazardous materials and wastes should be discarded in the appropriate containers according to national guidelines and organisational policies and procedures.
4. Sharps disposal containers shall be replaced before they are full to avoid disposal related injuries.
5. Use of safety or retractable devices should be maximised to allow for user safety, in accordance with the *Australian Guidelines for the prevention and control of infection in healthcare*.
6. Devices that provide built-in safety controls shall be activated during use and remain protected during disposal.
7. Manufacturers’ directions for use, standards of practice, and regulatory bodies, such as Medsafe, shall be adhered to when developing organisational policies, procedures, and/or practice guidelines pertaining to the safe handling of hazardous materials and hazardous waste.
8. Exposure to potentially infectious materials or injury from sharps should be identified, tracked, and analysed for trends via the incident report process.

**Practice criteria**

A. Device components should be discarded as a single item after use. (V)
B. All sharps must be accounted for before, during, and immediately upon completion of a procedure.
C. All clinicians should be trained in the use of engineered sharps safety mechanisms and how to properly engage the safety mechanism. (V)
D. Regulation sharps containers should be placed at multiple convenient and safe locations, they should be easily accessible, and should be disposed of by designated personnel as per organisational policies and procedures.
E. Ideally, all needles should have a safety device, with engineered sharps injury protection, to minimise the potentially serious consequences of exposure to bloodborne pathogens and the potential for permanent and disabling injury.

**References:**

Disinfection of reusable equipment

**Standard**

1. Reusable equipment shall be cleaned to remove foreign material, followed by disinfection to eliminate microorganisms after each patient use.
2. Cleaning and disinfection of reusable equipment shall be established in organisational policies, procedures, and/or practice guidelines.
3. Disinfectant solutions shall be used in accordance with equipment and manufacturers’ directions for use to prevent damage or alteration to the function or performance of the equipment.
4. All sterilisation and disinfection solutions must be in accordance with manufacturers’ guidelines.
5. Non-disposable equipment such as surgical instruments requiring re-sterilisation should be handled according to organisational guidelines for sterilisation of items posing a hazard. However, disposable equipment should be used wherever possible.

**Practice criteria**

A. To prevent cross-contamination, and transmission of infectious agents, cleaning and disinfection should be performed prior to new patient use and at established intervals during long-term single-patient use. (I)

B. Cleaning of reusable medical equipment should include, but not be limited to, poles, flow control devices, ultrasound or infra-red devices, and other non-disposable infusion-related equipment. (II)

C. Single use devices are meant for single use only and must not be re-used or sterilised.

D. Equipment removed from a community setting should be cleaned and disinfected before transporting to an appropriate site for terminal cleaning and disinfection.

**References:**


Isolation precautions

**Standard**

1. Isolation precautions shall be used to prevent transmission of infectious agents in healthcare settings to protect patients with specific immunosuppressed conditions, and/or surgical/medical interventions.

2. The use of isolation precautions shall be established in organisational policies and procedures, and/or practice guidelines.

**Practice criteria**

A. Isolation precautions are implemented when strategies beyond standard precautions are required to reduce the risk of transmission of infectious agents.

B. Isolation precautions are implemented for patients with suspected or documented infection or colonisation to prevent disease transmission. (II)

C. Contact isolation precautions are implemented to prevent transmission of infectious agents, including multi-drug-resistant organisms (MDRO), which are spread by direct or indirect contact with the patient or the environment, including when there are excessive bodily discharges such as wound drainage. (II)

D. Droplet isolation precautions are implemented to prevent transmission of pathogens spread through close respiratory or mucous membrane contact with respiratory secretions. (II)

E. Guidelines for isolation precautions should be adapted and applied as appropriate for non-acute care settings, including long-term care facilities, the home setting, and other workplaces where infusion therapy is provided. (V)

F. In ambulatory and home care settings, isolation precautions are followed for patients with multi-drug-resistant organisms (MDROs). (V)

G. In home care settings for patients with MDROS, reusable patient care equipment should be limited and left in the home until discharged, and disinfected before removing from the home in a container (e.g. plastic bag) or transported to an appropriate site for cleaning and disinfection.

**References:**

Latex sensitivity or allergy

**Standard**

1. Exposure to latex in the healthcare environment shall be minimised.
2. Latex-free personal protective equipment (PPE) shall be provided to latex-sensitive or latex-allergic individuals.
3. Latex-free supplies and equipment shall be used with patients at risk of latex sensitisation and those with known latex allergy.

**Practice criteria**

A. The clinician should review the label on medical devices for the presence of latex, which is a component of product labelling required by the US Food and Drug Administration (FDA). (V)

B. If latex gloves are used, they should be non-powdered due to the risks associated with aerosolisation and an increased risk of latex allergies. (V)

C. The clinician should assess all patients for history of asthma, environmental allergens, medicines, and food allergies. Allergies that may create cross-reactions with latex include, but are not limited to, avocados, mangoes, pears, bananas, citrus fruits, chestnuts, and other tropical fruits. (II)

D. The clinician should have knowledge of evolving guidelines on preventing allergic reactions from the CDC and the National Institute for Occupational Health and Safety (NIOSH). (Regulatory)

E. Staff and patient education programmes should be developed to aid risk reduction. (IV)

F. Latex allergy in patients should be documented in the patient’s clinical record with adequate patient education about avoiding future exposure and management of an anaphylactic reaction. (IV)

G. Latex allergy in healthcare workers and patients should be reported to the appropriate departments within the organisation as per organisational policies, procedures, and/or practice guidelines.

**References:**


Infusion Equipment

Add-on devices

Standard
1. The use of add-on devices must be established in organisational policies, procedures, and/or practice guidelines and according to manufacturers’ directions for use.
2. The clinician shall be competent in the use of the add-on device and shall be knowledgeable about the risk of misconnections and potential disconnections.
3. All add-on devices shall be of luer-lock design to ensure a secure junction.

Practice criteria
A. Add-on devices may include, but are not limited to: stopcocks, single and multilumen extension sets, manifold or ramp systems, extension loops, solid cannula caps, needleless systems, in-line filters and manual flow control devices. (V)
B. All add-on devices should be compatible with the administration system to prevent risk of leaks, disconnections or misconnections. (V)
C. The clinician should be aware that the potential for contamination exists with all add-on devices. In an effort to decrease the risk of contamination, the number of manipulation episodes, accidental disconnections or misconnections, and costs, there should be limited use of these devices. (V)
D. To determine the appropriate placement of the selected add-on device, the clinician should trace the administration set from the patient to the point of origin before attaching the device. (IV)
E. The clinician should disinfect the ports of the add-on devices using friction, with an appropriate antiseptic such as 70% alcohol, >0.5% chlorhexidine/alcohol combination, before accessing and allow to air dry. Specific guidelines directing the appropriate technique, antiseptic, or amount of time required to disinfect devices prior to access are unresolved. The access port should be accessed only with sterile devices. (V)
F. The clinician should change the add-on device with the catheter, with each administration set replacement, or as defined by the organisation, and whenever the integrity of the product is compromised or suspected of being compromised. (V)
G. The use of stopcocks is not recommended due to increased risk of infection. When a stopcock is attached as an add-on device, the clinician should attach sterile caps to the ports of the stopcock to provide a closed system when not in use and access sites that will allow cleaning prior to accessing. (V)

References:

Needleless connectors

Standard
1. The use of needleless connectors shall be established in organisational policies, procedures, and/or practice guidelines and according to manufacturers’ directions for use.
2. Needleless connectors attached to a catheter hub or access site shall be of luer-lock design to ensure a secure junction.
3. The clinician shall be competent in the use of needleless connector devices.
4. The clinician shall disinfect the needleless connector prior to each access.
5. Needles shall not be used to access catheters, administration sets, access sites, or needleless connectors.

Practice criteria
A. The clinician should be aware that needleless connectors are identified by design (simple and complex) and function. The simple needleless connector group includes the split-septum design with no internal mechanisms, a straight fluid pathway, and can be a blunt cannula or luer-lock design. The complex needleless connector group includes a variety of luer-lock mechanical valve needleless connectors with various internal mechanism designs and fluid pathways. (IV)
B. The clinician should be knowledgeable about the function of the needleless connector and the manufacturer’s directions for use for each needleless connector to reduce the risk of blood reflux into the catheter tip upon disconnection. Currently, there are 3 categories of needleless connector functions: negative fluid
displacement, positive fluid displacement, and neutral design. (II)

C. The clinician should be aware that the catheter hub is a known source for the development of catheter-related bloodstream infection (CR-BSI) and that needleless connectors are recognised sites for microbial contamination. (II)

D. The clinician should be aware of and implement appropriate infection prevention practices, and review the research and published literature related to this issue to promote and provide quality patient outcomes. (II)

E. The needleless connector should be consistently and thoroughly disinfected using 70% alcohol, or >0.5% chlorhexidine gluconate/alcohol combination prior to each access. (III)

F. The clinician should change the needleless connector in the following circumstances: if the needleless connector is removed for any reason; if there is blood or debris within the needleless connector; prior to drawing a blood culture sample from the catheter; upon contamination; per organisational policies, procedures, and/or practice guidelines; or per the manufacturer’s directions for use. The clinician should be familiar with the manufacturer’s directions for use and other device performance criteria to assist in the development of policies and procedures for needleless connector change frequency.

References:

Filters

Standard

1. The use of bacteria- and particulate-retentive, air-eliminating, and blood and blood component filters shall be established in organisational policies, procedures, and/or practice guidelines.
2. For non-lipid-containing solutions that require filtration, a 0.2 micron filter containing a membrane that is both particulate-retentive and air-eliminating must be used.
3. For lipid infusions or total nutrient admixtures that require filtration, a 1.2 micron filter containing a membrane that is both particulate-retentive and air-eliminating must be used.
4. In-line blood component filters (integral mesh filter 170-200 micron) must be used to reduce particulate matter during blood transfusion. Bedside leukocyte-depleting filters and micro-aggregating filters are not indicated.
5. For intraspinal infusions, a 0.2 micron filter that is surfactant-free, particulate-retentive, and air-eliminating shall be used.
6. A blunt needle or filter straw shall be used when drawing medicines from glass ampoules.

Practice criteria

A. Use of filters should adhere to the manufacturer’s guidelines and the filtration requirements of the therapy. (V)
B. Bacteria and particulate-retentive and air-eliminating membrane filter changes should coincide with administration set changes. (V)
C. All blood components require filters and may normally be used for transfusing up to 4 units provided the flow rate remains adequate. In an emergency or theatre situation 8-10 units may be transfused before the giving set and filter is changed. In all instances, the giving set and filter must be changed every 8-12 hours. (V)
D. Add-on in-line bacteria- and particulate-retentive, and air-eliminating membrane filters should be located as close to the catheter insertion site as possible. (V)
E. When an electronic infusion device is used, consideration should be given to the pounds per square inch (psi) rating of the filter. (V)

References:
Flow control devices

**Standard**

1. The type of flow-control device shall be based on patient age, condition, prescribed infusion therapy, type of vascular access device, and care setting.
2. Only electronic infusion devices with administration-set-based anti-free-flow mechanisms shall be used.
3. Dose-error reduction systems shall be considered in the selection and use of electronic infusion devices.
4. The use of flow-control devices shall be established in organisational policies, procedures, and/or practice guidelines.
5. The clinician shall be competent in the use of flow-control devices, including manual devices, mechanical devices, and electronic infusion devices.

**Practice criteria**

A. Flow-control devices should be monitored during the administration of infusion therapy to ensure accurate delivery of the prescribed infusion rate. (III)
B. The clinician should not rely on the electronic infusion device alarms to detect IV infiltration or extravasation as these alarms are not intended to detect disruption of the fluid flow pathway. (V)
C. Safety features and dose-error reduction systems should be considered in the selection of all electronic flow control devices. The clinician should be involved in the evaluation and selection of flow-control devices. (V)
D. Systematic methods should be incorporated into the evaluation of flow-control device selection and used to reduce errors and enhance safety. In addition, procurement personnel should be consulted when considering mechanical and electronic flow-control devices for purchase. (V)
E. The frequency of inspection, cleaning, testing, and maintenance of electronic flow-control devices should adhere to manufacturers’ direction(s) for use and directions and organisational guidelines. (Regulatory)
F. The choice of a flow-control device (manual flow regulators, pressure bags, mechanical pumps, elastomeric balloon pumps, spring-based pumps, negative pressure pumps, electronic infusion pumps) for a given clinical application should take into account such factors as age and mobility of the patient, severity of illness, type of therapy, and healthcare setting. Features should be consistent with recommendations for safe and effective use. Additional features are recommended for patient-controlled analgesia (PCA) pumps (e.g. patient ease of use, accuracy) and systems that require a higher pumping pressure (e.g. arterial and epidural lines). (V)

**References:**


**Electronic flow control devices**

**Standard**

1. Electronic infusion devices should be selected based on patient age, condition, prescribed therapy, type of vascular access device, and care setting.
2. The clinician should be competent in the use of electronic flow control infusion devices.
3. Medicine error reduction safety software should be a primary consideration when purchasing electronic infusion pumps.
4. Electronic flow control infusion devices should be standardised throughout the organisation.

**Practice criteria**

A. Protocols for the use of electronic infusion devices should be set out in organisational policies and procedures.
B. Manufacturers’ guidelines should be adhered to in the use of electronic infusion devices; and consideration should be given to electrical safety in the use of these devices.
C. The safety features of the equipment should be of prime consideration in the selection of electronic flow-control infusion devices. Safety features include, but are not limited to, audible alarms, battery life and operation indicators, anti-free-flow protection, adjustable occlusion pressure levels, accuracy of delivery indicator, medicine dosage calculation, in-line pressure monitoring and anti-tampering mechanisms, and dose-error reduction systems.
D. Patient education for those using electronic flow-control devices in the home care setting should include written instructions, troubleshooting guides, whom/how to contact for assistance, signs of under- or over-infusion, and pump malfunction. Education should include demonstration and explanation of infusion pump functions followed by observation of the patient/caregiver performance. (V)

**References:**

Blood and fluid warmers

**Standard**

1. The use of blood and fluid warmers must be established in organisational policies and procedures, and/or practice guidelines and in accordance with NZBS standards for administration of blood.

2. Blood and fluid warming must be performed only with devices specifically designed for that purpose.

3. Blood must be warmed, in a manner to prevent haemolysis, and must not be warmed above 41°C.

**Practice criteria**

A. Blood and fluid warmers should be used when warranted by patient history, clinical condition and prescribed therapy, including, but not limited to, avoiding or treating hypothermia, during cardiopulmonary bypass, when the patient is known to have cold agglutinins, or during replacement of large blood volumes.

B. Blood warmers should be used in the following situations: adults receiving infusion of blood at rates >50ml/kg/hour; children at rates >15ml/kg/hour; exchange transfusion of infants; and transfusing a patient who has clinically significant cold agglutinins. Recipients with cold agglutinins disease have auto-cold antibody, which results in lysis of their own or donor cells. The administration of cold blood in these patients may result in a severe haemolytic reaction. (V)

C. Blood and fluid warming devices must be cleaned and correctly maintained according to the manufacturer’s directions for use and guidelines established by regulatory agencies such as NZBS.

D. Blood and fluids must not be warmed by other warming methods, including, but not limited to, microwave ovens and hot water baths; and devices not expressly designed for blood and fluid warming should not be used because temperatures and infection risks cannot be controlled. (V)

E. Blood/fluid warmers should undergo routine quality control inspections and be equipped with warning systems including an audible alarm and visual temperature gauges. Monitor and document temperature of warmer during the transfusion.

**References:**


**Tourniquets**

**Standard**

1. A tourniquet should be properly applied to promote venous distention in preparation for peripheral venepuncture.

2. The use of tourniquets shall be established in organisational policies, procedures, and/or practice guidelines.

**Practice criteria**

A. The tourniquet should be single-patient use. (IV)

B. The clinician should assess the patient for latex allergy when considering tourniquet material. (V)

C. The tourniquet should be applied at an appropriate location above the selected venepuncture site for a maximum time of 1 minute.

D. An arterial pulse should be easily palpable distal to the tourniquet location. (I)

E. The tourniquet should be applied in such a manner as to prevent circulatory impairment. (I)

F. The clinician should assess for factors indicating that a tourniquet should be loosely applied or its use avoided in patients who bruise easily, are at risk of bleeding, have compromised circulation, and/or have fragile skin or veins.

**References:**


Power injectors

**Standard**

1. The use of a power injector medical device shall be established in organisational policies, procedure, and/or practice guidelines and according to manufacturers’ directions for use.

2. The clinician shall be competent to programme the power injector and to deliver specific amounts of contrast media at a specified rate during radiological diagnostic scanning to obtain an optimal image without harming the patient or the vascular access device.

3. The rates and types of contrast infusion required for various CT and MRI tests differ and shall be established in organisational policies, procedures, and/or practice guidelines.

4. Indications and protocols for management of intravascular devices whilst having contrast media injected into, should be set out in organisational policies and procedures.

**Practice criteria**

A. The clinicians responsibilities should include site assessment, care, and maintenance; discontinuation of power injector; and documentation.

B. The clinician must check for patency of the vascular access device, defined as ensuring the catheter flushes easily without pain, swelling, or leakage.

C. The injection of contrast media is a medical responsibility that is often delegated to another clinician, standardly a nurse or technician.

D. Use of a 24G peripheral vein catheter is not possible because of potential for disconnection due to the high flow rate and pressure.

E. Central venous access devices may only be used if they are deemed power injector compatible by the manufacturer. The criterion is they must be tested and proven to be able to withstand the pressure of 300 psi or greater.

F. If a central venous catheter does not have a blood return, it cannot be used for power injection until patency has been confirmed.

G. Radiological contrast media are considered to be vesicant solutions with the potential to cause blistering or tissue necrosis. Extravasation is the inadvertent administration of a vesicant solution into surrounding tissue, instead of into the intended vascular pathway.

H. Approximately 1% of patients experience extravasations whilst having contrast media via a power injector.

I. Intravenous catheters sited in the hand are associated with a higher extravasation rate.

J. Extravasations are more likely to occur through metal needles than through plastic catheters.

K. Multiple attempts at intravenous access at the same site or through different sites in the same vein also increase extravasation risk.

L. The risk of extravasation of contrast media is greater when using an automated power injection device (median range of injection 2.5mL/sec, compared to hand injection or drip infusion.

**References**


Vascular Access Device Selection and Placement

Vascular access device selection

Standard

1. Indications and protocols for vascular access devices (VADs) shall be established in organisational policies, procedures, and/or practice guidelines and according to manufacturers’ directions for use.
2. The clinician shall select the appropriate type of catheter (peripheral or central) to accommodate the patient’s vascular access needs based on the prescribed therapy or treatment regimen, length of treatment, duration of dwell, vascular integrity, and patient preference.
3. The catheter selected shall be of the smallest gauge and length with the fewest number of lumens and shall be the least invasive device needed to accommodate and manage the prescribed therapy.
4. The clinician shall not alter the vascular access device outside the manufacturer’s directions for use.
5. Placement of any vascular access device, particularly central vascular access devices, is a sterile procedure which shall only be inserted by staff that have had appropriate training.

Practice criteria

I. Short peripheral cannulae

A. The clinician should select a short peripheral cannula based on prescribed therapies, duration of treatment (usually for treatments of less than 1 week), availability of peripheral vascular access sites, diagnosis, known complications of the device, and the inserter’s experience.
B. A short peripheral cannula comes in a variety of gauge sizes (i.e. 14-24), winged or non-winged. A short peripheral cannula is defined as one that is less than or equal to 7.5cm in length. (V)
C. The clinician should use short peripheral cannula equipped with a passive or active safety mechanism to provide sharps injury protection. (V)
D. The use of steel winged infusion devices should be limited to short-term or single-dose administration of non-vesicant medicine administration. (V)
E. Therapies not appropriate for short peripheral cannulae include continuous vesicant therapy, parenteral nutrition exceeding 10% dextrose and/or 5% protein, infusates with a pH <5 or >9, and infusates with an osmolality greater than 600mOsm/L. The clinician should collaborate with the multi-disciplinary team to assist in selection of the most appropriate VAD based on a projected treatment plan. (IV)
F. Peripheral administration of parenteral nutrition via a short peripheral catheter should only be used if it is a peripheral preparation. (IV)
G. The clinician should be aware that a short peripheral cannula of 14-24 gauge for adults and 22-24 gauge for paediatric or neonates can generally be used for administration of blood components or blood products. (V)

II. Peripheral-midline catheters

A. The clinician should consider selection of midline catheters for therapies anticipated to last 1-4 weeks. Reported dwell time for midline catheters in neonates is 6-10 days. (V)
B. A midline catheter should be used for hydration, intravenous solutions, pain medicines, and some antibiotics. Therapies not appropriate for midline catheters include continuous vesicant therapy, parenteral nutrition, infusates with pH <5 or >9, and infusates with an osmolarity greater than 600 mOsm/L. (V)
C. Midline catheters are peripheral infusion devices with the tip terminating in either the basilic, cephalic, or brachial vein, distal to the shoulder. The basilic vein is preferred due to vein diameter. (V)
D. The tip of the midline catheter does not enter the central vasculature beyond the axillary vein, therefore X-ray confirmation of tip placement is not required prior to use. A midline catheter for an adult should be defined as one that is between 7.5cm and 20cm in length. (V)
E. Placement of the midline should be just above or below the fold of the antecubital area so as to aid patient comfort when flexing their arm. This will also minimise the potential for catheter kinking. (V)
F. Midline catheters inserted via a scalp vein in neonates and paediatric patients should have the tip terminating in the external jugular vein (EJV). (V)

III. Central venous access devices (CVADs) (non-tunneled, PICC, tunnelled, implanted port)

A. The clinician should use CVADs to administer short- or long-term continuous or intermittent infusion solutions such as antineoplastic medicines, vesicants or known irritants, parenteral nutrition, a variety of antibiotics, and any medicines with a pH of <5 or >9 and osmolality of greater than 600mOsm/L. (V)
B. The clinician should be aware that in order to minimise thrombotic complications, the tip of a CVAD should terminate in the central
vasculature, such as the superior vena cava (SVC) or inferior vena cava (IVC). Dialysis catheter tips may terminate in the right atrium. (V)

C. CVADs are manufactured as single or multilumen, silicone or polyurethane, along with various gauge sizes and lengths; open or closed-ended; power-injectable; and/or as anti-infective devices. (V)

D. The clinician should collaborate with the multidisciplinary team to consider anti-infective CVADs in the following circumstances: expected dwell of more than 5 days; catheter-related bloodstream infection (CR-BSI) rate remains high even after employing other preventive strategies; neutropenic, transplant, burn, haemodialysis, or critically ill patients; catheter insertion or exchange in patients with infections or bacteraemia; or for emergency insertions. Anti-infective CVADs have shown a decrease in colonisation and/or CRBSIs. These types of CVADs include devices coated or impregnated with chlorhexidine, silver sulfadiazine, minocycline and rifampicin, and silver ions. The clinician should be aware that anti-infective CVADs should not be used in patients with allergies to silver, chlorhexidines, silver sulfadiazine, rifampicin, or tetracyclines. (I)

E. CVADs designed to withstand high-pressure injections (up to 300 pounds per square inch [psi]) have been found to be feasible and effective and with published reports of safe use. (II)

F. The clinician should be knowledgeable about whether the CVAD may be trimmed (considering factors such as open- versus closed-ended; staggered lumen exits) and should follow the manufacturer’s directions for use to alter the device length. The use of scissors should be avoided in trimming catheter length. Use of scissors to adjust the length of peripherally inserted central catheters (PICCs) was found to result in rough, irregular surfaces as observed with scanning electron microscopy. If the catheter length is modified the clinician should document the length in the patient’s permanent clinical records. (IV)

G. The clinician should be aware that there are specific catheter selection and placement recommendations for patients with chronic kidney disease (CKD). Catheters with high flow rates should be used. (V)

H. CVAD tip location and dwell time for CKD patients vary based on type of catheter selected and the specific patient condition. Short-term CVAD tips should be located in the SVC; long-term (tunnelled) CVAD tips should be located in the right atrium; femoral CVAD tip locations should be in the IVC. Uncuffed haemodialysis CVADs should be used in hospitalised CKD patients only and dwell up to 1 week. If an uncuffed haemodialysis CVAD is selected for femoral placement, it should be used in bed-bound CKD patients and dwell for only 5 days.

I. The port or reservoir of an implanted venous access device should produce minimal computed tomography (CT) or magnetic resonance (MR) artifacts.

J. Consideration should therefore be given to the placement of plastic ports.

K. The implanted venous access device port or reservoir should be of an appropriate size and type for the patient’s needs.

IV. Arterial catheters

A. Peripheral or pulmonary arterial catheters should be considered for short-term use for haemodynamic monitoring, obtaining blood samples, and analysing blood gases in critically ill patients. (V)

B. The clinician should be aware that the radial artery is the most common insertion site because of easier access and a lower complication rate. Other possible sites are the femoral, axillary, brachial, and tibial posterior arteries. (I)

C. If the radial artery site is selected a 20-gauge arterial catheter is preferred to decrease the risk of thrombosis. (I)

D. The clinician should be aware of the potential complications associated with arterial catheters, and that rates of complications, such as thrombosis and infection, appear to increase with extended dwell time. (I)

E. Arterial catheters are only suitable in environments where continuous haemodynamic monitoring and patient observation is available.

References:

Professional Nurse, 17(9), 531-535.


Site selection

Standard

1. Site selection for all vascular access devices (VADs) shall be established in organisational policies, procedures, and/or practice guidelines.

2. The vasculature shall accommodate the gauge and length of the catheter required for the prescribed therapy.

3. Site selection for vascular access shall include: assessment of the patient’s condition, age, diagnosis; co-morbidities, condition of the vasculature at the insertion site and proximal to the intended insertion site; history of previous venepuncture and access devices; type and duration of the infusion therapy; and patient preference.

4. Prior to insertion of a peripherally inserted central catheter (PICC), anatomical measurements shall be taken to determine the length of the catheter required to ensure full advancement of the catheter to the lower third of the superior vena cava and the junction superior vena cava and right atrium.

5. Placement of central venous access devices (CVADs) by clinicians shall be established in organisational policies, procedures, and/or practice guidelines, and in accordance with the clinician’s regulatory body.

Practice criteria

I. Peripheral venous access via short peripheral cannulae

A. For adult patients, veins that should be considered for peripheral cannulation are those found on the dorsal and ventral surfaces of the upper extremities including the metacarpal, cephalic, basilic, and median veins. Avoid the lateral surfaces of the wrist for approximately 10cm because of the potential risk for nerve damage. For paediatric patients, similar veins to consider are in the hand, forearm, antecubital area, and upper arm below the axilla, as well as the veins of the scalp, foot, and fingers in infants and children. For adults and paediatric patients: avoid the ventral surface of the wrist due to pain on insertion and possible damage to the radial nerve. (V)

B. Site selection should be initiated routinely in the distal areas of the upper extremities; subsequent cannulation should be made proximal to the previously cannulated site. (V)

C. Site selection should be initiated routinely in the non-dominant arm. VAD site should avoid areas of flexion; areas of pain on palpation; veins that are compromised (e.g. bruised, infiltrated, phlebitic, sclerosed, or corded); location of valves; and areas of planned procedures; in an emergency situation such as during resuscitation the antecubital fossa is recommended (New Zealand Resuscitation Council, 2007). In infants and children, avoid the hand or fingers, or the thumb/finger used for sucking. (V)

D. Veins in the lower extremities should not be used routinely in the adult population due to the risk of tissue damage, thrombophlebitis, and ulceration. (I A/P)

E. Veins in an upper extremity should be avoided on the side of breast surgery with axillary node dissection, after radiation therapy to that side, or with lymphoedema, or the affected extremity from a cerebrovascular accident. For patients with chronic kidney disease stage 4 or 5, avoid forearm and upper arm veins “suitable for placement of vascular access”. A collaborative discussion with the patient and the multidisciplinary team should take place related to the benefits and risks of using a vein in an affected extremity. (V)

F. Veins in the right arm of infants and children should be avoided after procedures treating congenital cardiac defects that may have decreased blood flow to the subclavian artery. (V)

G. Cannulation of haemodialysis fistulas and grafts for infusion therapy requires an order from a Renal Physician.

H. The clinician should consider using visualisation technologies that aid in vein identification and selection. (V)

I. Peripheral devices should not be routinely used for blood sampling, but blood can be taken immediately following insertion. The exception is short-term use, i.e. anticipated need less than 48 hours, in which case the peripheral-short catheter should only be used for blood withdrawal, not for infusion of fluids or medicines.

J. Blood pressure cuffs and tourniquets should not be used on an extremity where a peripheral device has been inserted.

II. Peripheral venous access via midline catheters

A. Site selection should be routinely initiated in the region of the antecubital fossa. Veins that should be considered for midline catheter cannulation are the basilic, cephalic, and
brachial veins. For neonate and paediatric patients, additional site selections include veins in the leg with the tip below the groin and in the scalp with the tip in the neck above the thorax. (V)

B. Site selection should avoid areas of pain on palpation, veins that are compromised (e.g. bruised, infiltrated, phlebitic, sclerosed, or corded); and for patients with chronic kidney disease stage 4 or 5, avoid forearm and upper-arm veins “suitable for placement of vascular access”. (V)

C. Veins in an upper extremity should be avoided on the side of breast surgery with axillary node dissection, after radiation therapy to that side, or with lymphoedema, or the affected extremity from a cerebrovascular accident. For patients with chronic kidney disease stage 4 or 5, avoid forearm and upper arm veins “suitable for placement of vascular access”. A collaborative discussion with the patient and the multidisciplinary team should take place related to the benefits and risks of using a vein in an affected extremity. (V)

D. Veins in the right arm of infants and children should be avoided after procedures treating congenital cardiac defects that may have decreased blood flow to the subclavian artery. (V)

E. The clinician should consider using visualisation technologies that aid in vein identification and selection. (V)

III. Central venous access via peripherally inserted central catheters (PICCs)

A. Veins that should be considered for PICC cannulation are the basilic, cephalic, and brachial veins. For neonate and paediatric patients, additional site selections include the temporal vein and posterior auricular vein in the head and the saphenous vein in the lower extremities. (V)

B. Site selection should avoid areas of pain on palpation, veins that are compromised (e.g. bruised, infiltrated, phlebitic, sclerosed, or corded), and for patients with chronic kidney disease stage 4 or 5, avoid forearm and upper arm veins “suitable for placement of vascular access”. (V)

C. Veins in an upper extremity should be avoided on the side of breast surgery with axillary node dissection, after radiation therapy to that side, or with lymphoedema, or the affected extremity from a cerebrovascular accident. For patients with chronic kidney disease stage 4 or 5, avoid forearm and upper arm veins “suitable for placement of vascular access”. A collaborative discussion with the patient and the multidisciplinary team should take place related to the benefits and risks of using a vein in an affected extremity. (V)

D. The clinician should consider using visualisation technologies that aid in vein identification and selection. (V)

E. The device should be selected according to the type of technique used to introduce midline and PICCs into one of the antecubital fossa veins, for example “over the needle”, “through the needle” or “Seldinger” techniques (Sansivero, 2000).

F. Introducers for midline and PICC catheters should be equipped with a safety device with engineered sharps injury protection.

G. All catheters must be radiopaque.

IV. Central venous access via non-tunnelled central vascular access devices (CVADs)

A. To minimise the risk of catheter-related infection with a non-tunnelled CVAD, the subclavian vein is recommended in adult patients, rather than the jugular or femoral veins, although benefits and risks accompany each access site. For patients with chronic kidney disease, the subclavian vein is not recommended in order to preserve the vein. (I)

B. To minimise the risk of catheter-related thrombotic complications with a non-tunnelled CVAD, the subclavian vein is recommended in adult patients, rather than the femoral vein, although benefits and risks accompany each access site. (I)

C. There is no preferred venous insertion site for a non-tunnelled CVAD in infants and children to minimise the risk of infection. (V)

V. Central venous access via tunnelled central vascular access devices (CVADs) and implanted ports

A. The clinician should collaborate with the healthcare team and patient in assessment and site selection for placement of tunnelled catheters and implanted ports. (V)

VI. Peripheral arterial access

A. Criteria for selection should include the presence of a pulse and assessment of distal circulation. An Allen Test should be performed when selecting an appropriate artery for cannulation, prior to device insertion, and for assessment of distal arterial perfusion. (I A/P)

B. For adult patients, the radial artery should be considered the most appropriate access for percutaneous cannulation to reduce risk of infection. Alternative arteries include ulnar, brachial or dorsalis pedis in adults, with each having advantages and disadvantages. These
sites are preferred over the femoral or axillary arteries to reduce the risk of infection.

C. For paediatric patients, site selections include radial, posterior tibial, and dorsalis pedis arteries and are preferred over the femoral or axillary arteries to reduce the risk of infection. The brachial artery should not be used in paediatric patients due to the absence of collateral blood flow. (I)

D. Infusion therapy should not be administered in peripheral arteries via peripheral arterial catheters; these catheters are used for haemodynamic monitoring, blood gas analysis, and obtaining blood samples. (V)

E. The clinician should consider using visualisation technologies that aid in arterial identification and selection. (V)

VII. External jugular vein access

A. Clinicians who are competent in infusion therapy may insert short peripheral intravenous (IV) catheters and PICCs, using the external jugular vein in patients in acute care settings and in emergency situations when other veins cannot be accessed. (V)

B. A short peripheral catheter in the external jugular vein should not be used for contrast media or power injectors. (V)

C. Central venous pressure monitoring may be performed through PICCs in the external jugular vein. (V)

D. When a short peripheral catheter is inserted into the external jugular vein and infusion therapy is expected to exceed 72-96 hours, the clinician should collaborate with the healthcare team for an alternative vascular access site as soon as possible. (V)

References:

7. Sansivero, G. The micro introducer technique for peripherally inserted central catheter placement. Journal of Intravenous Nursing, 23(6), 345-351.

Local anaesthesia for vascular access device placement and access

Standard

1. Local anaesthesia shall be considered based upon clinical assessment of patient condition, needs, risks, and benefits.
2. When local anaesthesia is ordered or required, the agent and method that is the least invasive and carries the least risk for allergic reaction or infection should be considered first.
3. The clinician shall be competent to administer local anaesthesia for vascular access device (VAD) placement and access.
4. Use of local anaesthesia shall be established in organisational policies and procedures, and/or practice guidelines, and in accordance with the clinician’s scope of practice.
5. An injectable or topical local anaesthetic medicine should be used as prescribed or under a standing order.

Practice criteria

A. Local anaesthetic agents including but not limited to: topical transdermal agents, intradermal lignocaine, iontophoresis, and pressure accelerated lignocaine should be considered and used according to the manufacturer’s directions for use. (II)

B. The clinician should consider and encourage the use of available and effective local anaesthetic methods and agents prior to each painful dermal procedure in children and some adults. These include topical anaesthetics as well as adjunctive and less invasive anxiolytic, cognitive, behavioural, and complementary therapies to reduce pain and discomfort. (II)

C. The clinician should assess the patient for potential allergic reactions, tissue damage, or inadvertent injection of the medicine into the vascular system when administering a local anaesthetic.

References:


Vascular access site preparation and device placement

Standard

1. The clinician shall place a vascular access device (VAD) upon the order of the healthcare team, in accordance with the health professional’s regulatory body, and organisational policies and procedures, and/or practice guidelines.
2. VAD placement shall be established in organisational policies and procedures, and/or practice guidelines, and according to the manufacturer’s directions for use.
3. The clinician shall be competent in insertion technique, infection prevention measures, identifying potential complications, implementing clinical interventions, and in assisting with VAD placement.
4. The clinician shall prepare the intended VAD insertion site with antiseptic solution using aseptic technique.
5. Maximum barrier precautions including mask, sterile gown, cap, sterile gloves, protective eyewear, and surgical scrub; and large full-body sterile drapes shall be used for insertion of arterial, and central venous access devices (CVADs).
6. Antiseptic solutions in a single unit configuration shall be used.
7. Only one vascular access device shall be used for each cannulation attempt.
8. Tip location of a CVAD shall be determined radiographically or by other approved technologies prior to initiation of infusion therapy.
9. All vascular access device placement should be for definitive therapeutic and/or diagnostic purposes.

Practice criteria

I. General

A. Prior to inserting a vascular access device, the clinician should provide patient education, addressing the rationale for VAD placement; insertion process; expected dwell time; care and maintenance of the device; and signs and symptoms of complications to report (INS, 2011).
B. If the intended insertion site is visibly soiled, clean the area with soap and water prior to application of antiseptic solution(s). (V)
C. Clipping should be performed to remove excess hair at the insertion site with single-patient use scissors or disposable-head surgical clippers; micro-abrasions produced from shaving increase the risk for infection. (V)
D. The clinician should inspect the VAD for product integrity prior to insertion. (V)
E. If an artery is inadvertently accessed or if the patient complains of paresthesias, numbness, or tingling upon VAD insertion, the catheter should be removed immediately and the medical practitioner notified, as rapid attention may prevent permanent injury; nerves and arteries are often located in very close proximity to the venipuncture site. (V)
F. No more than 2 attempts at vascular access placement should be made by any 1 clinician, as multiple unsuccessful attempts limit future vascular access and cause patients unnecessary pain. Patients with difficult vascular access require a careful assessment of VAD needs and collaboration with the healthcare team to discuss appropriate options. (V)
G. Chlorhexidine solution greater than 0.5% is preferred for skin antisepsis. One percent or 2% tincture of iodine, an iodophor, or 70% alcohol shall be used as alternatives.
H. Chlorhexidine is not recommended for infants under 2 months of age.
I. The antimicrobial preparation solution(s) should be allowed to air-dry completely before proceeding with the vascular access device insertion procedure.
J. Peripheral and central vascular access device placement, including gauge and length, product name, batch and lot number, number of attempts, anatomical location, and patient’s response to the placement, should be documented in the patient’s clinical notes.

II. Short peripheral and midline catheters

A. The clinician should consider the use of methods to promote vascular distension in addition to the appropriate use of tourniquets, such as gravity (positioning the extremity lower than the heart for several minutes), having the patient open
and close their fist, and lightly stroking the vein downward. (II A/P)

B. The use of warmth should be considered another method to promote vascular dilation. The use of dry heat was found to increase the likelihood of successful peripheral catheter insertion. (II)

C. The clinician should use a new pair of disposable, non-sterile gloves in conjunction with a no-touch technique for peripheral IV insertion. With no-touch technique, the planned IV insertion site is not palpated after skin cleansing unless sterile gloves are worn. (V)

D. Insertion techniques for midline catheter placement include threading the catheter through an introducer or using the Modified Seldinger Technique (MST), also known as the micro-introducer technique. (V)

E. The midline catheter tip location should be at or below the axillary line. (V)

F. The vascular access device selected should be the smallest gauge that will accommodate the prescribed therapy.

III. Central vascular access devices (CVADs)

A. The clinician should use a standardised checklist to encourage adherence to recommended practices for access site preparation, infection prevention, and safety precautions. The CVAD placement procedure should be stopped for any breaches in sterile technique that occur during the procedure. (IV)

B. The clinician should use a standardised supply cart or kit that contains all necessary components for the insertion of a CVAD. (V)

C. Ultrasound technology should be used when inserting PICC and percutaneously centrally inserted catheters to increase success rates and decrease insertion-related complications. (III)

D. The clinician should use the Seldinger or Modified Seldinger Technique (MST) as the preferred method for CVAD (i.e. peripherally inserted central catheter [PICC], subclavian) insertion due to advantages of decreased vein trauma, decreased insertion complications, and decreased risk of arterial puncture or nerve injury. (V)

E. CVADs should have the distal tip in the lower third of the superior vena cava or near its junction with the right atrium; or if placed via the femoral vein, shall have the tip dwell in the inferior vena cava (IVC) above the level of the diaphragm. (IV)

F. The clinician should be aware that the presence of a pacemaker requires a careful evaluation and thorough assessment to select the appropriate catheter and insertion site. Pacemakers are usually placed on the left side of the chest or abdomen. The contralateral side is preferred for CVAD placement, but if the ipsilateral side is selected, a PICC may be the safest choice. It is important to have the pacemaker evaluated before and after CVAD insertion to determine integrity of the pacemaker unit and leads. There are no published reports of displaced leads noted during CVAD insertion, and there are currently no practice guidelines developed related to pacemakers and CVADs. (V)

IV. Arterial catheters

A. The clinician should use a cap, mask, sterile gloves, eyewear, and a large sterile fenestrated drape when placing a peripheral arterial catheter. (II)

B. Maximal sterile barrier precautions should be used when placing arterial catheters in the axillary or femoral artery. (II)

References:


Vascular access device stabilisation

**Standard**

1. Vascular access device (VAD) stabilisation shall be used to preserve the integrity of the access device, minimise catheter movement at the hub, and prevent catheter dislodgement and loss of access.

2. VADs shall be stabilised using a method that does not interfere with assessment and monitoring of the access site or impede vascular circulation or delivery of the prescribed therapy.

3. The use of stabilisation methods shall be established in organisational policies, procedures, and/or practice guidelines.

4. The clinician shall be competent in the proper use and application of VAD stabilisation methods and devices.

**Practice criteria**

A. The use of a catheter stabilisation device should be considered the preferred alternative to tape or sutures when feasible. Several studies have demonstrated a reduction in overall complications and improved dwell time with peripheral IV catheters. One study demonstrated reduced risk of infection with peripherally inserted central catheters (PICCs) when a catheter stabilisation device was used. Sutures were associated with fewer complications when compared to use of tape with PICCs in paediatric patients in a randomised, controlled trial that excluded use of stabilisation devices. (III)

B. Transparent semipermeable membrane (TSM) dressings or other dressings are often cited as helpful in stabilising the catheter; however, there is insufficient evidence supporting their benefits in stabilisation at the intravenous catheter hub alone. A randomised, controlled trial with peripheral IV catheters demonstrated that the use of a peripheral IV catheter with an IV securement dressing performed as well as a standard peripheral IV with a catheter stabilisation device. It is important to recognise that these results cannot be generalised to all types of short peripheral catheters. (III)

C. The use of alternative methods of VAD stabilisation in lieu of sutures should be considered to mitigate the risk of needlestick injury; the use of staples has been cited in the literature as an alternative to sutures, reducing exposure to contaminated sharps. Studies are limited, and have not demonstrated benefits and may not be appropriate in the non-sedated patient. (V)

D. Use of stabilisation method should be based on evidence as well as analysis of risks versus benefits. While sutures may increase the risk of needlestick injury and/or risk of infection due to the presence of suture wounds near the insertion site and development of biofilm on the sutures, sutures may be considered appropriate in special populations such as paediatric patients or those with skin integrity problems, precluding use of tape or an engineered stabilisation device. (V)

E. If sutures used to stabilise a VAD at placement become loosened or no longer intact, they should be removed and the VAD should be secured using another stabilisation method or resutured as appropriate. (V)

F. Removal and replacement of the engineered stabilisation device or tape should be done at established intervals according to the manufacturer’s directions for use, and/or in conjunction with replacement of the VAD, or with routine site care and dressing changes. (V)

G. A catheter that migrates externally should not be readvanced into the vein prior to application of a catheter stabilisation device; the VAD should be stabilised at the point of external migration and assessed for proper placement in the vasculature before further use. (V)

**References:**


**Joint stabilisation**

**Standard**

1. Joint stabilisation, using such devices as an arm board or limb or finger splint, shall be implemented to facilitate infusion delivery when the catheter is placed in or adjacent to an area of flexion, and is not considered a restraint.

2. A joint stabilisation device shall be considered a single-patient-use device.

3. The use of joint stabilisation devices shall be established in organisational policies, procedures, and/or practice guidelines and according to manufacturers’ directions for use.

4. The clinician shall be competent in the proper use and application of joint stabilisation devices.

**Practice criteria**

A. A joint stabilisation device, such as an arm board or limb or finger splint, should be padded and support the area of flexion (i.e. finger, hand, arm, foot) in order to maintain a functional position. (V)

B. The joint stabilisation device should be applied in a manner that will provide the ability to visually inspect and assess the vascular access...
site and vein path, prevent circulatory constriction, prevent skin impairment, and prevent nerve pressure in the area of flexion. (V)

C. The clinician should assess the patient’s risk for development of pressure ulcers, perform skin inspection and assessment, and implement appropriate interventions to avoid the risk of skin breakdown. The potential risk for skin breakdown and development of pressure ulcers exists due to pressure created from the device restricting vascular circulation. (V)

D. Joint stabilisation devices should be used to minimise complications and maintain device patency. (III)

E. Documentation in the patient’s clinical records should include the application of the joint stabilisation device and the periodic removal for assessment of circulatory status, range of motion, and skin integrity. (V)

References:

Site protection

Standard

1. The use of site protection and/or physical immobilisation devices, proper application, and patient monitoring shall be established in organisation policies, procedures, and/or practice guidelines.
2. The clinician shall be competent in the application, use, and removal of a site protection or immobilisation device.
3. The use of physical immobilisation devices (i.e. restraints) to protect the vascular access device (VAD) site shall not be routinely implemented and shall be avoided whenever possible.

Practice criteria

A. Site protection methods such as mittens are recommended for patient populations such as paediatric, elderly, those with cognitive limitation, or whenever there is a risk of accidental dislodgement. Clear plastic site protectors specifically designed for this purpose are used to prevent accidental dislodgement or vein damage in children. (V)

B. The site protection method selected should be based on a comprehensive assessment of the patient’s physical, behavioural, and psychological status. (III)

C. Immobilisation devices or site protection methods should be used in a manner that will preserve circulation and provide visualisation of the vascular access site and in accordance with manufacturers’ directions for use. The selected immobilisation device or site protection method should not interfere with the prescribed infusion rate, delivery method, ability to assess the vascular access site, or catheter stabilisation/securement. (V)

D. The physical immobilisation device should be removed at established intervals to allow assessment of the extremity’s circulatory status and provide an opportunity for supervised range-of-motion activities. (V, Regulatory)

E. The immobilisation device should be removed as soon as the patient’s condition allows. (V, Regulatory)

F. The clinician should educate the patient, caregiver, or legally authorised representative on the need for, and appropriate use of, patient-protective methods, including physical immobilisation devices. (IV)

G. Documentation should include, but not be limited to, the rationale for the immobilisation device; type and location of the immobilisation device; release and reaplication of the device; site and circulatory assessment; any complications caused by the immobilisation device; patient’s response to the immobilisation device; reassessment of the need for the immobilisation device; patient education; and removal of the device. (V, Regulatory)

References:
Specific Access Devices

Implanted vascular access ports

Standard

1. Placement and removal of an implanted vascular access port shall be considered surgical procedures and must be performed by a medical practitioner with validated competency operating within their professional scope of practice and according to organisational policies, procedures, and/or practice guidelines.

2. The clinician shall be competent in implanted vascular access port use and maintenance, including patient and caregiver education according to organisational policies, procedures, and/or practice guidelines.

3. Noncoring safety needles shall be used to access an implanted vascular access port.

4. Only implanted vascular access ports and noncoring needles designed for power injection shall be used with power-injection equipment for radiographic imaging in accordance with manufacturers’ directions for use.

5. A sterile transparent semipermeable membrane (TSM) dressing or gauze dressing shall be maintained over the access site if the implanted vascular access port remains accessed.

Practice criteria

A. When planning to use an implanted vascular access port for power injection, capability should be identified at the time of access and immediately prior to power injection. At least 2 identification methods should be used, including presence of identification card, wrist-bands, or key chains provided by manufacturer; review of operative procedure documentation; and palpation of the port. While some power-capable implanted vascular access ports have unique characteristics identifiable by palpation, palpation of the port should not be the only identification method used. (V)

B. The clinician should be aware of the potential for catheter rupture, which can lead to extravasation, catheter fragment emboli, and the need for port removal and replacement. The most common risk factors include pinch-off syndrome and power injection through ports not approved for this purpose. (V)

C. Aseptic technique, including the use of sterile gloves, should be used when accessing an implanted port. The use of a mask during access is often recommended; however, it remains an unresolved issue due to lack of research. (V)

D. The implanted vascular access port should be accessed with the smallest-gauge noncoring needle to accommodate the prescribed therapy. To reduce the risk of needle dislodgement during access, the noncoring needle should be of a length that allows the needle to sit flush to the skin and securely within the port. (V)

E. Prior to use of the implanted vascular access port for infusion, patency should be confirmed; this should include presence of blood return and ability to flush the port with preservative-free 0.9% sodium chloride for injection without evidence of infiltration. (V)

F. When using an implanted vascular access port for continuous infusions, there is insufficient evidence to support the optimal time for replacement of the noncoring needle; the most common practice is to replace every 7 days. (V)

G. When an implanted vascular access port is accessed, a transparent semipermeable membrane (TSM) dressing or gauze dressing should cover the needle and access site. If gauze is used to support wings of an access needle and it does not obscure the needle insertion site under the TSM dressing, it can be considered a TSM dressing and changed every 7 days. (V)

H. The use of positive pressure flushing prior to withdrawal of the noncoring needle is recommended to reduce blood reflux and risk of thrombotic catheter occlusion. (V)

I. General patient and/or caregiver education should include placement procedure; type of port placed (e.g. power injectable, number of lumens); importance of carrying a port identification card (e.g. in wallet) routine care, including frequency of flushing; expectations of aseptic technique during access; use of only noncoring needles (including appropriate type for power injection); and identification of potential complications and interventions. (V)

J. For patients who are receiving infusions at home via an accessed port, patient and/or caregiver education should include checking the dressing daily; how to dress and undress to avoid pulling at the needle site; protecting the site during bathing; making sure women’s bra straps do not rub over the accessed area; immediately reporting any signs or symptoms of pain, burning, stinging, or soreness at the site; and recognising the importance of stopping the infusion pump and immediately reporting any wetness, leaking, or swelling noted at the site. (V)

References:

Arteriovenous fistulae and haemodialysis catheters

**Standard**

1. Placement and removal of a tunnelled or implanted haemodialysis vascular access device (VAD), including an arteriovenous (AV) fistula, and insertion of an arteriovenous graft shall be considered surgical procedures and shall be performed by a medical practitioner with validated competency operating within professional regulatory body and in accordance with organisational policies, procedures, and/or practice guidelines.

2. The clinician should be competent in haemodialysis VAD use and maintenance, including device access, identification of potential complications, and appropriate nursing interventions, including patient and caregiver education, and according to organisational policies, procedures, and/or practice guidelines.

3. Administration of medicines and/or solutions through an AV fistula or haemodialysis catheter shall be in accordance with a valid prescription or standing order.

4. Removal of a temporary non-tunnelled or non-implanted haemodialysis catheter shall be performed by the nurse with validated competency, in agreement with the medical practitioner managing the patient’s care as per the organisational policies, procedures, and/or practice guidelines.

5. Haemodynamic monitoring and venepuncture shall not be performed on the extremity containing an AV fistula or graft.

**Practice criteria**

A. The decision to place a haemodialysis VAD or create a means of long-term vascular access for the purpose of haemodialysis is ideally made collaboratively between the nurse, physician responsible for care, and the patient/family/whanau. General order for vascular access preference is fistula, arteriovenous graft, and long-term VAD. (V)

B. The clinician should be knowledgeable about vein-preservation techniques for patients who are likely to need vascular access for haemodialysis. (V)

C. Sterile technique should be used for all procedures relating to haemodialysis VADs, including AV fistulas and grafts. (V)

D. Povidone-iodine antiseptic ointment or bacitracin/neomycin/polymyxin B ointment can be used for the exit site of a haemodialysis VAD at the end of each dialysis session only if this ointment does not interact with the material of the haemodialysis catheter as per the manufacturer’s directions for use. (V)

E. To minimise the potential for catheter-related complications, consideration should be given to the size and length of the haemodialysis VAD. (V)

F. Haemodialysis VADs should have their tips located in the superior vena cava or right atrium and confirmed by chest radiograph or fluoroscopy. Right atrial thrombosis is a serious complication with VADs placed in the right atrium. (V)

G. AV fistulae and haemodialysis catheters should not be used for routine administration of parenteral medicine and/or solutions.

H. When removing the guidewire from the catheter, or removing the needle from the fistula, techniques should be employed to reduce the potential for bleeding and to promote haemostasis.

I. The optimal dwell time for the removal of a non-tunnelled haemodialysis catheter is unknown; ongoing and frequent monitoring of the access site should be performed. Depending on the type of catheter and the clinical risk factors it will usually be removed at 7 days. If it is not, it should be assessed every 24 hours thereafter until it is removed.

J. The haemodialysis catheter will be removed immediately when contamination or complication is suspected or when therapy is discontinued.

**References:**


Umbilical catheters

**Standard**

1. Placement and removal of an umbilical arterial or venous catheter shall be considered a surgical procedure and must be performed by a medical practitioner with validated competency, operating within professional scope of practice and according to organisational policies, procedures, and/or practice guidelines.

2. The clinician shall be competent in umbilical catheter use and maintenance, including catheter access, identification of potential complications, and appropriate clinical interventions, including caregiver education according to organisational policies, procedures, and/or practice guidelines.

3. Tincture of iodine shall not be used to cleanse the umbilical catheter site because of the potential deleterious effect on the neonatal thyroid.

4. Catheter tip location shall be radiologically confirmed before catheter use and documented in the patient’s clinical records.

**Practice criteria**

A. Prior to insertion, the umbilical catheter site should be cleansed with appropriate antiseptic solution such as povidine-iodine. (V)

B. Umbilical artery catheters should be placed so that the tip is located in the descending aorta above the level of the diaphragm and below the left subclavian artery (high-positioned catheter). (V)

C. Umbilical venous catheters should be placed so the tip is located in the inferior vena cava, above the level of the diaphragm. (V)

D. Removal of the catheter should be performed aseptically and slowly over several minutes, and followed by manual compression with sterile gauze applied to the umbilical stump until haemostasis occurs. (V)

E. The site should be monitored after catheter removal for at least 12 hours, and then daily for signs of complication development. (V)

F. Infusion of medicines into the umbilical arterial catheter should be avoided. (V)

G. The clinician should be knowledgeable of the signs, symptoms and management of potential complications related to the use of umbilical catheters including, but not limited to, bleeding from the umbilical stump, haemorrhage, air embolism, infections, thrombosis, vascular perforation, and peripheral vascular constriction. The clinician should report complications to the medical practitioner and document them in the patient’s clinical records. (V)

References:


Apheresis catheters

**Standard**

1. Placement and removal of apheresis catheters must be performed by a trained clinician with a required standard of competence as per the HPCA Act 2003 and according to the organisational policies, procedures, and/or practice guidelines.

2. Indications and protocols for the insertion of, or assisting with use and care of, apheresis catheters must be established in organisational policies, procedures, and/or practice guidelines.

3. The clinician shall be competent in apheresis catheter use and maintenance, including identification of potential complications, and appropriate intervention, including patient and caregiver education.

4. Apheresis catheters must not be used for medicine or solution administration.

**Practice criteria**

A. A large-bore central catheter, percutaneously or surgically placed, designed to maintain high flow rates and accommodate large blood volumes should be selected and inserted in patients with inadequate vein access (adult or paediatric) for the purpose of apheresis. (IV)

B. If using a peripheral approach for apheresis, 2 large-gauge intravenous catheters should be inserted for collection and reinfusion. A multilumen apheresis central catheter should allow for repeated apheresis procedures and provide a multipurpose approach to
accommodate long-term infusion needs and supportive care.

C. The tip of the apheresis central catheter, if placed in the subclavian or internal jugular vein, should reside at the junction of the superior vena cava and right atrium.

D. The clinician should be knowledgeable about potential complications of apheresis catheters, the apheresis process, and interventions. Potential complications include, but are not limited to, central venous access device (CVAD) mechanical dysfunction; thrombosis; infection; hypotension; electrolyte imbalance; fluid overload; thrombocytopenia; hypocalaemia; photosensitivity; and citrate toxicity. (IV)

E. The clinician should provide education to the patient and caregiver related to apheresis catheter insertion procedure, reason for CVAD; use, maintenance, and care; expected dwell time of the catheter; potential insertion; mechanical or infectious complications; and document teaching in the patient’s clinical records.

References:
Site Care and Maintenance

Administration set change

Standard
1. Administration set changes shall be performed routinely, based on factors such as type of solution administered, type of infusion (continuous versus intermittent), immediately upon suspected contamination, or when the integrity of the product or system has been compromised.
2. The administration sets shall be changed whenever the peripheral catheter site is rotated or when a new central vascular access device is placed.
3. Add-on devices used as part of the administration set, such as single- and multilumen extension sets and filters, shall be changed at the same time as the administration set.
4. The frequency of performing administration set changes and the system used to promote adherence to administration set change (e.g. labelling/electronic) shall be established in organisational policies, procedures, and/or practice guidelines.
5. A vented administration set shall be used for solutions supplied in glass or semi-rigid containers, and a non-vented administration set shall be used for plastic fluid containers.
6. All administration sets shall be of luer-lock design to ensure a secure junction.

Practice criteria
I. General
A. The use of add-on devices for administration sets should be minimised as each device is a potential source of contamination, misuse, and disconnection; it is preferable to use an administration set with devices as an integral part of the set.
B. Product integrity should be ascertained prior to use of the administration set. Changing of add-on devices such as, but not limited to, extension sets, filters, stopcocks, and needleless devices should coincide with the changing of the administration set.

II. Primary and secondary continuous infusions
A. Primary and secondary continuous administration sets used to administer fluids other than lipid, blood components or blood products, should be changed no more frequently than every 96 hours. There is strong evidence that changing the administration sets more frequently does not decrease the risk of infection. (I)
B. Extending the administration set change to every 7 days may be considered when an anti-infective central vascular access device (CVAD) is being used or if fluids that enhance microbial growth are not administered through the set. (II)
C. If a secondary set is detached from the primary administration set, the secondary administration set is considered a primary intermittent administration set and should be changed every 24 hours. (V) Once a secondary administration set is detached from the primary administration set, the secondary set should be discarded.
D. When compatibility of infusates is verified, use of secondary administration sets that use back-priming infusion methods are preferred due to reduced need for disconnecting secondary intermittent administration sets. (V)
E. The type of solution administered via primary or secondary continuous administration set, for example parenteral nutrition, lipids, blood and blood components, should dictate whether the administration set is changed more frequently.
F. Use a sterile blood administration set with a 170-200 micron filter. The blood administration set must be changed when transfusion is completed or every 12 hours if the transfusion episode is not yet complete. Do not add a secondary administration set to the blood transfusion.
G. Primary and secondary administration sets shall be changed using aseptic technique, observing standard precautions and following manufacturers’ recommendations.
H. The primary administration set change should coincide with peripheral catheter change. and/or initiation of a new container of solution; the secondary administration set change should coincide with change of the primary administration set and/or initiation of a new container of solution.
I. An organisation that exhibits an increased rate of catheter-related bloodstream infection when carrying out 72-96 hour administration set changes should return to a 48-hour administration set change interval.

III. Primary intermittent infusions
A. Primary intermittent administration sets should be changed every 24 hours. When an intermittent infusion is repeatedly disconnected and reconnected for the infusion, there is increased risk of contamination at the catheter hub, needleless connector, and the male luer end of the administration set, potentially increasing risk of catheter-related bloodstream infection. There is an absence of studies addressing administration set changes for
intermittent infusions. In a meta-analysis of 12 randomised controlled trials that supported increasing the time interval for administration set changes to 96 hours, at least 2 of the studies excluded administration sets used for heparin-locked catheters and in sets disconnected for more than 4 hours. In several others, exclusions were not stated. (V)

B. A new sterile, compatible covering device should be aseptically attached to the end of the administration set after each intermittent use. The practice of attaching the exposed end of the administration set to a port on the same set (“looping”) should be avoided. (V)

IV. Parenteral nutrition
A. Administration sets used for non-lipid containing parenteral nutrition (PN) solutions should be routinely changed no more frequently than every 96 hours. (I)
B. Administration sets used for total nutrient admixtures (TNA) containing intravenous fat emulsions (IVFE) with amino acid and dextrose solution should be routinely changed every 24 hours. (III)
C. When primary administration sets used for PN are exposed to IVFE, consideration should be made to changing the administration set every 24 hours. Limited evidence suggests an increased risk for infection when duration of administration sets is extended beyond 24 hours. (III)

V. Intravenous fat emulsions (IVFE) and other lipid product infusions
A. When units of IVFE are administered intermittently, the administration set should be changed with each new container; the characteristics of IVFE (iso-osmotic, near neutral-alkaline pH, and containing glycerol) are conducive to the growth of micro-organisms. (III)
B. When units of IVFE are administered consecutively, the administration set should be routinely changed every 24 hours. (III)
C. A dedicated administration set should be used to administer propofol infusion and should be replaced every 12 hours, when the vial is changed, and according to the manufacturer’s directions for use. (Regulatory) 
D. Administration sets used to administer lipid-based infusates, such as IVFE or TNA, should be free of di-ethylhexyl-phthalate (DEHP). DEHP is lipophilic and is extracted into the lipid solution with commonly used polyvinyl chloride administration sets and containers. DEHP is considered a toxin, and studies have demonstrated increased DEHP levels in lipid solutions, which is especially a risk with neonatal, paediatric, and long-term home care patients. (IV)

VI. Blood components and blood products
A. A sterile blood administration set with a 170-200 micron filter (blood administration set) is used for administration of blood components. It shall be changed at least every 12 hours during a blood transfusion. Upon completion of the transfusion the blood administration set must be changed.
B. Administration sets used for blood components must be changed immediately upon suspected contamination or when the integrity of the product or system has been compromised.
C. Administration sets used for blood components and blood products must be changed using aseptic technique and observing standard precautions, in accordance with manufacturers’ directions for use.
D. In-line 170-200 micron filters should be added to the administration set for the administration of blood components when a specific blood administration set is not available.

VII. Haemodynamic and arterial pressure monitoring
A. The disposable or reusable transducer and/or dome and other components of the system, including the administration set, continuous flush device and the flush solution used for invasive haemodynamic pressure monitoring, are considered a closed system and must be changed every 96 hours or sooner if contamination is suspected or when the integrity of the product or system has been compromised. The number of manipulations and entries into the system should be minimised. (III)
B. Product integrity should be ascertained prior to use of the haemodynamic monitoring system.
C. Filters should be used as appropriate to the therapy.
D. Haemodynamic monitoring set changes should coincide with the initiation of a new container of solution.
E. Changing of add-on devices such as, but not limited to, extension sets, filters, stopcocks, and needless devices should coincide with the changing of the haemodynamic monitoring set.

References:

Vascular access device site care and dressing changes

**Standard**

1. Vascular access device (VAD) site care and dressing changes, including frequency of procedure and type of antiseptic and dressing, shall be established in organisational policies, procedures, and/or practice guidelines.
2. The clinician shall be competent in performing VAD site care and dressing changes.
3. VAD site care and dressing changes shall be performed at established intervals and immediately if the dressing integrity becomes compromised, if moisture, drainage, or blood is present, or if signs and symptoms of site infection are present.
4. A sterile dressing shall be applied and maintained on VADs.
5. Application of a cutaneous antiseptic solution that will effectively disinfect the site of insertion before placing a central venous catheter is an important method of preventing catheter related infection. Skin antisepsis with >0.5% chlorhexidine gluconate provides better antisepsis than other antiseptic agents.
6. Vascular access device site care should allow for the observation and evaluation of the catheter-skin junction and surrounding tissue.
7. A sterile dressing shall be applied and maintained on vascular and nonvascular access devices (for example subcutaneous infusions).
8. All dressings must be changed at established intervals and immediately if the integrity of the dressing is compromised.
9. The insertion site must be assessed at the minimum on a daily basis at least for the potential development of infusion-related complications.

**Practice criteria**

A. Routine site care and dressing changes are not performed on short peripheral catheters unless the dressing is soiled or no longer intact. (V)

B. Central vascular access device (CVAD) site care and dressing changes should include the following: removal of the existing dressing, cleansing of the catheter-skin junction with an appropriate antiseptic solution(s), replacement of the stabilisation device if used, and application of a sterile dressing. (INS 2011) (V)

C. Chlorhexidine solution >0.5% is preferred for skin antisepsis as part of the VAD site care. One percent to 2% tincture of iodine, iodophor (povidone-iodine), and 70% alcohol may be used. Chlorhexidine is not recommended for infants under 2 months of age. (I)

D. Where 70% alcohol is used, check manufacturers’ recommendations for any potential damage to catheter material.

E. For infants under 2 months of age or paediatric patients with compromised skin integrity, dried povidone-iodine should be removed with sodium chloride 0.9% for injection or sterile water. (V)

F. CVAD site care is based on the type of dressing; transparent semipermeable (TSM) dressings should be changed every 5-7 days, and gauze dressings should be changed every 2 days. While the evidence does not support one type of dressing over another, gauze is preferable to TSM if the patient is diaphoretic, or if the site is oozing or bleeding. In the event of drainage, site tenderness, other signs of local or systemic infection, or loss of dressing integrity, the dressing should be changed sooner, allowing the opportunity to closely assess, cleanse, and disinfect the site.

G. Placement of a gauze dressing under a transparent dressing should be considered a gauze dressing and changed every 2 days. If gauze is used to support the wings of a noncoring
n needle in an implanted port and does not obscure the insertion site, it is not considered a gauze dressing. (V)

H. The use of a chlorhexidine-impregnated dressing with short-term CVADs should be considered in patients older than 2 months of age as an additional catheter-related bloodstream infection (CR-BSI) prevention measure. (I)

I. A tunnelled CVAD that is well-healed, consideration should be given to no dressing. (III)

J. The catheter–skin junction site should be visually inspected or palpated daily for tenderness through the intact dressing for patients receiving outpatient or home care, the patient should be instructed to check the VAD site and dressing every day for signs of infection and to report such changes or dressing dislodgement immediately to the healthcare provider. (V)

K. Gauze, bandages, or dressing material that may obstruct visualisation of the catheter–skin junction and/or constrict the extremity should not be used. (V)

L. Sterile gloves should be worn when performing CVAD site care. The use of a mask during access is often recommended; however, it remains an unresolved issue due to lack of research. (IV)

M. The dressing should be labelled with the following information: date, time and initials of the clinician performing the dressing change. (V)

N. Documentation of catheter site care in the clinical records should reflect the condition of the catheter site; specific nursing actions should be taken to resolve or prevent adverse reactions and interventions should be recorded in the patient’s clinical record.

O. When implanted ports are accessed the noncoring needle should be changed every 7 days, and a stable TSM dressing should be used to cover the port site.

References:


Catheter patency

Standard

1. Vascular access devices shall be flushed prior to each infusion as part of the steps to assess catheter function.

2. Vascular access devices shall be flushed after each infusion to clear the infused medicine from the catheter lumen, preventing contact between incompatible medicines.

3. Vascular access devices shall be locked after completion of the final flush solution to decrease the risk of occlusion.

4. Flushing and locking of all vascular access devices shall be established in organisational policies, procedures, and/or practice guidelines and in accordance with manufacturers’ directions for use.

5. The patency of the catheter will be checked prior to administration of medicines and/or solutions. However, there is no requirement to routinely withdraw blood and discard it prior to flushing (except prior to blood sampling although the first sample can be used for blood cultures).

Practice criteria

A. Single-use systems, including single-dose vials and prefilled syringes, are the preferred choices for flushing and locking. If multiple-dose containers must be used, each container should be dedicated to a single patient.

Checking for blood return

A. The clinician should aspirate the catheter for blood return to assess catheter function and confirm patency prior to administration of medicines and solutions. (V)

B. If resistance is met and absence of blood return is noted, the clinician should take further steps to assess patency of the catheter prior to
administration of medicines and solutions. The catheter should not be forcibly flushed. (V)

C. The clinician should assess for and identify signs of CVAD occlusion, including the inability to withdraw blood, sluggish flow, and/or inability to flush or infuse through the device.

**Flushing solutions and frequency**

**Practice criteria**

A. Flushing is accomplished with preservative-free 0.9% sodium chloride for injection. When the medicine is incompatible with preservative-free 0.9% sodium chloride for injection 5% dextrose in water should be used and followed by flushing with preservative-free 0.9% sodium chloride for injection and/or heparinised saline lock solution. Dextrose should be flushed from the catheter lumen because it can provide nutrients for biofilm growth. (IV)

B. The minimum volume of preservative-free 0.9% sodium chloride for injection for catheter flushing depends upon the type and size of catheter, age of the patient, and type of infusion therapy administered. A minimum volume of twice the internal volume of the catheter and add-on device is recommended; however, a larger volume may be needed for blood sampling or blood transfusion procedures. (V)

C. To prevent catheter damage, the size of the syringe used for flushing and locking should be in accordance with the catheter manufacturer’s directions for use. Patency is assessed with a minimum 10mL syringe filled with preservative-free 0.9% sodium chloride for injection. Flush syringes holding a smaller volume and/or designed to generate lower amounts of pressure may also be used to assess patency. Administration of small quantities of medicine should be given in a syringe appropriately sized for the dose required following confirmation of catheter lumen patency. (V)

D. Prefilled syringes filled with preservative-free 0.9% sodium chloride for injection should not be used for dilution of medicines to prevent medicine errors. Syringe-to-syringe medicine transfer is not recommended due to risk of serious medicine errors. (V)

E. Short peripheral catheters should be locked with preservative-free 0.9% sodium chloride for injection following each catheter use in adults and children. (I)

F. No specific recommendation can be made about the use of heparin lock solution or preservative-free 0.9% sodium chloride for injection for locking short peripheral catheters in neonatal patients. Data are inconsistent and inadequate to make specific recommendations. (V)

G. Frequency of flushing should be daily for peripheral devices, 8-12 hourly for short-term central venous catheters and weekly for long-term central venous access devices unless occlusive problems indicate otherwise.

H. Flushing with 0.9% sodium chloride for injection solution to ensure and maintain patency should be performed before, between, and after the administration of incompatible medicines and/or solutions.

**Heparin/Heparinised saline lock and alternative solutions**

**Practice criteria**

A. The clinician should assess for contraindications for the use of heparinised saline lock solution including, but not limited to presence or risk of heparin-induced thrombocytopenia; heparinised saline’s impact on laboratory studies drawn from the catheter, and systemic anticoagulation. Heparin-induced thrombocytopenia (HIT) has been reported with the use of heparin flush solutions, although the exact rates are unknown. All patients should be monitored closely for signs and symptoms of HIT. If present or suspected, heparin and all sources of heparin (i.e. heparin-coated catheters) should be discontinued. (IV)

B. Many studies report equivalent outcomes in central vascular access catheters when locked with heparinised saline solution or preservative-free 0.9% sodium chloride for injection others have reported greater complications with 0.9% sodium chloride for injection only locking. Due to the risk and costs associated with central venous access device (CVAD) insertion, heparinised saline lock solution 10 units/ml is the preferred lock solution after each intermittent use. (III)

C. For postoperative patients receiving heparinised saline lock solutions of any concentration, monitoring platelet counts for heparin-induced thrombocytopenia (HIT) is recommended every 2-3 days from day 4 through to day 14 or until the heparinised saline is stopped. For medical patients receiving heparinised saline solutions, routine platelet count monitoring is not recommended. (II)

D. Before removal of an access needle from an implanted port and/or periodic access and flushing, the device should be locked with heparinised saline solution 100 units/mL. (V)

E. Catheters used for haemodialysis should be locked with undiluted heparin solution 1,000 units/mL after each use. (V)

F. Catheters used for apheresis procedures are large-bore catheters and require rapid flow rates; the procedure has an impact on
coagulation factors. The flushing and locking procedures for these catheters should follow the same practices as haemodialysis catheters. (V)

G. Patency of arterial catheters used for haemodynamic monitoring is greater when heparin solution is infused, although existing studies are inconclusive due to variations in the catheter’s location (peripheral versus pulmonary), duration of catheter use, and differences in patency measurement. The decision to use preservative-free 0.9% sodium chloride for injection instead of a heparin infusion should be based on clinical risk of catheter occlusion, the anticipated length of time the arterial catheter will be required, and patient factors such as heparin sensitivities. (II)

H. Concentrations of heparin less than or equal to 1 unit/mL should be used as an infusion in umbilical arterial catheters in neonates; however, heparinised saline flush or locking solution is not effective. (II)

I. Alternative locking solutions may be considered in patients with HIT including, but not limited to, ethanol, sodium citrate, taurodilene, ethylenediamine-tetraacetate (EDTA), or combinations of these solutions. These solutions are not commercially available in single-use containers and do not have a labelled indication for maintaining catheter patency. (II)

J. Antibiotic lock solution may be used for salvage of an infected long-term CVAD in the absence of a tunnel or port-pocket infection. High concentrations of vancomycin, ceftazidime, cefazolin, ciprofloxacin, gentamycin, and ampicillin have been reported to be effective when used in conjunction with systemic antibiotics. Medicine precipitation is possible when heparin is added to these solutions. The length of dwell time for the lock solution and the duration of treatment depends on the need to use the catheter for infusion and the clinical response. Use of antibiotic lock solution is not recommended as a routine prophylactic measure due to the possibility of development of resistant strains of micro-organisms and adverse reactions to the high concentration of lock solution. Prophylactic use may be considered in patients with a history of catheter-related bloodstream infections or those with other risk factors such as a prosthetic heart valve. (I)

A meta-analysis of randomised controlled trials focused on central venous catheters concluded that heparin significantly reduced bacterial colonisation and showed a strong but non-significant trend towards reduction of catheter-related bacteraemia.

Flush techniques

Practice criteria
A. The clinician will flush using a pulsatile push-pause-push and positive pressure method.
B. The pulsed flush creates turbulence within the catheter lumen, removing debris from the internal catheter wall.
C. Positive fluid displacement within the lumen of the catheter should be maintained to prevent reflux of blood upon luer disconnection. This is accomplished with either a flushing technique or a needleless connector designed to overcome blood reflux. (V)

References:

Catheter clearance

Standard
1. Medicines and/or solutions used to dissolve thrombotic deposits or precipitate in central venous access device (CVADs) shall be administered as prescribed and administered as per organisational policies, procedures, and/or practice guidelines.
2. The clinician should be competent in performing procedures used in catheter clearance.
3. The clinician shall assess the patient and the patient’s CVAD for appropriateness of the use of catheter clearance medicines and/or solutions in relation to the suspected cause of catheter occlusion.

Thrombotic occlusions
The instilled volume of thrombolytic agents shall not exceed the volume capacity of the catheter and the add-on device.

Non-thrombotic occlusions
The instilled volume of precipitate clearance agents shall not exceed the volume capacity of the catheter and the add-on device.

Practice criteria
A. The clinician should assess for and identify signs of CVAD occlusion, including the inability to withdraw blood, sluggish flow, and/or inability to flush or infuse through the device. (III)
B. The clinician should assess for potential causes of catheter occlusion and consider the use of an appropriate catheter clearance procedure in order to preserve the patient’s CVAD. (III)
C. The responsibility of the clinician performing catheter clearance should include, but not be limited to, knowledge of medicine and/or solution dosage, contraindications, side-effects, techniques for instillation, potential complication, and patient and caregiver education. (V)
D. The instillation of low-dose alteplase is effective in restoring blood flow and has been found to be safe for use in both adult and paediatric patients. (II)
E. Infusions of low doses of alteplase over 1-2 hours have been found successful in restoring patency to haemodialysis catheters. (V)
F. Instillation of a 0.1 N hydrochloric acid into the occluded lumen has been used to dissolve low pH medicine precipitates, and instillation of sodium bicarbonate has been used to dissolve high pH medicine precipitates. (V)
G. Instillation of ethanol, ethyl alcohol, and sodium hydroxide into the occluded catheter lumen has been used to restore patency to catheters with suspected buildup of intravenous fat emulsions particularly associated with administration of total nutrient admixtures. (V)
H. Instillation of alcohol solutions such as ethanol or ethyl alcohol may damage catheters made of some types of polyurethane; manufacturers’ directions for use should be reviewed and followed. (V)
I. Consideration should be given to the potential pressure exerted on an occluded CVAD when medicines and/or solutions used for catheter clearance are instilled. The syringe size used for catheter clearance procedures should be no smaller than 10mL and should be in accordance with the catheter manufacturer’s directions for use. Instillation methods that use a negative-pressure approach should be considered. (V)
J. If the catheter clearance procedure does not result in patency of the CVAD, the medical practitioner should be notified; alternative actions such as referral to interventional radiology should be considered; and catheter removal should be considered if catheter patency is not restored. (V)

References:

Vascular access device removal

Standard
1. Removal of a vascular access device (VAD) shall be performed upon the order of the healthcare team by the clinician in accordance with their professional scope of practice, organisational policies, procedures, and/or practice guidelines, or immediately upon suspected contamination or complication.
2. The clinician shall be competent in the process of VAD removal, including identification of potential complications, and appropriate clinical interventions and/or emergency measures as needed, and patient and caregiver education.
3. VADs shall be removed for unresolved complications, therapy discontinuation, or if deemed unnecessary.
4. VADs inserted in an emergency situation shall be replaced as soon as possible and no later than 48 hours.
5. The frequency of short peripheral catheter removal for the purpose of site rotation shall be established in organisational policies, procedures, and/or practice guidelines.
6. Removal of tunelled catheters or implanted ports is considered a surgical procedure and shall be performed by a medical practitioner.
Practice criteria

General
A. If a catheter-related infection is suspected, consideration should be given to obtaining blood cultures via the catheter. Routine culture of catheter tips upon removal is not recommended. (I)
B. If a vesicant medicine has extravasated, treatment should be determined prior to device removal.
C. A catheter should never be readvanced following completion of initial placement.
D. The integrity of the catheter should be ascertained upon removal, clinical interventions should be implemented as necessary, and observations and actions should be documented in the patient’s clinical records.
E. A catheter defect should be reported to the organisation’s risk management department via the incident reporting process and the manufacturer.

I. Short peripheral cannula
A. A short peripheral cannula should be replaced when clinically indicated and/or every 72-96 hours. The decision to replace the short peripheral cannula should be based on assessment of the patient’s condition; access site; skin and vein integrity; length and type of prescribed therapy; venue of care; integrity and patency of the VAD, dressing, and stabilisation device. (I)
B. The clinician should not routinely replace short peripheral cannulae in paediatric patients. (IV)
C. Digital pressure should be applied after removal of a short peripheral catheter, until haemostasis is achieved, and a dressing should be applied to the access site. (V)
D. The cannula should be removed should the patient report discomfort or pain related to the short peripheral cannula. The medical practitioner should be notified if unable to restart the short peripheral cannula or a delay in medicine administration occurs. (V)
E. If a catheter-related bloodstream infection (CR-BSI) is suspected; consideration should be given to culturing the cannula after removal. (V)
F. If a vesicant medicine has extravasated, treatment should be determined prior to cannula removal. The clinician should aspirate the remaining medicine from the cannula prior to removal. (V)

II. Midline catheters
A. The midline catheter is indicated for those peripheral infusion therapies prescribed for a duration of 1-4 weeks. For therapies requiring catheter dwell times greater than 4 weeks, extension of catheter dwell should be based on the professional judgment of the clinician after consideration of the following factors including, but not limited to, length and type of therapy remaining, peripheral vascular status, condition of the vein in which the catheter is indwelling, skin integrity, and patient condition. (V)
B. Removal of a midline catheter should be determined by patient condition, completion or change of therapy administered, presence of infectious or inflammatory process, catheter malposition, or catheter dysfunction. Midline catheters should be removed if the tip location is no longer appropriate for the prescribed therapy. (V)
C. Digital pressure should be applied after removal of a midline catheter, until haemostasis is achieved, and a sterile dressing should be applied to the access site to seal the skin-to-vein tract and decrease risk of air embolism. The access site should be assessed every 24 hours, where possible, until the site has healed. (V)
D. If a catheter-related complication is suspected, an assessment of the patient and catheter should occur. If unable to resolve the complication or the complication warrants removal, after collaboration with the healthcare team, the midline catheter should be removed. (V)
E. If the patient reports discomfort or pain related to the midline catheter, the patient and the catheter should be assessed and appropriate interventions performed. The medical practitioner should be notified. When interventions are unsuccessful, the catheter should be removed. (V)

III. Central vascular access devices (non-tunneled)
A. Daily assessment of CVAD need and removal when no longer required are components of the central line bundle known to decrease risk of infections. The maximum dwell time for non-tunneled catheters is unknown; ongoing and daily monitoring of the device necessity should be performed. (II)
B. Removal of non-tunneled CVAD should be determined by patient condition, completion of therapy, presence of infections or inflammatory process, catheter malposition, or catheter dysfunction. (V)
C. The decision to remove or salvage a catheter due to suspected or confirmed catheter-related bloodstream infection (CR-BSI) should be based on blood culture results, specific type of cultured organism, patient’s current condition, available vascular access sites, effectiveness of
antimicrobial therapy, and healthcare team direction. (V)

D. The CVAD should be removed after patient assessment and in collaboration with the healthcare team if a catheter-related complication is suspected and interventions are unsuccessful. (V)

E. A CVAD with a malpositioned catheter tip location that cannot be repositioned to a central vein, should be removed. (V)

F. When removing the CVAD, the clinician should position the patient so that the CVAD insertion site is at or below the level of the heart to reduce the risk of air embolism. The use of valsalva manoeuvre during CVAD removal is widely accepted. (IV)

G. Caution should be used in the removal of central venous catheters, including precautions to prevent air embolism. Digital pressure should be applied after removal of a non-tunnelled CVAD catheter, until haemostasis is achieved, and a sterile occlusive dressing should be applied to the access site to seal the skin-to-vein tract and decrease risk of air embolism.

H. The occlusive dressing should remain in situ for 72 hours. Air embolism has been shown to occur up to 72 hours after catheter removal.

I. After central vascular access device removal, a transparent occlusive dressing should be applied and where possible the access site assessed every 24 hours until the site has epithelialised.

J. If resistance is encountered when the catheter is being removed, the catheter should not be forcibly removed and the medical practitioner should be notified to discuss initiating appropriate interventions for successful removal. (V)

K. Coagulation studies, such as International Normalised Ratio (INR), are not routinely necessary for the removal of a CVAD. (IV)

IV. Central vascular access devices: tunnelled/implanted ports

A. The maximum dwell time of a surgically placed CVAD is unknown; ongoing and frequent monitoring of the access site should be done as well as ongoing assessment of need. When no longer necessary the surgically placed CVAD should be removed. (V)

B. The decision to remove or salvage a catheter due to suspected or confirmed catheter-related bloodstream infection (CR-BSI) should be based on blood culture results, specific type of cultured organism, patient’s current condition, available vascular access sites, effectiveness of antimicrobial therapy, and healthcare team direction. (V)

C. If a catheter-related complication occurs (e.g. cuff exposure, dislodgement, infection) and interventions are unsuccessful, the catheter should be surgically removed after patient assessment and in collaboration with the healthcare team. (V)

D. After removal, the clinician should continue to monitor the site, implement interventions as necessary, provide patient education, and document observations and actions in the patient’s permanent clinical records. The wound should be kept dry for 5-7 days and the wound monitored until healed. (V)

Arterial catheters

A. Arterial catheters should not be routinely removed or replaced. (V)

B. When a peripheral arterial catheter is removed, digital pressure should be applied until haemostasis is achieved (5-15 minutes) by using manual compression and/or other adjunct approached such as haemostatic pads or patches that are designed to potentiate clot formation. A sterile, pressure dressing should be applied to the access site. Prolonged digital pressure and adjunct haemostatic approaches may need to be applied in patients with coagulation abnormalities or femoral arterial catheters. (IV)

C. After the removal of the arterial catheter, the clinician should assess the circulatory status distal to the access site and document in the patient’s clinical records.

References:


Catheter malposition/dislodgement

**Standard**

1. Central vascular access device (CVAD) repositioning techniques shall be set out in organisational policies, procedures, and/or practice guidelines.
2. The clinician shall be competent with the chosen CVAD repositioning techniques.
3. The clinician shall know the anatomic location of the CVAD tip prior to initial infusion through the catheter.
4. The clinician shall know the clinical signs and symptoms of CVAD malposition and report the condition to the medical practitioner.
5. The clinician shall document in the patient’s clinical record the CVAD malposition, interventions implemented and patient response to treatment.

**Practice criteria**

**General**

A. The clinician should be knowledgeable of aberrant CVAD tip locations from primary and secondary malpositioning and catheter dislodgement. (V)
B. Primary and secondary CVAD malposition may produce atrial and ventricular tachyarrhythmias. Peripherally inserted central catheter (PICC) tip migration into the heart is associated with arm adduction and flexion. (IV)
C. The clinician should notify the medical practitioner immediately of any signs or symptoms related to CVAD malposition and obtain orders for diagnostic procedures. Procedures include, but are not limited to, chest radiograph and contrast injection through the catheter under fluoroscopy. (V)
D. The clinician should perform procedures for repositioning percutaneous CVADs or prepare the patient for radiologic or surgical intervention for repositioning the catheter tip. (V)
E. Infusion through a malpositioned catheter should be withheld until proper tip position has been established. The clinician should assess the infusion therapy being administered and, if possible, insert a short peripheral catheter to continue therapy. If the infusion therapy is not possible through a peripheral vein, the clinician should assess the potential risk for discontinuing therapy, or seek orders to change the infusion therapy until the proper CVAD tip location can be re-established. (V)
F. Extravascular CVAD tip location has been reported to cause cardiac tamponade and severe intrathoracic infiltration and extravasation injury. (V)

**Primary malposition**

A. Primary CVAD malposition occurs during the insertion procedures with the catheter passing into numerous aberrant locations, including contralateral innominate and subclavian veins, ipsilateral or contralateral internal jugular veins, ayzygos vein, right or left internal thoracic vein, pericardiophrenic vein, and right atrium or ventricle. (IV)
B. Inadvertant arterial insertion may be a location for primary CVAD malposition, even with the use of dynamic ultrasound during insertion procedure. (V)
C. The clinician’s awareness of primary CVAD malposition during the insertion procedure is enhanced by use of tip location technology; however, a post-procedure chest radiograph remains the recommended method to identify tip location. While a post-anterior chest radiograph is preferred, an anterior-posterior chest radiograph may be needed for bedridden patients. A lateral chest radiograph may be required to confirm some aberrant tip locations (e.g. ayzygos vein) or if clinically indicated. (V)
D. During the insertion procedure, ultrasound may be used to rule out tip location in the internal jugular vein. (III)
E. The inserter/operator should know the results of the chest radiograph, properly reposition the CVAD if required, obtain a confirming repeat chest radiograph, and document all actions taken. (IV)

**Secondary malposition**

A. Secondary CVAD malposition, also known as tip migration, may occur at any time during catheter dwell time and is related to sporadic changes in intrathoracic pressure (e.g. coughing, vomiting); presence of congestive heart failure; neck or arm movement; positive-pressure ventilation; high-pressure injection; or flushing techniques. The most common locations for secondary CVAD malposition include internal jugular, innominate, subclavian, axillary, and ayzygos vein and the right atrium. (V)
B. The clinician should assess for catheter functions prior to each use, observing for clinical signs and symptoms such as lack of blood return; difficulty or inability to flush the CVAD; unusual shoulder, chest, or back pain; oedema; complaints of hearing gurgling or flow stream sounds on the ipsilateral side; paresthesia; and neurological effects due to retrograde infusion into the intracranial venous sinuses. (V)
Dislodgement

A. CVAD dislodgement is caused by arm movement, body habitus, patient manipulation (e.g. Twiddler’s syndrome), and inadequate catheter stabilisation, resulting in changes of the external catheter length and alteration of CVAD tip location. (V)

B. The clinician should not advance any external portion of the CVAD that has been in contact with skin into the insertion site. Skin cannot be rendered sterile, and no studies have established an acceptable length of time after insertion for such catheter manipulation. (V)

C. The clinician should measure the external CVAD length and compare to the external length documented at insertion. Dislodgement could indicate the tip location is suboptimal, increasing the risk for catheter-related thrombosis. (V)

D. CVAD malposition and dislodgement may require a catheter exchange procedure or removal and insertion at a new site. (V)

E. CVAD migration and dislodgement increase the risk for thrombosis, thrombophlebitis, pericardial effusion, cardiac tamponade, and cerebrovascular accidents. If complications are present, the catheter should be removed and inserted at a new site if infusion therapy is to be continued. (V)

F. Use of tape and or transparent dressing, or adhesive anchors (for example Statlock) will reduce the risk of catheter dislodgement.

G. The patient and/or caregiver should be instructed in ways of avoiding catheter dislodgement.

H. If catheter malposition is suspected the catheter should not be used for the administration of medicine, solutions or chemotherapy until the catheter tip position has been confirmed.

References:


Catheter exchange

**Standard**

1. Central vascular access device (CVAD) exchange shall be initiated upon the order by the medical practitioner in accordance with professional scope of practice, organisational policies, procedures, and/or practice guidelines, and according to the manufacturer’s directions for use.
2. The clinician shall be competent to perform or assist with a CVAD exchange.
3. The clinician shall implement maximal barrier (MSB) precautions for the CVAD exchange procedure.
4. After completion of the exchange procedure, the CVAD tip location shall be determined radiographically or by other approved technologies and documented prior to resumption of the prescribed therapy.

**Practice criteria**

A. Prior to performing a CVAD exchange, the clinician should assess the risk-benefit of the procedure, particularly in high-risk patient populations, such as burn or transplant patients. (IV)

B. CVAD exchange should be considered to replace a non-tunneled catheter for the following reasons: need for a different type of catheter, malpositioned or malfunctioning catheter, or when there is no evidence of a site infection. (V)

C. Assessment along with a risk-benefit analysis should occur prior to performing an exchange procedure on a catheter with infection or suspected infection. If venous access is limited due to other sites being unavailable, and there is no evidence of exit site or tunnel infection, a catheter exchange procedure may be considered. An anti-infective catheter should be considered for placement when exchanging a catheter for infection or suspected infection. (II)

D. The clinician’s responsibilities for a CVAD exchange procedure should include, but are not limited to, positioning the patient to facilitate the procedure; ensuring MSB precautions are in place; ensuring that techniques to reduce the risk of air embolism are employed; and obtaining a radiograph or other approved technologies to confirm correct CVAD tip location prior to initiating or resuming prescribed therapies. (IV)

E. The clinician should be aware that routine exchanges are not necessary for CVADs that are functioning and without evidence of local or systemic complications. (I)

F. The integrity of the catheter should be ascertained immediately following retrieval.

G. Any defect in the retrieved catheter should be reported to the organisation’s risk management department via the incident reporting process and to the manufacturer.

H. A record of the procedure should be recorded in the patient’s clinical records.

**References:**


Catheter repair

**Standard**

1. Vascular access device (VAD) repair shall be initiated upon the order of a medical practitioner.

2. Guidelines and resource for the repair of the external segment of a central venous catheter shall be established in organisational policies, procedures and/or practice guidelines.

3. The clinician shall be competent in access device repair.

4. The device shall be repaired according to the manufacturer’s directions for use.

5. Assessment of the patient’s risk-to-benefit ratio shall be performed prior to repair of the access device.

**Practice criteria**

A. Immediately upon discovery of catheter damage, the device should be clamped or sealed (e.g. closing an existing clamp, adding a clamp, covering the damaged area with adhesive dressing material, folding the external segment, and securing) between the patient and the damaged area to prevent air embolism or bleeding from the device. The damaged catheter should be labelled “Do Not Use” while waiting for the catheter repair or catheter replacement procedure to be performed. (V)

B. Options to consider for managing a damaged or ruptured catheter include use of a repair procedure, an exchange procedure, or insertion of a new catheter at a different site. Factors to consider in making this decision include, but are not limited to, the patient’s immune status; length of time remaining on infusion therapy; characteristics of infusion therapy (e.g. pH and osmolality); external catheter length; and
resulting changes in proper tip location with repair. (V)

C. Patient and caregiver education should include how to prevent catheter damage, how to assess for catheter damage, and what immediate actions to take if catheter damage is found. (V)

D. Catheter damage increases the risk for catheter fracture and embolisation, air emboli, bleeding, catheter-lumen occlusion, and bloodstream infection. If catheter repair is chosen, it should be performed as soon as possible to reduce the risk of these complications. (V)

E. The selected repair kit should be specifically designed for the device being repaired. If no device-specific repair kit is available, the clinician should consider other alternatives, such as catheter exchange or insertion of a new catheter. (V)

F. Ongoing assessment after repair should be routinely performed to confirm the integrity of the repair and identify any continuing problems, as the repaired catheter may not have the same strength as the original catheter. The access device should be removed if the repair was unsuccessful or the device is unable to be repaired. (V)

G. Access device repair should be documented in the patient’s clinical records. (V)

H. Data on the causes of the device damage should be analysed to identify the root cause(s) including, but not limited to, flushing technique, syringe size, and use of scissors during dressing changes. (V)

I. An incident form should be completed and any defective devices should be reported to your organisational risk management via the incident reporting process, and to the manufacturer.

References:
Infusion-Related Complications

Phlebitis

**Standard**

1. The assessment and treatment of phlebitis must be established in organisational policies, procedures, and/or practice guidelines.
2. The clinician must be competent to assess the vascular access site for phlebitis; determine the need for and type of intervention; educate the patient and/or caregiver about phlebitis, the intervention, and any follow-up; and assess patient response to treatment.
3. The clinician must document in the patient’s permanent clinical records the signs and symptoms of phlebitis using a standardised scale, interventions implemented, and patient response to treatment.

**Practice criteria**

A. The clinician should routinely assess all vascular access sites for signs and symptoms of phlebitis based on patient population, type of therapy, type of device, and risk factors. Signs and symptoms of phlebitis include pain, tenderness, erythema, warmth, swelling, induration, purulence, or palpable venous cord; the number or severity of signs and symptoms that indicate phlebitis differ in the published literature.

B. If phlebitis occurs, the clinician should:
   1. Assess the vascular access site for signs, symptoms, and severity of phlebitis using a standardised scale.
   2. Determine the possible etiology of the phlebitis – chemical, mechanical, bacterial, or post-infusion – and implement appropriate interventions for midline and peripherally inserted catheters. Remove the short peripheral catheter. (INS, 2011)
   3. Assess and document patient response to intervention(s).
   4. When the vascular access device (VAD) is removed, consider the need to collaborate with the medical practitioner regarding the need for continued or alternative vascular access.

C. When any VAD is removed, the clinician should monitor the vascular access site for 48 hours to detect post-infusion phlebitis; or upon discharge the patient and/or caregiver should be given instructions about the signs and symptoms of phlebitis and the person to contact if this occurs.

D. The clinician should use a standardised phlebitis scale that is valid, reliable, and clinically feasible.

Two phlebitis scales have demonstrated validity and reliability and have been used for adult patients. The population for which the scale is appropriate should be identified: adult or paediatric patients.

1. The Phlebitis Scale has concurrent validity, inter-rater reliability, and is clinically feasible (see Table 1)

<table>
<thead>
<tr>
<th>Grade</th>
<th>Clinical Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No symptoms</td>
</tr>
<tr>
<td>1</td>
<td>Erythema at access site with or without pain</td>
</tr>
<tr>
<td>2</td>
<td>Pain at access site with erythema and/or oedema</td>
</tr>
<tr>
<td>3</td>
<td>Pain at access site with erythema Streak formation Palpable venous cord</td>
</tr>
<tr>
<td>4</td>
<td>Pain at access site with erythema Streak formation Palpable venous cord &gt;2.5 cm in length Purulent drainage</td>
</tr>
</tbody>
</table>

2. The Visual Infusion Phlebitis (VIP) scale has content validity, inter-rater reliability, and is clinically feasible. This scale includes corrective actions matched to each scale score.

E. The clinician should participate in quality improvement activities or outcomes evaluation regarding the occurrence and reporting of phlebitis with infusion therapy.

F. The clinician should advocate for ongoing improvement in phlebitis rates.

G. The clinician should use a consistent, standard, and clinically feasible formula for short peripheral catheter phlebitis, which may be reported as a phlebitis rate based on point prevalence of short peripheral catheters.

H. One clinically feasible calculation for point prevalence (measurement at 1 point in time) of a peripheral VAD phlebitis rate is:

\[
\text{Number of phlebitis incidents} \quad \times 100 = \% \text{ peripheral phlebitis}
\]

\[
\text{Total number of IV peripheral devices}
\]

**References:**

Infiltration and extravasation

Standard
1. The assessment and treatment of infiltration and extravasation must be established in organisational policies, procedures, and/or practice guidelines.

2. The clinician shall assess the vascular access site for infiltration and extravasation; determine the need for and type of intervention; educate the patient and or caregiver about infiltration and extravasation, the intervention, and any follow-up; and assess patient response to treatment.

3. The clinician shall document all information related to signs and symptoms of infiltration and extravasation, including photographic records, where appropriate, interventions implemented and patient response to treatment in the patient’s clinical records.

Practice criteria
A. Infiltration and extravasation are reported with all types of peripheral and central vascular access devices (CVADs) and intravenous devices. The clinician should routinely assess all vascular access sites for signs and symptoms of infiltration and extravasation based on patient population, type of therapy, type of device, and risk factors. (V)

B. The clinician should determine possible causes of infiltration and extravasation, which include mechanical, pharmacologic, obstructive, and inflammatory factors. (IV)

C. The clinician should immediately stop all infusions when the patient complains of any type of pain, burning or stinging, at or around the insertion site, catheter tip, or entire venous pathway as this should not be considered within normal limits with any infusion. These symptoms require further assessment to determine appropriate intervention(s). (IV)

D. The clinician should use a standardised scale for assessing and documenting infiltration/extravasation from all types of vascular access devices (VADs). This measurement should occur initially and regularly until resolution, based on patient condition and age; type of fluid; severity of infiltration/extravasation; type of device; and anatomical location. Signs and symptoms progress from simple to complex, and the clinical presentation can easily be confused with phlebitis or irritant and flare reactions. Early recognition of infiltration/extravasation is critical to limit the amount of fluid that escapes into the subcutaneous tissue and potential subsequent tissue injury. (III)

E. Frequency of site assessment after infiltration/extravasation depends upon the medicines involved and the individual patient needs. All changes should be reported to the medical practitioner. (V)

F. The clinician should not rely on alarms from electronic infusion pump to identify infiltration/extravasation because these alarms are not designed to detect the presence or absence of these complications. Electronic infusion pumps do not cause infiltration/extravasation; however, they will exacerbate the problem until the infusion is stopped. (V)

G. All infusions through the peripheral catheter or CVAD should be discontinued at the first sign of infiltration/extravasation, the administration set disconnected, and all fluid aspirated from the catheter with a small syringe (e.g. 3ml). The peripheral catheter or implanted port needle should be removed after aspiration. Timing of CVAD removal depends on the plan of care. The clinician should notify the medical practitioner about the complication and activate the treatment protocol or other prescribed treatments. (I)

H. The clinician should estimate the volume of fluid that escaped into the tissue based on the rate of injection or infusion and the length of time since the assessment. Large volumes (e.g. greater than 25-30mL) of escaped fluid increase the risk of tissue damage, and consultation with a plastic surgeon may be necessary. (V)

I. Treatment of infiltration depends on its severity when it is recognised. Treatment may include extremity elevation, thermal manipulation, use of antidotes, and surgical interventions. (IV)
J. The clinician should educate the patient and caregiver about the possible progression of the signs and symptoms of infiltration/extravasation, changes that should be reported to the medical practitioner (e.g. changes in mobility and sensation, elevated temperature, and other signs of infection), to protect the site from sunlight, and the frequency of follow-up visits to the medical practitioner and/or other medical consultants as needed. (V)

K. There is insufficient evidence for the management of infiltration/extravasation in neonates and other paediatric patients. Thermal manipulation is a controversial issue, and skin maceration with moist heat is possible. (IV)

L. The clinician should monitor clinical outcomes associated with infiltration, which may include compartment syndrome with the need for rapid surgical intervention, and nerve injury from excessive compression producing neuropathies and complex regional pain syndrome. (V)

M. The clinician should monitor clinical outcomes associated with extravasation that may include formation of blisters over a prolonged period (e.g. 7-14 days), skin sloughing and tissue necrosis, functional and sensory loss in the injured area, disfigurement, loss of limb, or mastectomy. (V)

N. The infiltration/extravasation rate should be calculated according to a standard formula:

\[
\text{Number of infiltration /extravasation incidents} \times 100 = \% \text{ peripheral infusions/extravasations}
\]

Total number of IV peripheral devices

References:


Infection

**Standard**

1. The assessment and treatment of infusion- and vascular access devices (VAD)-related infections must be established in organisational policies, procedures, and/or practice guidelines.

2. The clinician shall assess the patient for suspected infusion- and VAD-related infections; provide timely and appropriate information to the medical practitioner; educate the patient and/or caregiver about infusion- and VAD-related infections, the intervention, and follow-up; and assess patient response to treatment.


4. The clinician must implement infection prevention measures with the goal of preventing all infusion- and VAD-related infections.

**Practice criteria**

A. VAD-related infection includes exit site, tunnel, port pocket, and catheter-related bloodstream infection (CR-BSI). Infusate-related bloodstream infections are caused by intrinsic or extrinsic contamination of the administration delivery system, infusing fluids and medicines. (IV)

B. The clinician should immediately notify the medical practitioner of the signs and symptoms of infection including, but not limited to, erythema, oedema, induration, or drainage at the VAD insertion site, and/or body temperature elevation, and take appropriate interventions. (V)

C. Routine culturing of all central vascular access device (CVAD) tips upon removal is not recommended. Catheter colonisation may be detected but does not indicate the presence of bloodstream infection. This practice can result in inappropriate use of anti-infective medicines, thus increasing the risk of emergence of antimicrobial resistance. (I)

D. Immediate removal of a functioning CVAD is not recommended based solely on temperature elevation. Clinical findings, such as temperature elevation with or without chills or inflammation and purulence at the insertion site, are unreliable indicators of bloodstream infection. (I)

E. When present, purulent exudates from a peripheral or CVAD insertion site should be collected for culture and gram-staining to determine gram-negative or gram-positive bacteria. (IV)
F. The goal of catheter salvage should be a collaborative decision among the healthcare team and patient based on:
   1) The type of VAD (e.g. percutaneous versus surgically inserted long-term catheter;
   2) Difficulty with inserting a new CVAD;
   3) Presence of bleeding disorders;
   4) The infecting organism(s) as confirmed by paired blood cultures;
   5) The presence of other complicating conditions including, but not limited to severe sepsis, suppurrative thrombophlebitis, endocarditis, or the presence of vascular hardware (e.g. pacemaker). (IV)

G. Infection in a subcutaneous tunnel or implanted port pocket requires removal of the CVAD; however, uncomplicated exit-site infection without systemic infection, positive blood culture, or purulence may be treated with topical antimicrobial ointment as indicated by the culture results. (V)

H. The clinician should ensure that all blood cultures have been obtained prior to initiation of anti-infective agents. (IV)

I. Use of phlebotomy teams for collecting peripheral blood cultures is recommended. (IV)

J. Skin preparation for blood cultures obtained from a peripheral venipuncture should be done with alcohol, tincture of iodine, or >0.5% chlorhexidine gluconate/alcohol combination. Antiseptic agents should be applied with adequate contact and drying time. Povidone-iodine is not recommended. (IV)

K. When a sample for blood culture is drawn from the catheter, the used needleless connector should be changed prior to obtaining the sample. The new needleless connector should be thoroughly scrubbed with alcohol, tincture of iodine, or >0.5% chlorhexidine gluconate/alcohol combination. The first drawn sample should be collected and used to inoculate the culture bottles without discarding the initial blood sample. (IV)

L. Short-term central vascular and arterial catheters suspected of being the cause of a BSI should have the tip cultured by using a semiquantitative (roll-plate) method or quantitative (sonication) method upon removal. A suspected BSI from a pulmonary artery catheter requires culture of the introducer/sheath tip. (IV)

M. If an implanted port is removed for suspected CR-BSI, the port body should also be sent for culture of the reservoir contents along with the catheter tip. (IV)

N. For short- and long-term catheters, paired blood cultures have been shown to accurately diagnose CR-BSI. (I)

O. In a patient with a CR-BSI, the insertion of a new CVAD at a new site should be a collaborative decision based on the specific risks and benefits for each patient. There is insufficient evidence for definitive recommendations for the insertion of a new CVAD. (IV)

P. A catheter exchange procedure may be chosen when other vascular access sites are limited and/or bleeding disorders are present. The removed CVAD should be sent for culture and the new catheter removed if tip culture results show significant growth. (IV)

Q. The use of thrombolytic/fibrinolytic agents as adjunctive treatment for CR-BSI is not recommended. (IV)

References:

Air embolism

**Standard**

1. The prevention, identification, and management of air embolism during insertion, care, and removal of vascular access devices (VADs) shall be established in organisational policies, procedures, and/or practice guidelines.

2. The clinician with the appropriate training, experience, knowledge, and skills must be competent to insert, manage, and remove all types of VADs toward the goal of preventing air emboli.
Infusion-related Complications

3. Luer-lock connections must be used on all catheter-administration set junctions.
4. All air must be purged from syringes, administration sets, needleless connectors, and all other equipment added to the catheter.
5. The clinician must document in the patient's clinical notes the signs and symptoms of air embolism, interventions implemented and patient response to treatment.
6. Patients and/or caregivers managing infusion therapy in non-acute settings must be taught how to prevent an air embolism and how to manage the catheter if an air embolism is suspected.

Practice criteria

A. The clinician should suspect air embolism with the sudden onset of dyspnoea, continued coughing, breathlessness, chest pain, hypotension, jugular venous distension, tachyarrhythmias, wheezing, tachypnea, altered mental status, altered speech, changes in facial appearance, numbness, and paralysis. Clinical events from air emboli produce cardiopulmonary and neurological signs and symptoms. (V)
B. The clinician should immediately take the necessary action to prevent more air from entering the bloodstream by closing, folding, or clamping the existing catheter or by occluding the puncture site if the catheter has been removed. (V)
C. The clinician should immediately position the patient in the left lateral, head down position if not contraindicated by other conditions such as increased intracranial pressure or respiratory diseases. The goal is to trap the air in the lower portion of the right ventricle; however, there is no supporting scientific evidence. (V)
D. The clinician should assess for conditions that contraindicate use of the valsala manoeuvre, including but not limited to aortic stenosis, recent myocardial infarction, glaucoma, and retinopathy. When these conditions are present, ensure that a catheter clamp is present before changing administration sets or needleless connectors. (V)
E. During catheter removal, the clinician must rely upon the patient's position to prevent air embolism; gentle digital pressure should be applied to the exit site and vein entry site until haemostasis is achieved; and a sterile occlusive, air tight (air impermeable) dressing should be applied to the access site immediately on catheter removal. The dressing should remain in situ for 72 hours. (V)
F. The clinician should instruct the patient and caregiver not to disconnect or reconnect any IV administration sets or connectors from the catheter hub, as reconnecting the wrong type of tubing has been documented to cause an air embolism. (V)

References:

Catheter embolism

Standard

1. The prevention, identification, and management of catheter embolism during insertion, care, and removal of vascular access devices shall be addressed in organisational policies, procedures, and/or practice guidelines.
2. The clinician shall be competent to insert, manage, and remove all types of vascular access devices toward the goal of preventing catheter embolism.
4. Patients and/or caregivers managing infusion therapy in non-acute care settings shall be taught how to prevent catheter embolism and how to manage the catheter if a catheter embolism is suspected.

Practice criteria

A. Clinical interventions to prevent catheter embolism include:
   1) No catheter should be withdrawn through a needle during insertion.
   2) A stylet should not be reinserted into a catheter.
   3) The clinician should not use power injection for vascular access devices that are not designed for this purpose.
   4) To prevent catheter damage, the size of the syringe used for flushing should be in accordance with the catheter
manufacturer’s directions for use (INS, 2011).

5) Be aware of early signs and symptoms of pinch-off syndrome in subclavian vein insertion sites. (II)

B. The clinician should suspect catheter embolism when the patient exhibits symptoms such as palpitations, arrhythmias, dyspnoea, cough, or thoracic pain when not associated with the patient’s primary disease or co-morbidities. (II)

C. The clinician should be aware that catheter dysfunction, such as inability to aspirate blood or fluid with localised pain and/or subcutaneous swelling, may be a precursor to catheter embolism, or leaking at the site can indicate catheter rupture. In the presence of these symptoms, the clinician should further evaluate catheter integrity before using the vascular access device for infusions or blood draws. The most frequent mechanisms of catheter fragmentation are catheter pinch-off syndrome, catheter damage during catheter exchange, separation of the catheter from an implanted port catheter. (III)

D. Catheter embolism is often asymptomatic, therefore chest radiographs of the patients with vascular access devices are obtained as part of the care, and the radiographs should be assessed for catheter fragment, catheter pinch-off, and intraclavicular catheter compression. (II)

E. Upon removal, vascular access catheters should be examined for damage and possible fragmentation. If damage is seen, a chest radiograph or further evaluation may be warranted. (II)

F. The clinician should carefully assess the patient for signs and symptoms of catheter embolism and for catheter damage when vascular access device removal is difficult. (V)

References:

Speedshock/fluid overload

Standard
1. The administration of medicine and/or infusion shall be performed in accordance with manufacturers’ recommendations and the organisational policies, procedures, and/or practice guidelines in order to prevent the development of speedshock and fluid overload.

Practice criteria
A. The clinician administering the medicine and/or infusion should have the knowledge of the speed or rate that shall be employed in order to prevent administration.

B. The clinician should be able to prevent the occurrence and recognise the signs and symptoms of speedshock and overloading.

C. The clinician should be able to act accordingly and the medical practitioner should be notified.

References:

Haematoma

Standard
1. Haematoma prevention and corrective action shall be established in organisational policies, procedures, and/or practice guidelines.

2. The clinician shall be competent to assess the access site and determine the need for treatment and/or intervention in the event of haematoma.

Practice criteria
A. The clinician should perform a risk assessment in order to identify individuals who may be particularly susceptible to haematoma formation, including older people, those having anticoagulation therapy, and children.

B. Strategies to minimise the risk of haematoma should be employed. These should include the use of optimal pressure to the puncture site following a failed procedure (e.g. transfixation of the vein) or removal of a vascular access device. The clinician should have the appropriate level of expertise for insertion of the device.

C. The clinician should have knowledge on the management of a haematoma including the use of pharmacological methods such as Hirudoid cream and observing limb perfusion injury following an arterial haematoma.

D. Incidence of haematoma, together with cause and its treatment, should be recorded in the patient’s clinical notes, so that possible steps for future prevention can be identified.
Catheter-associated venous thrombosis

Standard
1. The assessment and treatment of catheter-associated venous thrombosis shall be established in organisational policies, procedures, and/or practice guidelines.

2. The clinician shall assess the patient for suspected catheter-associated venous thrombosis; provide timely and appropriate information to the medical practitioner; educate the patient and/or caregivers about catheter-associated venous thrombosis, the intervention, and follow-up; and assess patient response to treatment.

3. The clinician shall be competent in venepuncture insertion procedures toward the goal of preventing catheter-associated venous thrombosis.


Practice criteria
A. Skilful venepuncture insertion procedures by the clinician decrease the risk of vein wall trauma and associated thrombus development. (I,A,P)

B. Before central vascular access device (CVAD) insertion, the clinician should assess the patient for venous thrombosis risk factors including, but not limited to:
1) Presence of chronic diseases that produce a hypercoaguable state such as cancer, diabetes, irritable bowel syndrome, or end-stage renal failure;
2) Known presence of genetic coagulation abnormalities (e.g. Factor V Leiden, prothrombin mutation);
3) Pregnancy or the use of oral contraceptives, surgery, and immobility;
4) Age extremes in young children and older adults;
5) History of multiple CVADs, especially with difficult or traumatic insertion and the presence of other intravascular devices (e.g. pacemakers). (II)

C. Decisions about VAD choices impact the rate of catheter-associated venous thrombosis including but not limited to:
1) Peripherally inserted central catheter (PICC) insertion sites in the antecubital fossa have higher rates of catheter-associated venous thrombosis than mid-upper arm insertion sites.
2) Suboptimal CVAD tip location in the mid-to-upper portion of the superior vena cava is associated with greater rates of catheter-associated venous thrombosis. (II)

D. The clinician should encourage the patient to use nonpharmacologic strategies for thrombosis prevention whenever possible, including early mobilisation of the catheterised extremity, performance of normal activities of daily living, gentle limb exercise, and adequate hydration. (II)

E. The clinician should be aware that the majority of catheter-associated venous thromboses are clinically silent and do not produce overt signs and symptoms, although pulmonary emboli have been linked to catheter-associated venous thrombosis. Clinical signs and symptoms of catheter-associated venous thrombosis are related to obstruction of venous blood flow and include, but are not limited to:
1) Pain in the extremity, shoulder, neck, or chest;
2) Oedema in the extremity, shoulder, neck, or chest;
3) Engorged peripheral veins on the extremity, shoulder, neck, or chest wall;
4) Difficulty with neck or extremity motion. (II)

F. VAD flushing and locking procedures have no effect on catheter-associated venous thrombosis as the technique and solutions used are directed to internal CVAD lumen rather than the vein lumen. (V)

G. Usual management of catheter-associated venous thrombosis includes systemic anticoagulation with or without CVAD removal. (I)

H. Prophylaxis with anticoagulant therapy is not recommended for patients at risk for catheter-associated venous thrombosis; the use of anticoagulant prophylaxis is controversial due to the risk of bleeding. The use of an assessment tool to predict catheter-associated venous thrombosis could be beneficial to identify patients that could benefit from prophylactic anticoagulation. The patient’s preferences and the burden of anticoagulant therapy (e.g. subcutaneous injection) should be considered. (I)
References:
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Intraspinal catheters

**Standard**

1. Intraspinal medicine administration, and care and maintenance of intraspinal access devices shall be initiated in accordance with a valid prescription and organisational policies, procedures, and/or practice guidelines.

2. Removal of temporary intraspinal access devices (intrathecal and epidural) shall be performed in agreement with the medical practitioner managing the patient’s care and in accordance with organisational policies, procedures, and/or practice guidelines. Removal of long-term implanted ports/reservoirs/pumps or tunnelling intraspinal devices shall be considered a surgical procedure.

3. Medicines administered via an intraspinal route shall be preservative-free.

4. A 0.2 micron surfactant-free, particulate-retentive filter shall be used for intraspinal medicine administration.

5. Alcohol, antiseptics containing alcohol, or acetone shall not be used for site preparation or cleansing the catheter hub due to potential deleterious effects as a neurotoxin.

6. The clinician shall be competent in the care of patient with intraspinal access device.

7. Intraspinal access devices and administration sets shall be identified and labelled as a specialised infusion administration system and differentiated from other infusion administration and access systems.

**Practice criteria**

A. Intraspinal administration of opioids and adjuvant medicines via the intrathecal, epidural, or ventricular space may be used to control pain with surgical procedures, for women in labour, and with cancer and chronic pain conditions when pain control has not been achieved through less invasive routes. Intrathecal baclofen may be used to control spasticity in children with cerebral palsy and adults with spasticity due to spinal cord injury or multiple sclerosis unresponsive to oral therapy. (IV)

B. Preservative-free medicines administered via the intrathecal or epidural route include, but are not limited to, morphine, fentanyl, clonidine, bupivacaine, and baclofen. Infusions may include opioids alone, opioids in combination with dilute local anaesthetics, and opioids in combination with local anaesthetics and clonidine. Antineoplastic agents and pain medicines may be administered via an intraventricular access device. (IV)

C. The responsibility of the clinician in caring for a patient with an intraspinal access device includes, but is not limited to, knowledge of anatomy and physiology; device placement; care and maintenance practices; implanted port/reservoir/pump filling and/or access; potential complications; and patient and caregiver education. (V)

D. Careful titration is required when initiating medicine, when converting from one route to another (e.g. intravenous to epidural to intrathecal), when converting one medicine to another, and when adding adjuvant medicines. Dosing and opioid conversion guidelines should be used, and dosing should start extremely low when converting from one medicine to another. (IV)

E. Epidural access devices should be aspirated to ascertain the absence of spinal fluid and blood prior to medicine administration. Intrathecal and ventricular access devices should be aspirated to ascertain the presence of spinal fluid and the absence of blood prior to medicine administration. (V)

F. Medicine compounding, accessing, and filling of an implanted intraspinal delivery system with a medicine reservoir should be performed at regular intervals in accordance with the manufacturer’s directions for use. (V)

G. Infusion medicine delivery via an intraspinal access device may be a single administration, an intermittent injection, or continuous infusion. Continuous infusion should be administered using an electronic infusion device with anti-free flow protection. Patient-controlled analgesia may be used with epidural infusions. (V)

H. The patient should be carefully monitored for the first 24 hours after initiating or restarting intraspinal infusions. High-risk patients such as the elderly, the very young, the opioid naïve, and those with cardiac and/or respiratory disease should be monitored in the supported environment of a hospital setting for the first 24 hours. (V)

I. The patient should be assessed for response to therapy at established intervals. Recommendations include assessing the following hourly for the first 24 hours and then every 4 hours; assessment of outpatients and patients receiving home care should occur with every patient encounter:

1) Pain rating using a validated, appropriate pain scale (e.g. 1-10), with regard to patient age and condition, both at rest and with activity;

2) Blood pressure, pulse, respiratory rate, temperature;
3) Level of sedation if opioid is being administered;
4) Number of bolus doses, if used (e.g. patient-controlled epidural analgesia);
5) Fetal status and response to intraspinal infusion for the woman in labour;
6) Presence of any side-effects: pruritus, nausea, urinary retention, orthostatic hypotension, motor block;
7) Signs of catheter insertion site infection or epidural abscess such as backpain, tenderness, erythema, swelling, drainage, fever, malaise, neck stiffness, progressive numbness, or motor block;
8) Dressing for intactness and absence of moisture leakage;
9) Catheter and administration set connections;
10) Changes in sensory or motor function that may indicate an epidural haematoma, including unexplained back pain, leg pain, bowel or bladder dysfunction, motor block;
11) Oxygen saturation levels via pulse oximeter and/or carbon dioxide levels, if prescribed;
12) Electronic infusion device for history of analgesic use and correct administration parameters. (V)

J. The potential for catheter tip migration should be routinely assessed by checking for changes in external catheter length. Migration of the catheter may result in changes including decrease in pain control (e.g. intrathecal migration to epidural space) or increase in side-effects (e.g. epidural migration to intrathecal space). (V)

K. A dressing should cover the intraspinal access site; routine dressing changes on short-term epidural and intrathecal access devices are not recommended due to risk of dislodgement and infection. Transparent semipermeable membrane (TSM) dressings are most often used for tunnelled and implanted epidural devices and are changed every 7 days; after the first 24 hours postplacement of a ventricular reservoir, the site is generally left open to air. (V)

L. Use of chlorhexidine-impregnated dressings should be considered for patients with epidural access devices; use of these dressings is associated with significant reduction in epidural exit site/catheter colonisation with microorganisms and with a trend toward decreased central nervous system infections. (I)

M. After intraspinal access device removal, a sterile dressing should be applied. (V)

N. Patient and/or caregiver information should be appropriate to the duration of therapy (short- or long-term) and care setting. This information should include the purpose of the therapy, operating instructions for the device, expected outcomes, precautions, and potential side-effects.

O. The appropriateness of epidural analgesia, the environment, and the patient’s comprehension of the intended therapy should be assessed prior to initiation of therapy; whenever possible, patients should be offered the opportunity to self-manage pain by using patient-controlled epidural analgesia (PCEA).

P. The clinician should have knowledge of analgesic pharmacokinetics and equianalgesic dosing, contraindications, side-effects, appropriate administration modalities, and anticipated outcome, and should document this information in the patient’s clinical notes.

Q. Patients having epidural analgesia should have deep vein thrombosis (DVT) prophylaxis adjusted, as appropriate, to minimise the risk of epidural haematoma.

R. Patients who have had orthopaedic or vascular surgery should be observed in order to detect the development of compartment syndromes.

S. Epidural analgesia therapy, together with any complications, should be documented in the patient’s record together with observations of the patency of the VAD and integrity of pressure areas.

References:

Intraosseous access

Standard
1. Intraosseous (IO) access should be initiated upon the order of a medical practitioner with the experience, knowledge, and skills to undertake this procedure in accordance with professional body regulations.
2. Indications and protocols for use of intraosseous access should be set out in organisational policies, procedures, and/or practice guidelines.
3. The clinician shall be competent in the care of a patient with IO access.

Practice criteria
A. In situations of adult or paediatric cardiac arrest, the IO route should be used if vascular access is not available or cannot be quickly obtained. (IV)
B. IO access and infusion of medicines or fluids via the IO route should be initiated for emergency or short-term treatment when access by the vascular route cannot be achieved and the patient’s condition is considered life threatening (infants and children). (IV)

C. The site most often used for IO access in both adults and children is the proximal tibia; other sites for adults include the proximal humerus, sternum, distal femur, humeral head, radius, ulna, pelvis, and clavicle; in children, distal tibia or distal femur are also used. (V)

D. The responsibility of the clinician caring for a patient with an IO access device includes, but is not limited to, knowledge of anatomy and physiology; IO device placement and removal; care and maintenance practices; potential complications; and patient/family/whanau/caregiver education. (V)

E. IO access should be avoided in the following sites: previously used IO sites or where IO has been previously attempted; fractures at or above the site where previous surgery has been performed on the bone; presence of infection at the insertion site; and local vascular compromise. Bone diseases such as osteogenesis imperfecta, osteopetrosis, and severe osteoporosis may be a contraindication depending on the device. (V)

F. Pain management during insertion and infusion should be considered especially in the conscious patient. Lignocaine is recommended prior to insertion (subcutaneously at the intended site) and into the IO space prior to initiation. (V)

G. Prior to infusion, access device placement should be confirmed by aspiration of bone marrow followed immediately by a flush of preservative-free 0.9% sodium chloride solution for injection using a separate syringe. (V)

H. IO access device placement is a temporary, emergency procedure and the device should be removed within 24 hours. Assessment should be made for a replacement vascular access device (VAD). (V)

I. Complications associated with IO access are relatively rare but include extravasation from dislodgement, iatrogenic fracture, growth plate injury, infection, fat emboli, compartment syndrome, and osteomyelitis. Infectious complications are more likely to occur with prolonged infusion or if bacteraemia is present during the time of insertion. (V)

J. The IO access device should be secured with a sterile dressing after placement to prevent migration and extravasation into the subcutaneous tissues. (V)

References:


Subcutaneous injection/infusion

Standard

1. Administration of continuous subcutaneous infusion of medicine or hydration fluids shall be initiated in accordance with a valid prescription and organisational policies, procedures, and/or practice guidelines.

2. The use of continuous subcutaneous infusion access shall be established in organisational policies, procedures, and/or practice guidelines.

3. The clinician shall be competent in the care of a patient requiring continuous subcutaneous infusion therapy.

4. The clinician shall assess the patient for appropriateness of the subcutaneous route in relation to the prescribed medicine or fluid and to the patient’s clinical condition and presence of adequate subcutaneous tissue.

Practice criteria

A. Isotonic dextrose or 0.9% sodium chloride fluid may be administered as a continuous infusion via a subcutaneous access device (hypodermoclysis) for the treatment of mild to moderate dehydration. (II)

B. The most common types of medicines used in continuous infusion via a subcutaneous device are opioids for pain management. (III)

C. The responsibility of the clinician caring for the patient requiring continuous subcutaneous infusion therapy includes, but is not limited to, knowledge of anatomy and physiology; care and maintenance practices; potential complication; and patient caregiver education. (V)

D. Site selection for subcutaneous access should include areas with intact skin such as the upper arm, subclavicular chest wall, abdomen, upper back, and thighs. (III)

E. A small gauge (25-27 gauge) subcutaneous infusion device should be used to establish subcutaneous access. (III)

F. Nonmetal subcutaneous access devices are preferable to metal devices; advantages include...
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extended dwell time and decreased risk for healthcare provider needlestick injury. (IV)

G. The subcutaneous infusion access device should be aspirated to ascertain the absence of blood prior to medicine and fluid administration. (V)

H. Hyaluronidase may be considered to enhance absorption and diffusion of the medicine or solution.

I. The optimal subcutaneous infusion rate is unknown. Medicine infusion rates of 3-5mL per hour are reported, and hydration infusion rates of up to 1500mL over 24 hours are reported. More than 1 infusion site may be used to accomplish a larger infusion volume. (IV)

J. Medicines infused via a subcutaneous access device should be administered using an electronic infusion device; syringe pumps are used most often for subcutaneous immunoglobulin infusions. (V)

K. A standard administration set should be used for the administration of fluids and solutions (hypodermoclysis) which must be gravity fed, not pumped.

L. The subcutaneous access site used for medicine administration should be rotated every 2-7 days and as clinically indicated based on the integrity of the access site. (IV)

M. The subcutaneous access site used for hydration fluids should be rotated every 24-48 hours or after 1.5-2 litres of infused fluid and as clinically indicated. (II)

N. A sterile transparent semipermeable membrane (TSM) dressing should be applied over the subcutaneous access site and changed with each subcutaneous site rotation, and immediately if the integrity of the dressing is compromised. (V)

O. Subcutaneous sites should be assessed for and rotated when there is erythema, swelling, leaking, bruising, burning, or pain. (II)

P. Documentation in the patient’s clinical records should include evaluation of the need for subcutaneous infusion, patient response to therapy, and the established intervals of monitoring the infusion site.

References:

Infusion Therapies

Parenteral medicine and solution administration

**Standard**

1. The administration of parenteral medicines and solutions should be initiated upon the order of a medical practitioner or authorised prescriber or as part of a standing order, and in accordance with organisational policies and procedures, and/or practice guidelines.
2. The clinician shall be competent in the administration of parenteral medicines and solutions.
3. Prior to the initiation of therapy, a Keep Vein Open (KVO) order shall contain a specific infusion rate.

**Practice criteria**

A. The clinician should review the prescription for appropriateness for the patient’s age and condition, access device, dose, route of administration and follow the rights of medicine administration.
B. The clinician administering medicines and solutions should have knowledge of indications for therapy, side-effects and potential adverse reaction, and appropriate interventions, particularly related to the management of anaphylaxis.
C. A list of approved parenteral medicines and solutions for each type of administration method and route (e.g. continuous, intermittent, or push/direct injections; intravenous, intra-arterial, subcutaneous, hypodermoclysis, intraspinal, intraosseous, intrathecal) should be established in organisational policies, procedures, and/or practice guidelines. (V)
D. The clinician administering parenteral medicines and solutions should have knowledge of indications for therapy, side-effects, potential adverse reactions, and appropriate interventions. (V)
E. The clinician should inspect solutions and medicines for appropriate labelling, integrity (no leakage, discolouration, or open packaging), accuracy (right medicine or solution and right dose), sterility (within the expiry date), and in the home care setting, verify storage/refrigeration. (V)
F. The clinician should reduce the manipulation of all the components of the entire infusion system (e.g. administration set junctions, catheter hub) to as few as needed to deliver the infusion therapy. (V)

G. The clinician should administer solutions and medicines prepared and dispensed from the pharmacy or as commercially prepared solutions and medicines whenever feasible. Medicines admixed outside of the pharmacy, pharmacy-labelled solutions, and medicines labelled for emergency use should be administered within 1 hour of preparation. Multidose vials should only be used once. Filter needles or filter straws should be used when withdrawing medicines from glass ampoules. (IV)
H. The clinician should trace the administration set from the patient to the point of origin before making connections, and on admission or transfer of a patient to a new setting. (V)
I. The clinician should advocate for the use of engineering controls, protocols, and technology that is intended and has been shown to reduce medicine errors including, but not limited to, electronic order entry, smart pumps with medicine libraries, bar coding, procedures for distraction-free medicine administration, establishment of protocols for high-risk intravenous medicines, and standardised medicine concentrations or standard order sets. (V)
J. The clinician should exercise particular care when administering solutions and medicines to paediatric and neonatal patients, as medicine errors are significantly higher in incidence for these patients. The use of standardised medicine concentrations is strongly recommended for this population. (IV)
K. The clinician should be accountable for evaluating and monitoring the effectiveness of prescribed therapy; documenting patient response, adverse events, and interventions; and achieving effective delivery of the prescribed therapy. (V)
L. Documentation of administration of intravenous solutions and medicines should include date; medicine name/concentration; time administered/started; time discontinued/stopped; route of administration; VAD used; presence of blood return; patient’s response and tolerance, including any signs and symptoms of adverse reaction; patient/caregiver instructions post-administration; and name and title of the clinician administering the medicine in the clinical records. (V)
M. Discontinuation of therapy may occur when the clinician assesses that intervention is necessary (e.g. in the event of an adverse reactions, complication such as phlebitis or infiltration, suspected VAD malposition, or loss of VAD patency). The medical practitioner or
prescriber should be notified of the assessment and intervention immediately. (V)

N. Discontinuation of therapy, including amount infused, time, date, condition of the site, integrity of the catheter if removed, and reason for discontinuation, should be documented in the patient’s permanent clinical record. (V)

O. The clinician should provide instruction to the patient and caregiver about observations and care of the infusion and catheter site and potential post-infusion complications, such as post-infusion phlebitis or infiltration, and document such instructions in the patient’s permanent clinical record. (V)

References:

Oncology and chemotherapy

Standard
1. Administration of cytotoxic agents shall be initiated upon the prescription of an appropriately qualified medical practitioner, in accordance with the organisational policies, procedures, and/or practice guidelines.
2. The clinician administering cytotoxic agents shall be competent and have knowledge of protocols for prescribed therapies.
3. The clinician shall administer cytotoxic agents delineated by written orders only, including new orders or changes to existing orders. Verbal orders are acceptable only if cytotoxic agents are to be placed on hold or stopped.
4. Clinical management of potential adverse events, including treatment and management of anaphylactic and anaphylactoid reactions, shall be addressed in organisational policies, procedures, and/or practice guidelines.

Practice criteria
A. The patient and/or caregiver should be informed of all aspects of chemotherapy including the physical and psychological effects, side and adverse effects, risks, and benefits. (V)
B. Prior to administration of chemotherapeutic agents, laboratory data should be reviewed and the patient assessed in collaboration with the healthcare team.
C. Validation by 2 registered nurses prior to administration of chemotherapeutic agents should include body surface area (BSA) and weight if applicable, medicine, dose concentration, rate, route of infusion, and confirmation of the calculation for dosing to reduce the risk of adverse outcomes and medicine errors. (V)
D. The clinician should participate in monitoring cumulative chemotherapy dose to ensure that the medicine is discontinued if the maximum lifetime dose is reached. (V)
E. The clinician should use electronic infusion devices (EIDs) for specific types of chemotherapeutic administration and for all continuous administrations. (V)
F. When administering a vesicant medicine:
   i. A low pressure flow control infusion device should be the instrument of choice.
   ii. Prior to administration, a positive blood return should be confirmed and documented.
   iii. A new access site should be initiated prior to any peripheral vesicant administration and documented.
   iv. Peripheral access devices should not be used for continuous infusion of vesicants. (V)
G. Scalp veins should not be used for administration of vesicant therapy in the neonate and paediatric patient. (V)
H. Medicine administration sets should be attached and primed prior to the addition of the chemotherapeutic agent. The administration set should be primed with non-medicine-containing fluid. (V)
I. Clinicians planning for a family or who are pregnant should be advised of the potential risks associated with handling chemotherapeutic agents and should be given the opportunity to refrain from preparing or administering these agents. (V)
J. Safe handling of chemotherapeutic agents should include access to personal protective equipment, material safety data sheets, spill kits, containment bags, and disposal containers in all areas where hazardous medicines are handled. (V)
Parenteral nutrition

Standard

1. The administration of parenteral nutrition shall be initiated upon the order of a medical practitioner or an authorised prescriber in accordance to organisational policies, procedures, and/or practice guidelines.
2. The clinician shall be competent in the administration and monitoring of patients receiving parenteral nutrition.
3. Non-fat-emulsion-containing parenteral nutrition solutions shall be filtered using a 0.2 micron filter, and fat emulsion-containing parenteral nutrition solutions shall be filtered using a 1.2 micron filter.
4. Parenteral nutrition containing glucose and amino acids alone, using a 0.2 micron in-line filter, shall have a hang time for up to 96 hours.
5. Parenteral nutrition containing glucose and amino acids with fat emulsion added as a 3-in-1 formulation shall have a hang time not to exceed 24 hours. Fat emulsions alone/containing vitamins (but not in the same bag as the amino acid/glucose mix) shall have a hang time not to exceed 24 hours.
6. Parenteral nutrition shall be administered using an electronic infusion device (EID) with anti-free-flow control.
7. Parenteral nutrition shall be prepared, using a sterile technique in an appropriately graded laminar flow unit.
8. Medicines shall only be added to the parenteral nutrition solution as an exception and should be performed by a pharmacist experienced in compounding such solutions.

Practice criteria

A. The clinician shall collaborate with the patient and/or caregiver, medical practitioner, pharmacist and dietician on the development and implementation of a nutrition care plan. The clinician should recommend that the enteral route of feeding be used when feasible, especially in the critically ill adult or child. (II)
B. Parenteral nutritional solutions containing final concentrations exceeding 10% dextrose should be administered through a central venous access device (CVAD) with the tip located in the central vasculature, preferably the superior vena cava-right atrium junction for adults. (III)
C. Parenteral nutrition solutions with a final concentration of 10% dextrose or lower administered via a short peripheral or midline catheter should be reserved for situations in which a CVAD is not currently feasible and delay in feeding would be detrimental to the patient. The solution’s osmolality should not exceed 600mOsm. Clinical trials demonstrate that peripheral parenteral nutrition causes phlebitis. The literature also show that the frequency and severity of phlebitis can be mitigated by the addition of heparin and steroids to the parenteral nutrition, coadministration with fat emulsion, cyclical infusion, keeping the osmolality of the parenteral nutrition solution less than 600mOsm, frequent catheter site changes (every 24-48 hours), and limiting the duration of peripheral nutrition use. The risk/benefit decision to use peripheral parenteral nutrition should include as many phlebitis-mitigating techniques as possible. The conservative approach of a maximum of 600mOsm final concentration is recommended for peripheral parenteral nutrition as that recommendation appears to be the limit of tolerance not requiring mitigation for most patients. (V)
D. Parenteral nutrition solutions in final concentrations of 10% dextrose or lower and/or 5% protein (nitrogen) or lower should not be administered peripherally for longer than 7-10 days unless concurrent supplementation with oral or enteral feeding is provided to ensure adequate nutrition.
E. The nursing assessment of patients who are receiving long-term parenteral nutrition should include both physiological and psychological aspects of response to therapy. (IV)
F. Parenteral nutrition solutions should be removed from refrigeration 30 minutes to 1

References:

Infusion Therapies
hour prior to infusion in order to reach approximate room temperature.

G. Parenteral nutrition solutions must be compounded in the pharmacy using sterile technique under a horizontal laminar flow unit in compliance with pharmacy service standard.

H. Medicines added to parenteral nutrition solutions prior to administration of the solution should be assessed for compatibility under the direction of a suitably skilled and validated pharmacist and the Pharmacy Service Standard.

I. Medicines added to parenteral nutrition should be documented on the label that is affixed to the infusate container in compliance with pharmacy service standard. (V)

J. The clinician’s monitoring of the patient receiving parenteral nutrition should include, but not be limited to, body weight; fluid and electrolyte balance; metabolic tolerance, especially glucose control; organ function; nutrition therapy-related complications; functional performance; and psychological responses. The clinician should educate the home patient or caregiver about signs and symptoms of metabolic intolerance, infection, and access device complications to report to the healthcare team.

K. Documentation in the patient’s permanent clinical record should include, but is not limited to, type of access device, parenteral nutrition formulation, additives, volume, rate, patient assessment, and response to therapy. (V)

References:

Transfusion therapy

Standard
1. The administration of transfusion therapy should be initiated upon a prescription by a medical practitioner in accordance with the rules and regulations promulgated by NZBS standards, relevant professional regulatory council, and organisational policies and procedures and/or practice guidelines.
2. The decision to transfuse should be based on the NZBS guidelines.
3. The clinician should be competent in blood component and product administration, identification of transfusion reactions, and/or complications associated with transfusion therapy and implementation of appropriate interventions.
4. Validation of correct patient identification, appropriateness of therapy and administration setting, blood and/or blood component compatibility, and expiry date of the blood component must be verified simultaneously by two qualified clinicians prior to administration.
5. Blood components must be transfused using an in-line or add-on filter (170-200 micron) appropriate to the prescribed therapy.
6. Informed consent of the patient or a responsible person legally authorised to act on the patient’s behalf before administering any transfusion therapy is a requirement of the Patients Code of Rights (Health & Disability Commissioner, 1997). This requires that patients be provided with information and an explanation of the purpose for which blood products are being prescribed and that they consent to transfusion.
7. Temperature, pulse, respirations, blood pressure, and oxygen saturation must be measured and recorded before the start of each unit of blood/blood component, 15 minutes after the start of each unit of blood/blood component and when the transfusion is completed. The patient must be monitored for the first 15 minutes after initiation of transfusion and at established intervals as determined by organisational policy.

Practice criteria
A. The clinician administering blood components should have knowledge and understanding immunohaematology; blood grouping; blood and its components; administration equipment, including vascular access devices (VADs) and filters; techniques appropriate for each component; transfusion reactions, and clinician interventions; and associated risks of transfusion therapy.
B. The clinician should administer blood components using an in-line or add-on filter that will remove particles of 170-200 microns and above. The use of additional in-line blood filters is not indicated for the majority of transfusions. Where small volumes are drawn into a syringe for infants, a 170-200 micron filter must be used. All blood components are leucocyte-depleted within 48 hours of collection in New Zealand to minimise the theoretical risk of transmission of new variant Creutzfeldt-Jakob disease. Bedside
leucocyte depletion filters are no longer used and may be detrimental.

C. Administration sets should be primed only with 0.9% sodium chloride for injection. No other solution or medicine should be added to blood components or products. Dextrose or lactated Ringer’s solution can cause haemolysis or clotting and must not be mixed with blood components.

D. Single units of red blood cells should be administered and completed within a 4 hour time period of removal from the blood fridge or hospital transfusion laboratory. Platelets should be administered over 30-60 minutes.

E. The clinician should initiate the administration of blood components within 30 minutes from the time of release from transfusion service or blood bank or its removal from a controlled environment.

F. Prior to transfusion therapy, the clinician should perform a patient assessment to identify and verify current status and appropriateness of the indwelling VAD, and/or select and initiate a peripheral VAD, and/or collaborate with the healthcare team for placement of a central venous access device (CVAD).

G. Blood components may be transfused via a 14-24 gauge short peripheral catheter. Transfusion for neonate or paediatric patients is usually given using a 22-24 gauge peripheral VAD.

H. Blood components may be transfused via a CVAD as small as 1.9 French. Umbilical venous catheters or small saphenous vein catheters are commonly used for infants and/or paediatric patients. The clinician should be aware that catheter length will decrease the rate of infusion. (IV)

I. Electronic infusion devices (EIDs) may be used for blood components providing they have been verified as safe to use for this purpose according to the manufacturer’s instructions.

J. Blood warmers should be used for large volumes transfused rapidly, exchange transfusions, and patients with clinically significant conditions. If warming is clinically indicated use only an appropriate and approved system. Blood must not be warmed above 41°C.

K. External compression devices are not recommended, if used, they should be equipped with a pressure gauge and must exert uniform pressure against all parts of the blood container. A blood pressure cuff should not be used as it is unable to apply uniform pressure. (V)

L. Further observations are indicated if the patient becomes unwell or shows signs of a transfusion reaction (conscious patient). If the patient is unconscious, their pulse and temperature should be checked at intervals during the transfusion. Transfusions should only be administered in clinical areas where patients can be readily observed by clinical staff.

M. Document the start and finish times of each unit of blood. Record the volume of blood transfused on the patients fluid balance chart or 24 hour chart.

N. Transfusion reactions require immediate nursing and/or medical intervention. If a transfusion reaction is suspected stop the transfusion immediately and inform a medical practitioner. If the reaction appears life-threatening, call the resuscitation team. Record the adverse event in the patient record. Report the adverse event in accordance with local hospital policy and national reporting procedure. The blood and the administration set should be retained for analysis by the blood transfusion laboratory.

O. Serious events or adverse reactions must be discussed with the NZBS Transfusion Medicine Specialist or clinical haematologist for advice and further management of the patient, laboratory investigations and future transfusion requirements.

P. In the event of an adverse reaction, clinical staff must report this to the blood bank as soon as possible, who will implement the NZBS Notification and Investigation of Adverse Transfusion Reaction process.

Q. Change the administration set at least every 12 hours for a continuing transfusion and on completion of the transfusion.

R. Patient information is essential to ensure informed consent. Information sheets that outline the risks and benefits of blood transfusion can be helpful to patients. NZBS have printed patient information regarding blood transfusions, these are available at all hospital blood banks.

References:
Patient-controlled analgesia

Standard
1. The administration of patient-controlled analgesia (PCA) should usually be initiated upon the order of a medical practitioner or authorised prescriber in accordance with organisational policies, procedures, and/or practice guidelines.
2. The clinician shall be competent in the care of patients receiving PCA. The clinician shall have knowledge of the appropriate medicines used with PCA, including pharmaco-kinetiks and equi-analgesic dosing, contraindications, side-effects and their management, appropriate administration modalities, and anticipated outcomes.
3. The patient and/or caregiver shall be educated in the use of PCA. The patient’s and/or caregiver’s comprehension and ability to comply with procedures shall be evaluated and documented prior to, and on initiation of, therapy.
4. The use of infusion devices for PCA shall adhere to manufacturers’ directions for use. Dose-error reduction infusion systems shall be considered when available.

Practice criteria
A. The clinician should assess the patient for the appropriateness of PCA therapy and the patient’s comprehension of, and the ability to participate in, the intended therapy. (V)
B. If the patient is unable to actively participate in PCA, the clinician should assess the patient for appropriate analgesia.
C. The clinician should advocate for the use of standardised medicines concentrations and standardised preprinted order sets for PCA.
D. Patient risk factors should be indentified and appropriate monitoring implemented to prevent respiratory depression and other adverse events. Risk factors include, but are not limited to, elderly patients, morbid obesity, obstructive sleep apnoea, chronic obstructive pulmonary disease, and renal insufficiency. The use of pulse oximetry and/or capnography should be considered when monitoring for respiratory depression. (IV)
E. A double check by another clinician using independent verification should be considered prior to initiation of the PCA, and when the syringe, solution container, medicine, or rate is changed. Special attention should be given to medicine, concentration, dose, and rate of infusion according to the order and as programmed into the electronic infusion device (EID), in order to reduce the risk of adverse outcomes and medicine errors. (V)
F. Patient and/or caregiver education should be appropriate to the duration of therapy (short- or long-term) and care setting, including the purpose of the PCA therapy, operating instructions for the EID, expected outcomes, precautions, potential side-effects, and contact information for support services. (V)
G. Nursing interventions should include evaluating the effectiveness of PCA therapy, using valid and reliable monitoring and assessment methods or scales and documentation tools:
   i. Regular assessment and reassessment of patient self-report of pain using a consistent pain assessment scale appropriate to the patient;
   ii. Monitoring for potential adverse effects including, but not limited to, sedation and respiratory depression;
   iii. Regular evaluation of PCA injections and attempts;
   iv. Considering the need for change in treatment methods, as necessary.
H. The clinician should partipate in selection and evaluation of PCA EIDs to promote patient safety, which may include dose-error reduction systems and barcoding technology. (V)

References:
Intravenous sedation/analgesia

Standard
1. Intravenous sedation/analgesia (IVCS/A) must be administered as prescribed and in accordance with individual organisations’ policies and procedures and/or standing orders and must be provided in a controlled setting, with appropriate monitoring and resuscitation equipment available.
2. Informed consent of the patient, or a representative legally authorised to act on the patient’s behalf, including the risks of IVCS/A, must be obtained prior to the procedure and documented in the patient’s clinical records.

Practice criteria
A. The clinician should be knowledgeable about the medicines and reversal agents for unconscious sedation/analgesia, as well as competent in airway management and resuscitation through age-appropriate cardiac life support validation.
B. The practitioner managing the patient receiving IVCS should be educated and competent in the principles of IVCS and the administration of the therapy. The organisation providing the service should have an education and competency verification system in place.
C. The patient receiving IVCS should be continuously monitored and vascular access should be maintained throughout the procedure; the practitioner should have knowledge of the sedation rating scales which can be used to assess the patient.
D. The practitioner managing the patient receiving IVCS should not leave the patient unattended or compromise continuous monitoring by participating in other duties.

References:

Blood sampling and phlebotomy

Standard
1. Blood sampling and phlebotomy via vascular access devices (VADs) must be performed upon an order for laboratory tests by a medical practitioner and/or clinician according to established organisational policies, procedures, and/or practice guidelines.
2. Therapeutic phlebotomy must be performed upon an order of a medical practitioner in accordance with organisational policies, procedures, and/or practice guidelines.
3. The clinician shall be competent in performing phlebotomy procedures.
4. The blood sample must be identified at the time of collections at the patient’s bedside or ambulatory setting and clearly labelled with patient identifiers.
5. Pre-transfusion blood specimens require patient details to be handwritten. No pre-printed labels are accepted.
6. All hazardous waste including discarded blood from VAD sampling and therapeutic phlebotomy must be disposed of in an acceptable biohazard container.

Practice criteria
Phlebotomy via direct venepuncture
A. The clinician should assess the patient for anxiety, understanding of the purpose of venepuncture for blood testing, and any history of vasovagal reactions with venepuncture. The clinician should provide education and reassurance as required and be prepared to manage a vasovagal reaction in patients at risk (NZBS, 2008).
B. Venepuncture for the purpose of phlebotomy should be drawn from the opposite extremity of an infusion. Should venepuncture be required on the extremity with a VAD infusion, it should be performed in a vein below the device or infusion.
C. Venepuncture should be avoided on the side of breast surgery with axillary node dissection, after radiation therapy to that side, or with lymphoedema; the affected extremity from a cerebrovascular accident; or the extremity with an actual planned fistula access.
D. The clinician should select an appropriate vein for phlebotomy; the most common veins include the median cubital, the cephalic, and the basilic veins in the antecubital area. Skin-puncture blood collecting methods (e.g. heel/finger stick) may be used with infants or adults/children with
difficult venous access and with point-of-care testing methods; venepuncture was found to be less painful than heel punctures in term neonates (INS, 2011).

E. The clinician should be knowledgeable about technical factors involved in blood specimen collection such as the need for patient fasting prior to collection, minimal tourniquet time to avoid haemoconcentration or haemolysis, use of appropriate blood collection tubes in the correct order of draw, and timeliness of dispatch to the laboratory in an accepted biohazard container.

F. Only the volume of blood needed for accurate testing should be obtained; phlebotomy contributes to iron deficiency and blood loss in neonates and critically ill patients. Efforts to conserve blood should be considered; these may include use of low-volume blood collection tubes; recording the volume of blood obtained for laboratory testing; avoidance of routine testing; use of point of care testing methods; and consolidation of all daily tests with 1 draw.

G. Pressure should be applied with a sterile dressing following venepuncture and maintained until bleeding stops.

**Blood sampling via vascular access devices**

A. Blood sampling for laboratory testing from a central vascular access device (CVAD) should be considered based on evaluation of benefits versus risks. Benefits include avoidance of anxiety, discomfort, and dissatisfaction associated with venepuncture in patients who require frequent blood tests and/or those with difficult access. Risks include increased incidence for occlusion and catheter-related bloodstream infection (CR-BSI) due to increased hub manipulation and potential for inaccurate laboratory results.

B. Sampling of blood through short peripheral catheters has been found to be reliable for many routine blood tests, including coagulation studies, and may be considered for paediatric patients, those who require multiple laboratory tests including patients with risk of bleeding, and/or those who have difficult vascular access.

C. Caution should be exercised when interpreting medicine levels with a CVAD-obtained blood sample. When questionable results are obtained (e.g. unexpected high levels that would necessitate a medicine dose change) the clinician should collaborate with a medical practitioner in retesting via direct venepuncture. Some studies have shown elevated medicine levels with blood sampling from CVADs; factors negatively influencing accuracy include sampling from implanted ports, silicone catheters, and from the same catheter lumen used for medicine infusion.

D. Caution should be exercised when interpreting coagulation values with a blood sample obtained from a heparinised CVAD. Current literature does not support blood sampling for coagulation levels via heparinised arterial catheters. (Nor does it support the use of heparin for flushing arterial lines.) With haemodialysis catheters, accurate coagulation levels were obtained using the arterial port of the catheter. When questionable results are obtained (e.g. unexpected high level that would necessitate a medicine dosage change) the clinician should collaborate with the medical practitioner in retesting via direct venepuncture.

E. The clinician should be knowledgeable about technical factors involved in blood specimen collections such as changing needleless connectors, use of appropriate blood collection tubes in the correct sequence, and timeliness of dispatch to the laboratory.

F. When using a large syringe (larger than 10ml) or a vacuum system to obtain blood samples from a cannula this may increase haemolysis of the sample. Consideration should be given to the use of a smaller syringe to obtain samples.

G. The reinfusion method following blood sampling should not be used due to risk of contamination and blood clot formation, as this method includes reinfusion of the discarded specimen following blood withdrawal.

H. Prior to blood sampling from a VAD, infusions should be stopped and the VAD flushed with 0.9% sodium chloride solution for injection. The largest lumen should be used for blood sampling with multilumen CVADs. For CVADs with staggered lumen exit site, the sample should be drawn from the one highest in the superior vena cava; for medicine levels, the sample should be preferentially drawn from the catheter lumen not being used for the medicine infusion.

I. Only the volume of blood required for accurate testing should be obtained; phlebotomy contributes to iron deficiency and blood loss in critically ill patients and neonates, so efforts to conserve blood should be considered. These may include use of low volume blood collection tubes, recording the volume of blood obtained for laboratory testing, and avoidance of routine testing, use of point-of-care testing methods, consolidation of all daily tests with 1 draw, and consideration of the use of the mixing method for blood sampling from CVADs.
Therapeutic phlebotomy

A. Orders for therapeutic phlebotomy should include frequency of phlebotomy and amount of blood to be withdrawn; orders for fluid replacement may also be included and, if ordered, should include the type of fluid, amount, and rate of infusion.

B. Patient education should address potential side-effects such as syncope and nausea/vomiting, need for increased fluid intake post procedure unless contraindicated, and when to resume normal activities. (V)

C. Use of a short peripheral catheter for therapeutic phlebotomy is preferred. Adequate blood flow is based upon size of the vein and catheter size; 18-20 gauge catheters are acceptable and cause less insertion pain and less bleeding after catheter removal. To ensure the best results and reduce the risk of trauma to the vein, the catheter should be placed immediately before phlebotomy and removed upon completion. (V)

D. The use of CVADs is not recommended for therapeutic phlebotomy due to risk of thrombotic occlusion or catheter damage. In patients who require multiple phlebotomies, an apheresis catheter may be placed for this purpose.

E. Blood collection receptacles may include collection bags used for volunteer blood donation or bags specifically designated for therapeutic phlebotomy; use of vacuum containers to facilitate blood flow is controversial due to risk of air embolism and vein collapse.

F. After completion of the phlebotomy, homeostasis should be maintained at the venepuncture site after removal of a peripheral catheter, and the patient should remain in a reclining position for several minutes.

G. Documentation should include total volume of blood withdrawn, patient response to the procedure, and patient education.

References:


Glossary

Add-on device. An additional component such as an in-line filter, stopcock, y-site, or needleless connector that is added to the administration set or vascular access device.

Administration set. A device used to administer fluids from a container to a vascular access device.

Admixing. The preparation or compounding of medicines.

Adverse event. Any unintended or untoward event that occurs with a patient receiving medical treatment; can be related to medicines, products, equipment, and procedures.

Air embolism. Presence of air in the vascular system. Venous air embolism may occur during insertion, use or maintenance of a central venous catheter, and after catheter disconnection and removal. Symptoms of air embolism include: shortness of breath, altered consciousness, visual disturbance, hemiparesis, chest pain, and a low cardiac output state.

Allen Test. A test performed on a radial artery prior to arterial puncture to ascertain adequate arterial perfusion.

Ambulatory infusion device. An electronic infusion device specifically designed to be worn on the body to promote patient mobility and independence.


Ampoule. Hermetically sealed glass medicine container which must be broken at the neck to access the medicine.

Analgesic infusion pump. An electronic microprocessing machine that can be programmed to deliver a prescribed amount of medicine via continuous infusion, at specified intervals, or on demand by activation of a button; also referred to as a PCA pump.

Anastomosis. Surgical formation of a passage between two normally distant structures, for example 2 blood vessels.

Anti-free-flow administration set. An administration set that stops when removed from the infusion device, yet allows gravity flow when the user manipulates the regulatory mechanism.

Anti-free-flow protection. Technology that prevents intravenous fluid from flowing into the patient when the administration set is removed from the flow-control device.

Anti-infective central vascular access device (CVAD). A central vascular access device that is coated or impregnated with antiseptic or antimicrobial agents.

Antimicrobial. Preventing or destroying the growth and development of micro-organisms.

Antineoplastic agent. Medicine that prevents the development, growth, or proliferation of malignant cells.

Antineoplastic therapy. In oncology practice, the term is used synonymously with cytotoxic (cell-killing) medicine therapy.

Antiseptic. An agent that inhibits the growth of, or kills, micro-organisms on the external surfaces of the body.

Antiseptic ointment. A semisolid preparation that prevents the pathogenic action of microbes.

Apheresis. Pronounced ay-fur-ee-sis, it comes from the Greek word meaning “to take away” or “to separate” It is a method of obtaining one or more blood components by machine processing of whole blood in which the residual components of the blood are returned to the donor during or at the end of the process.

Arterial pressure monitoring. Monitoring of arterial pressure through an in-dwelling arterial catheter connected to an electronic monitor.

Arteriovenous (AV) fistula. Surgical anastomosis between an artery and a vein, creating an access for haemodialysis.

Arteriovenous (AV) graft. A surgical structure connecting an artery and a vein with synthetic material to create an access for haemodialysis.

Aseptic technique. A set of specific practices and procedures performed under carefully controlled conditions to minimise contamination by pathogens.

Bacteria. Micro-organisms that may be non-pathogenic (normal flora) or pathogenic (disease-causing).

Biohazardous waste. Blood, body fluids, body parts, or materials that have come into contact with blood, body...
fluids, or body parts and have the potential to carry bloodborne pathogens.

**Biologic agent.** A medicinal preparation made from living organisms and their products, including serums, vaccines, antigens, and antitoxins.

**Blood warmer.** An electronic device that raises refrigerated blood to a desired temperature during administration.

**Body surface area.** Surface area of the body expressed in square meters. Used in calculating paediatric dosage, managing burn patients and determining radiation and chemotherapy dosage.

**Bolus.** Concentrated medicine and/or solution given rapidly over a short period of time.

**Cannula.** Hollow tube made of silastic, rubber, plastic, or metal, used for accessing the body.

**Cardiac tamponade.** The effusion of blood, air or pus into the pericardial sac, causing compression of the heart.

**Catheter.** A tube for injecting or evacuating fluids; hollow tube made of silastic, rubber, plastic, or metal, used for accessing the body.

**Catheter-associated venous thrombosis.** A secondary vein thrombosis related to the presence of a central vascular access device; includes extraluminal fibrin sheath, mural thrombosis overlying the fibrin sheath, and veno-occlusive thrombosis.

**Catheter clearance.** The process to re-establish catheter lumen patency using medicines or chemicals instilled into the lumen.

**Catheter dislodgement.** Movement of the catheter into and out of the insertion site. Causes of catheter dislodgement include inappropriate securement of the catheter, and motion of the extremity, neck, or shoulder. Catheter dislodgement may cause occlusion of the catheter and lead to a change in the catheter tip location. Signs and symptoms of catheter dislodgement include changes in the external length of the catheter, clinical signs of local catheter infection, and inability to flush or infuse via the catheter.

**Catheter dysfunction.** The inability to withdraw blood or infuse solutions via the catheter; may result from mechanical obstruction or catheter damage.

**Catheter exchange.** The replacement of an existing central vascular access device with a new central vascular access device using the same catheter tract.

**Catheter malposition.** The catheter tip is in suboptimal position.

**Catheter–related bloodstream infection (CR-BSI).** A bacteraemia or fungaemia in a patient with a vascular access device and no apparent source for the bloodstream infection other than the vascular access device. There must be at least 1 positive blood culture (obtained from a peripheral vein) in addition to clinical manifestations of infection (i.e. fever, chills, and/or hypotension).

**Catheter stabilisation device.** A device/system specifically designed and engineered to control movement at the catheter hub, thereby decreasing catheter movement within the vessel and risk of catheter malposition.

**Central Line-Associated Bloodstream Infection (CLABSI).** A primary bloodstream infection that occurs in a patient with a central vascular access device inserted within 48 hours prior to the development of the bloodstream infection.

**Central vascular access device (CVAD).** A device that permits access to the central vascular system. A catheter is inserted with the tip residing in the lower one-third of the superior vena cava; or above the level of the diaphragm in the inferior vena cava.

**Chemical incompatibility.** Change in the molecular structure or pharmacological properties of a substance that may or may not be visually observed.

**Clinician.** A health professional whose practice is based on direct observation and treatment of a patient, as distinguished from other types of health workers, such as laboratory technicians and those employed in research.

**Closed system.** Administration system with no mechanism for external entry after initial set-up and assembly.

**Closed system transfer.** The movement of sterile products from one container to another in which the container’s closure system and transfer devices remain intact through the entire transfer process. It is compromised only by the penetration of a sterile, pyrogen-free needle or cannula through a designated closure or port to affect transfer, withdrawal, or delivery.
**Colour coding.** System developed by manufacturers that identifies products and medicines by the use of a colour system. Colour code systems are not standardised. Each manufacturer uses different colour code systems.

**Compatibility.** Capability to be mixed and administered without undergoing undesirable chemical and/or physical changes or loss of therapeutic action.

**Competence.** The capability of the clinician to apply knowledge, critical thinking, interpersonal decision making, and psychomotor skills to the performance of infusion therapy; maintenance of the required knowledge, skills, and attitudes to provide safe, competent care.

**Competency.** An integration of the behaviours in the varied circumstances of the work environment demonstrating the individual’s ability to perform a job, role, specific tasks, or other patient care.

**Competency assessment.** The process of reviewing and documenting the individual’s demonstrated ability to perform a job, role, specific tasks, or other patient-care activities.

**Compound.** Form or make by combining different elements, ingredients, or parts; as to compound a medicine.

**Complex needleless connector.** A device that contains an internal mechanism that allows both the injection and aspiration of fluids; commonly referred to as a mechanical valve.

**Conscious sedation.** Minimally depressed level of consciousness, in which the patient retains the ability to maintain a patent airway independently and continuously and to respond appropriately to physical stimulation and verbal commands. The medicines, doses, and techniques used are not intended to produce loss of consciousness.

**Contamination.** Introduction or transference of pathogens or infectious material from one source to another.

**Continuing competence.** Maintenance of the required knowledge and skills to provide safe, competent care.

**Corrective action.** A defined plan to eliminate deficiencies.

**Criteria.** Relevant, measurable indicators.

**Critical or adverse incident.** An event or omission arising during clinical care and causing physical or psychological injury to a patient.

**Cross-contamination.** Movement of pathogens from one source to another.

**Curative.** Having healing or remedial properties.

**Cutdown.** Surgical procedure for locating a vein or artery.

**D**

**Delivery system.** Product that allows for the administration of medicine. The system can be integral or can have component parts and includes all products used in the administration, from the solution container to the catheter.

**Disclosure.** The process of revealing to the patient and family all the facts necessary to ensure an understanding of what occurred when a patient experiences a significant complication from a medical error or mistake; information that is necessary for the patient’s well-being or relevant to future treatment.

**Disinfectant.** Agent that eliminates all micro-organisms except spores.

**Distal.** Farthest from the centre or midline of the body or trunk, or farthest from the point of attachment; the opposite of proximal.

**Distention.** An increase in size because of pressure from within; stretching or inflation.

**Document.** Written or printed record containing original, official or legal information.

**Documentation.** The act of recording information on a written, printed, or electronic form, containing original, official, or legal information.

**Dome.** Plastic component used in haemodynamic monitoring.

**Dose error reduction system.** Electronic flow-control devices manufactured with medicine libraries containing medicine name and soft and hard infusion limits, designed to prevent errors in solution and medicine delivery; often called “smart pumps”.

**Durable medical equipment.** Equipment that may be considered property or capital equipment; it is reusable and cleaned between patient use; examples include
intravenous poles, flow-control devices, and ultrasound machines.

**Dwell time.** The suggested length of time a vascular access device may remain in place.

**E**

**Electronic infusion device (EID).** A programmable device powered by electricity or battery used to regulate infusion rate and volume.

**Embolus.** Mass of clotted blood or other material, such as catheter fragments or air, brought by the blood from one vessel and forced into a smaller one, obstructing circulation.

**Epidemiology.** Study of the distribution and determinants of health-related states and events in populations; defines and explains the relationship between host, agent, and environment.

**Epidural space.** Space superior to the dura mater of the brain and the spinal cord and inferior to the ligamentum flavum.

**Epithelialised.** The healing of a wound or catheter site by the process of epithelial cell growth.

**Erythema.** Redness of skin along vein track that results from vascular irritation or capillary congestion in response to irritation; may be a precursor to phlebitis.

**Exit site infection.** An erythema or induration within 2cm of the catheter exit site without evidence of a bloodstream infection or purulent drainage.

**Expiration date.** The date beyond which a manufacturer has designated a product not to be used.

**Extravasation.** Inadvertent infiltration of vesicant solution or medicine into surrounding tissue.

**Extrinsic contamination.** Contamination that occurs after the manufacturing process of a product.

**F**

**Fat emulsion (lipid emulsion).** Combination of liquid, lipid and an emulsifying system suitable for intravenous use.

**Filter.** Special porous device integrated or added to an administration set to prevent the passage of air or other undesired substances into the vascular system.

**Flow control device.** A manual, mechanical, or electronic infusion device used to regulate flow rate.

**Fluid overload.** A fluid and electrolyte imbalance caused by the volume of fluid infusion into a patient.

**Fluid warmer.** An electronic device that raises parenteral fluids to a desired temperature during administration.

**Flushing.** The act of moving fluids, medicine, blood, blood products, and nutrients out of the vascular access device into the bloodstream, ensuring delivery of those components and verifying device patency.

**Free flow.** Non-regulated, inadvertent administration of fluid.

**G**

**Grade.** Degree of standing or value.

**H**

**Haemodynamic pressure monitoring.** General term for determining the functional status of the cardiovascular system as it responds to acute stress such as myocardial infarction and cardiogenic or septic shock. A pulmonary artery catheter is used to directly measure intracardiac pressure changes, cardiac output, blood pressure, and heart rate.

**Haemolysis.** Destruction of the membrane of the red blood cells resulting in the liberation of haemoglobin, which diffuses into the surrounding fluid.

**Haemostasis.** Arrest of bleeding or of circulation.

**Haemothorax.** The presence of blood in the pleural space.

**Healthcare-associated infection (HAI).** An infection that is not present when a patient is admitted into the healthcare system.

**Heparin-induced thrombocytopenia (HIT).** A potentially life- and limb- threatening immunologic reaction caused by platelet activation resulting in a hypercoagulable state with a strong association to vascular and arterial thrombosis as a result of heparin exposure.

**Hypertonic.** Solution of higher osmotic concentration than that of an isotonic solution; having a concentration greater than the normal tonicity of plasma.
Hypodermoclysis. The subcutaneous administration of isotonic fluids for the treatment or prevention of dehydration.

Hypotonic. Solution of lower osmotic concentration than that of an isotonic solution; having a concentration less than the normal tonicity of plasma.

Immunocompromised. Having an immune system with reduced capability to react to pathogens or tissue damage.

Immunohaematology. The study of blood and blood reactions with respect to the immune system.

Immunologic Transfusion Reaction. Untoward effects of a blood transfusion that are not unexpected and in many cases are benign.

Implanted port. A catheter surgically placed into a vessel, body cavity, or organ and attached to a reservoir located under the skin.

Implanted pump. A catheter surgically placed into a vessel, body cavity, or organ and attached to a reservoir located under the skin that contains a pumping mechanism for medicine administration.

Incompatible. Incapable of being mixed or used simultaneously without undergoing chemical or physical changes or producing undesirable effects.


Infiltration. Inadvertent administration of a nonvesicant solution or medicine into surrounding tissue.

Infusate. Parenteral solution administered into the vascular or nonvascular systems.

Infusate-related bloodstream infection. An infection caused by intrinsic or extrinsic contamination of the administration delivery system, infusing fluids, and/or medications.

Infusion-related hypersensitivity reactions. Any sign or symptom experienced by the patient during the infusion of a pharmacologic or biologic agent that results in an immediate hypersensitivity reaction and anaphylactic or anaphylactoid response.

INR (International Normalisation Ratio). A system established by the World Health Organisation for reporting the results of blood coagulation tests.

Intermittent infusion. The administration of intravenous medicines or solutions at prescribed intervals.

Intradermal. Within or between the layers of skin.

Intraosseous (IO). The intraosseous route is an alternative for intravenous access in the critically ill or injured patient. This route is used for emergency medicine administration, fluid resuscitation, and access to the vascular system in situations where conventional routes cannot be utilised or would cause delays in treatment. The intraosseous access needle consists of a needle and stylet such as a standard bone marrow needle. The intraosseous access needle is advanced through the skin to the bony cortex where the needle is further advanced into the marrow cavity. The stylet is then removed prior to use. Any medicine administered intraveneously can be given via the intraosseous route.

Intrathecal. Within the spinal canal.

Intrathecal chemotherapy. The administration of cytotoxic medicines into the central nervous system via the cerebrospinal fluid by means of a lumbar puncture. Used in the treatment of leukaemia and lymphoma. Only thiopeta, cytarabine, methotrexate, hydrocortisone, and interferon may be administered by this route.

Intravenous fat emulsion (IVFE). A preparation of lipids administered intravenously to maintain or support nutrition.

Intraventricular access device. The Ommaya reservoir is an implanted ventricular access device that enables the delivery of medicines directly into the central nervous system. The Ommaya reservoir consists of a mushroom-shaped, self-sealing silicone port that is placed subcutaneously underneath a scalp flap, usually in the frontal region. A ventricular catheter is attached to the reservoir and inserted into the lateral ventricle to provide access to the cerebro-spinal fluid (CSF).

Intrinsic contamination. Contamination that occurs during the manufacturing process of a product.

Introducer. A needle used to control, direct, and place a catheter into a blood vessel.

Investigational medicine. A medicine undergoing investigation for a specific use via a clinical trial to determine its safety and effectiveness in humans.

Iontophoresis. A noninvasive transdermal method of administering medicine via an electrical charge.
Iron overload. Abnormally high levels of iron that may cause life-threatening organ damage; a side-effect of frequent blood transfusions.

Irritant. Agent capable of producing discomfort or pain at the venepuncture site or along the internal lumen of the vein.

Isotonic. Having the same osmotic concentration as plasma.

Joint stabilisation. A device used to stabilise or restrict movement of the joint.

Laminar flow unit. A work zone or cabinet in which the airflow moves in a unidirectional and uniform manner. The flow is regulated and validated on a regular basis.

Latex precautions. Measures taken to prevent and eradicate latex allergy.

Latex-safe environment. A healthcare setting in which all products containing natural rubber latex intended for contact with mucosa or nonintact skin are removed or covered.

Lipid emulsion. See Fat emulsion.

Locking. The instillation of a solution into a vascular access device to maintain device patency.

Low-frequency tasks. Tasks that are performed infrequently (less than weekly).

Luer lock. Type of fitting connector with simple screw locking mechanism.

Lumen. Interior space of a tubular structure, such as a blood vessel or catheter.

Lymphoedema. Swelling caused by obstruction of the lymphatic vessel(s).

Manual flow-control device. Manually operated device to control the flow rate of the infusion.

Mechanical infusion device. A device that uses a nonelectronic method to regulate infusion flow rates; examples include the elastomeric balloon device and the spring coil piston syringe device.

Mechanical valve device. A needleless connector with an internal mechanical device that provides a fluid pathway capable of infusion and aspiration.

Medicine reconciliation. The process of collecting and documenting complete and accurate medicine information for each patient, including prescribed, over-the-counter, and herbal medicines that the patient is currently taking.

Micro-abrasion. Superficial break in skin integrity that may predispose the patient to infection.

Micro-aggregate. Microscopic collection of particles such as platelets, leukocytes, and fibrin that occurs in stored blood.

Micro-aggregate blood filter. Filter that removes micro-aggregates and reduces the occurrence of non-haemolytic febrile reactions. No longer indicated in New Zealand.

Micro-introducer. A dilator/introducer assembly used in the Modified Seldinger Technique for insertion of a peripherally inserted enteral catheter.

Micron (µ). Unit of length equal to one-millionth of a metre, or one-thousandth of a millimetre.

Micro-organism. Minute living body not perceptible to the naked eye.

Mid-arm circumference. Measurement of the arm at a predetermined distance above the insertion of a peripherally inserted central catheter or midline catheter.

Midline catheter. A vascular access device measuring 20cm or less with the distal tip dwelling in the basilic, cephalic, or brachial vein, at or below the level of the axilla and distal to the shoulder.

Milliosmoles (mOsm). One-thousandth of an osmole; osmotic pressure equal to one-thousandth of the molecular weight of a substance divided by the number of ions that the substance forms in a litre of solution.

Modified Seldinger Technique. A method of percutaneous insertion of a catheter into a blood vessel. A needle is inserted into a vein and a guidewire is threaded through the needle. The needle is removed, and a small nick is made in the skin. A dilator/introducer
unit is threaded over the guidewire. The guidewire and dilator are removed, and the catheter is advanced through the introducer, followed by removal of the introducer. This technique reduces trauma to the vein as well as the risk of artery or nerve injury.

**Multiple-dose vial.** Medicine bottle that is hermetically sealed with a rubber stopper and is designed to be used more than once.

**Needleless connectors.** A device designed to accommodate needleless devices for the administration of solutions into the vascular system.

**Needleless system.** An umbrella term used to encompass all types of needleless devices or products.

**Needlestick injury.** Needlestick injuries are wounds caused by needles that accidentally puncture the skin. Needlestick injuries are a hazard for people who work with needles and other sharps equipment. These injuries can occur at any time when people use, handle, or dispose of needles. When not disposed of properly, needles can become concealed in linen or waste and injure other workers who encounter them unexpectedly. Needlestick injuries transmit infectious diseases, especially bloodborne viruses.

**Negative displacement.** Blood reflux into the catheter lumen upon disconnection with movement of valve mechanism, or when a fluid container empties and remains connected to the administration set.

**Neutral connector.** A needleless connector with an internal mechanism designed to prevent blood reflux upon connection or disconnection.

**No-Touch technique.** A method to ensure the aseptic preparation of a peripheral insertion site. Once the site has been prepared, it is not to be touched unless sterile gloves are used.

**Non-tunneled central vascular access device.** A vascular access device inserted by puncture directly through the skin and to the intended location without passing through subcutaneous tissue.

**Non-permeable.** Impervious to the passage of substances, able to maintain integrity.

**Non-vesicant.** Intravenous medicine that generally does not cause tissue damage or sloughing if injected outside a vein.

**Occluded.** Blocked because of precipitation of infusate, clot formation, or anatomic compression.

**Oclusion.** The state of being occluded; the inability to infuse or inject fluid into a catheter; the inability to aspirate blood from a catheter, or both.

**Osmolality.** Characteristic of a solution determined by the ionic concentration of the dissolved substances per unit of solvent; measured in milliosmoles per kilogram.

**Osmolarity.** Number of osmotically active particles in a solution.

**Outcome.** Interpretation of documented results.

**Paired blood samples.** Two blood samples are drawn from a catheter and from a peripheral venipuncture site; both samples should be of the same value and obtained within a 10-minute period.

**Palliative.** Relieving or alleviating without curing.

**Palpable cord.** Vein that is rigid and hard to the touch.

**Palpation.** Examination by application of the hands or fingers to the external surface of the body in order to detect evidence of disease or abnormalities in the various organs.

**Parenteral.** Administered by any route other than the alimentary canal, for example by the intravenous, subcutaneous, intramuscular, or mucosal routes.

**Parenteral nutrition.** Intravenous provision of total nutritional needs for a patient who is unable to take appropriate amounts of food enterally; typical components include carbohydrates, proteins and/or fats, as well as additives such as electrolytes, vitamins, and trace elements.

**Particulate matter.** Matter relating to or composed of fine particles.

**Patency.** The condition of being open, unblocked or unobstructed.

**Pathogen.** Micro-organism or substance capable of producing disease.

**Patient-controlled analgesia (PCA).** A method of pain control designed to allow the patient the ability to administer bolus doses of an analgesic as needed.
**Percutaneous.** Technique performed through the skin.

**Peripheral.** Pertaining to a vessel located outside the central circulation.

**Peripherally inserted central catheter (PICC).** A central vascular access device inserted into an extremity and advanced until the tip is positioned in the lower third of the superior vena cava.

**Personal protective equipment (PPE).** Specialised equipment worn by an individual for protection against health and safety hazards; examples include, but are not limited to, face masks, caps, goggles, gloves, or fluid-resistant gowns.

**pH.** Degree of acidity or alkalinity of a substance.

**Pharmacology.** Concerns the actions of medicines in the body.

**Pharmaceutics.** Concerns the formulation, manufacture/preparation, stability, and packaging of medicines.

**Phlebitis.** Inflammation of a vein; may be accompanied by pain, erythema, oedema, streak formation, and/or palpable cord; rated by a standard scale.

**Phlebotomy.** Withdrawal of blood from a vein.

**Physical incompatibility.** Undesirable change that is visually observed within a solution, such as a change in colour, clarity, presence of precipitate, or gas formation.

**Pneumothorax.** The presence of air between the pleura.

**Pocket infection.** A purulent fluid found in the subcutaneous pocket of an implanted port or pump without evidence of a bloodstream infection. It may or may not be associated with spontaneous rupture and drainage or necrosis of the overlying skin.

**Policy.** Written statement describing a course of action; intended to guide decision making.

**Positive displacement.** The result of a small amount of fluid being pushed out of the end of the catheter lumen, clearing any blood reflux resulting from the disconnection of an administration set or syringe.

**Positive pressure.** Constant, even force within a catheter lumen that prevents reflux of blood; achieved by clamping while injecting or by withdrawing the needle from the catheter while injecting.

**Post-infusion phlebitis.** Inflammation of the vein occurring after the infusion has been terminated and the catheter removed, usually identified within 48 hours after removal.

**Pounds per square inch (psi).** Measurement of pressure. One psi equals 50mm Hg or 68cm H₂O.

**Power-injectable central vascular access device.** A device capable of withstanding high-pressure injections up to 300 psi.

**Prescipitation.** The act or process of a substance or drug in solution to settle in solid particles.

**Preservative-free.** Containing no added substance capable of inhibiting bacterial growth.

**Primary catheter malposition.** A tip location of any central vascular access device found to be in suboptimal position as determined by the initial chest radiograph.

**Primary continuous administration set.** The main administration set used to deliver solutions and medicines to the patient.

**Primary intermittent administration set.** An administration set that is connected and disconnected with each use.

**Procedure.** Written statement of steps required to complete an action.

**Product integrity.** Condition of an intact, uncompromised product suitable for intended use.

**Proximal.** Closest to the centre or midline of the body or trunk, or nearer to the point of attachment; the opposite of distal.

**Psychomotor.** Characterising behaviours that place primary emphasis on the various degrees of physical skills and dexterity as they relate to the thought process.

**Purulent.** Containing or producing pus.

**Push.** Manual administration of a medicine under pressure.

**Quality assurance/performance improvement.** An ongoing, systematic process for monitoring, evaluating, and problem solving.
Radiopaque. Impenetrable to X-rays or other forms of radiation; detectable by radiographic examination.

Risk evaluation mitigation strategies (REMS). A strategy to manage a known or potentially serious risk associated with a medicine or biological product. REMS can include a medicine guide, patient package insert, a communication plan, elements to ensure safe use, and an implementation system; must include a timetable for assessment of the REMS.

Risk management. Process that centres on identification, analysis, treatment, and evaluation of real and potential hazards.

Root cause analysis (RCA). The process for identifying factors that contribute to variations in performance.

Safety device system. Engineered physical attribute of a device that effectively reduces the risk of bloodborne pathogen exposure.

Scale. Tool to measure gradations.

Sclerosis. Thickening and hardening of the layers in the wall of the vessel.

Secondary catheter malposition or tip migration. Tip location of any central vascular access device found to be in suboptimal position following initial correct positioning.

Secondary continuous administration set. An administration set attached to a primary administration set for a specific purpose, usually to administer medicines; also known as a piggyback set.

Seldinger technique. A method of percutaneous insertion of a vascular access catheter into a blood vessel. The vessel is accessed with a needle, and a guidewire is placed through the needle. The needle is removed. A catheter is placed into the vessel over the guidewire to the desired location. The guidewire is removed, leaving the catheter in place.

Semiquantitative culture technique. Laboratory protocol for isolating and identifying micro-organisms.

Sentinel event. An unexpected occurrence involving death, or serious physical or psychological injury; serious injury specifically includes loss of limb or function.

Sepsis. Presence of infectious micro-organisms or their toxins in the bloodstream.

Sharps. Objects in the healthcare setting that can be reasonably anticipated to penetrate the skin and to result in an exposure incident, including but not limited to needle devices, scalpels, lancets, broken glass, or broken capillary tubes.

Simple needleless connector. A device with a straight fluid pathway that contains no internal mechanisms or moving pieces.

Single-use product. A device, such as a vial or syringe that is intended for one entry or use.

Single-use vial. Medicine bottle that is hermetically sealed with a rubber stopper and is intended for one-time use.

Site protection. Method or product used to protect the catheter insertion site.

Six sigma. A data-driven, fact-based philosophy of quality improvement that values prevention over detection.

Skin tunneled catheter. Vascular access device whose proximal end is tunneled subcutaneously from the insertion site and brought out through the skin at an exit site.

Speedshock. The rapid, uncontrolled administration of a medicine, where symptoms occur as a result of speed with which medicine is administered rather than the volume of medicine/fluid. This can therefore occur even with small volumes.

Split-septum device. A simple needleless connector with a prepierced septum that can be of blunt cannula or luer-lock design.

Standard. Authoritative statement enunciated and promulgated by the profession by which the quality of practice, service, or education can be judged.

Standard precautions. Guidelines designed to protect workers with occupation exposure to bloodborne pathogens; all blood and body fluids are treated as potentially infectious.

Statistics. Systematic collection, organisation, analysis, and interpretation of numerical data.

Sterile. Free from living organisms.
**Structure.** Elements on which a programme is based, including resources such as federal and state laws, professional standards, position descriptions, patient rights, policies and procedures, documentation, quality controls, and corrective action programmes.

**Stylet.** Rigid metal object within a catheter designed to facilitate insertion.

**Subcutaneous infusion.** Administration of medicines or solutions into the tissues beneath the skin.

**Surfactant.** Surface-active agent that lowers the surface tension of fluid.

**Surveillance.** Active, systematic, ongoing observation of the occurrence and distribution of disease within a population and the events or conditions that alter the risk of such occurrence.

**T Tamper-proof.** Unable to be altered.

**Therapeutic phlebotomy.** Removal of a specific volume of blood from a patient for the treatment of a specific condition or disease.

**Transfixion.** Penetration of the posterior vein wall.

**Thrombolytic agent.** Pharmacological agent capable of dissolving blood clots.

**Thrombophlebitis.** Inflammation of the vein in conjunction with formation of a blood clot (thrombus).

**Thrombosis.** Formation, development or existence of a blood clot within the vascular system.

**Thrombus.** A clot composed of fibrin and blood cells that is attached to a vessel. The thrombus may grow to surround a vascular access device, eventually obstructing the device as well as the vessel. Factors that promote the formation of a thrombus are vascular endothelial damage, venous stasis, and hypercoagulable states (Virchow’s triad).

**Transducer.** Electronic device that converts one form of energy to another.

**Transfusion reaction.** A complication from a blood transfusion in which there is an immune response against the transfused blood components.

**Transfusion-Related Acute Lung Injury (TRALI).** TRALI is an acute lung injury occurring within 6 hours of transfusion, not due to any other cause. It is one of the causes of non-cardiogenic pulmonary oedema.

**Transparent semipermeable membrane (TSM).** A sterile dressing that allows moisture to pass through the dressing away from the skin while preventing external moisture from contacting the insertion site of the vascular access device.

**Tunnel infection.** Tenderness, erythema, and/or induration 2cm from the catheter exit site, along the subcutaneous tract of a tunneled catheter with or without a confirmed bloodstream infection.

**Tunneled catheter.** A vascular access device whose proximal end is tunneled subcutaneously from the insertion site and brought out through the skin at an exit site.

**U Ultrasound technology.** A device that employs the use of sound waves or light to allow for the location and identification of blood vessels.

**V Vascular access device (VAD).** Catheters, tubes, or devices inserted into the vascular system, including veins, arteries, and bone marrow.

**Vesicant.** Agent capable of causing blistering, tissue sloughing, or necrosis when it escapes from the intended vascular pathway into surrounding tissue.

**Virchow’s triad.** The pathophysiological explanation for the development of vascular thrombosis. The triad consists of the following components: vessel wall damage or injury, alterations in blood flow, and hypercoagulability of the blood.

**Visual Infusion Phlebitis (VIP) scale.** A tool developed by the Royal College of Nursing in the United Kingdom to determine the degree of phlebitis.

**Visualisation technology.** A device that employs the use of sound waves or light to allow for the location and identification of blood vessels.
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