## **A picture containing logo  Description automatically generatedSupplemental** **TABLE 1 Research Committee Response to E-Delphi Round 1 Results**

## **Recommendations for Assessment and Planning**

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| --- | --- | --- | --- |
| **Recommendation** | **N** | **Median (IQR)** | **Range** |
| Valid | Missing |
| 1. Assess patient to determine if subcutaneous access is appropriate for the infusion of medications and hydration as an alternative route to intravenous access. (Subcutaneous access is a vessel health preservation strategy for adults in all health care settings.1–6  | 10 | 0 | 9 (9-9) | 7-9 |
| 2. Assess intended duration of therapy, reason for parenteral route, properties of the solution/medication (eg, viscosity, pH, dose, volume, concentration and rate), available support and resources (if outside the hospital), patient’s clinical and skin condition (including availability of appropriate tissue). 7,8,13  | 10 | 0 | 9 (8-9) | 8-9 |
| 3. For the management of mild to moderate dehydration, assess need for subcutaneous infusion of isotonic solutions if oral route not appropriate (alternate routes include enteral, intravenous and intraosseous). Complete an interprofessional team hydration/nutrition/electrolyte assessment to determine patient’s fluid and electrolyte needs.9,13  | 10 | 0 | 9 (8-9) | 7-9 |
| 4. Review drug product monograph to determine labeling of medication for subcutaneous route. In the absence of marketing authorization for subcutaneous route, the organization/prescriber, including the pharmacy team, will determine if infusion of medications off-label meets organizational and/or regulatory requirements and is supported in the literature.10–13  | 10 | 0 | 9 (8-9) | 6-9 |
| 5. Collaborate with the health care team and patient to perform a risk/benefit analysis with the patient/caregiver to determine appropriateness of subcutaneous infusions, establishing the goals of treatment. Ensure treatment is consistent with patient’s plan of care; obtain consent as per organizational policy.1,7  | 10 | 0 | 9 (9-9) | 5-9 |
| 6. Ensure subcutaneous medications and hydration prescribed are at rates, frequency, and volumes/dosage appropriate for the patient’s age, weight, clinical condition, individual subcutaneous absorption, laboratory values, and as recommended by the drug manufacturers or supporting literature, and generally not exceeding those used for IV infusions.2,8,13  | 10 | 0 | 9 (8-9) | 7-9 |
| 7. Ensure prescriptions include medication/solution, dose/volume, route, rate, frequency (eg, once daily), duration of infusion (eg, over 8 hours), and end date.9,13  | 10 | 0 | 9 (9-9) | 8-9 |
| 8. Avoid infusion rates greater than 5mL/hour for medications (unless recommended by manufacturer- eg, subcutaneous immunoglobulin). Slow infusion rates and use of diluted solutions have been recommended in the literature for subcutaneous antibiotics.1,2,8,11  | 10 | 0 | 9 (8-9) | 8-9 |
| **Qualitative Data** (Participants’ Comments) | **Steering Committee Response** |
| I would caution use or administration of medication or solutions outside of manufacturer guidelines, FDA approval or for any "off label" use as this would open the organization up to potential legal action should something happen. | No change to recommendation (Recommendation 4 addresses “organizational and/or regulatory requirements”) |
| For subcutaneous bolus of fluid, we usually do not give more than 3ml each bolus in the palliative care setting  | No change to recommendation (Guideline does not cover boluses) |
| Recommendation No 7: include the diluent to be used with medications delivered via a syringe pump | No change to recommendation (Diluent selection may be determined by clinicians other than the prescriber and based on chemical and stability concerns) |

## **Recommendations for Subcutaneous Access Device Placement**

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| --- | --- | --- | --- |
| **Recommendation** | **N** | **Median****(IQR)** | **Range** |
| Valid | Missing |
| 9. Select a site for subcutaneous access with intact skin and adequate subcutaneous tissue, (eg, minimum 1-2.5 cm thickness), assessing patient comfort, mobility, safety, and preference, (to identify optimal position or location for the patient).1,7–9,13,15   | 10 | 0 | 9 (9-9) | 8-9 |
| 10. Consider use of 2 or more sites as required for high volume solutions (eg, up to 1 L/day/site).2,10,15  | 10 | 0 | 9 (8-9) | 3-9 |
| 11. If multiple subcutaneous infusions are prescribed, determine if they are compatible and can be administered in the same infusion. If using more than one subcutaneous set simultaneously (or bifurcated needle sets), use a separate site for each set.16  | 10 | 0 | 9(8-9) | 5-9 |
| 12. To aid in dressing adhesion, remove excess hair from insertion site with clippers or scissors (do not shave or use a depilatory).14  | 10 | 0 | 7 (5-9) | 3-9 |
| 13. Perform hand hygiene and don gloves. Perform skin antisepsis, preferably using chlorhexidine-based solution, using a single-use applicator, and allow to dry naturally (without wiping, fanning or blowing on skin).2,8,13,14  | 10 | 0 | 9 (8-9) | 8-9 |
| 14. Use a non-metal cannula appropriate for the patient and infusate, preferably with a short length (to avoid intramuscular injection) and small gauge (eg, 24 to 27 gauge). Note that a smaller gauge cannula may result in a slower infusion and thus not be suitable for higher infusion rates (eg, hydration). Avoid use of a metal winged needle unless required, as indicated in a drug product monograph, due to patient discomfort and risk of needle-stick injury. If using a steel needle, consider use of a device with a manually activated self-blunting mechanism activated immediately after siting the device, to avoid needle-stick injuries if needle accidentally dislodges.1,2,8,13,14,16–19 | 10 | 0 | 9 (8-9) | 8-9 |
| 15. Prime the subcutaneous access device with either 0.9% sodium chloride or the prescribed medication/solution (to expel any air). For specific medications, such as immunoglobulins which may be irritating to the intradermal space, consider partially priming the cannula, stopping prior to the tip of the cannula (“dry-priming approach”).7,8,16, 20  | 10 | 0 | 8 (8-9) | 6-9 |
| 16. Using aseptic non-touch technique, insert cannula to establish subcutaneous access. Insert short cannula (<6mm) at a 90° angle, using a skin fold lift in the slim patient to lift the skin away from the muscle fascia. To insert a longer cannula or cannula of any length in lean adults, arm or thigh sites (which have less subcutaneous tissue), use a 45° angle and/or use a skin fold lift to minimize the risk of intramuscular injection.1,7,13,14,16,18–21  | 10 | 0 | 9 (8-9) | 7-9 |
| 17. Remove the metal stylet (if applicable) and dispose in sharps container.16  | 10 | 0 | 9 (8-9)  | 1-9 |
| 18. If blood return is present during device placement, remove and insert new device at new site.8  | 10 | 0 | 9 (9-9) | 7-9 |
| 19. Aseptically apply a transparent semipermeable membrane dressing (if not integrated with the cannula) over the site (to protect the site, allow moisture vapor permeability and allow for site assessment). Use skin injury mitigation strategies (eg, alternate dressings, skin barrier prep) where necessary.8,13,20  | 10 | 0 | 9 (8-9) | 7-9 |
| 20. Document the patient assessment, patient consent, device placement (including cannula type, size, and site), patient response, complications or missed attempts.13  | 10 | 0 | 9 (8-9) | 7-9 |
| **Qualitative Data** (Participants’ Comments)  | **Research Committee Response** |
| While I don't disagree with the verbiage in statement 11 - I would be very cautious-and probably opt not -to mix more than one medication together for a SC infusion as I would be concerned about potential reactions. | No change to recommendation (limited evidence supports this practice if the compatibility has been determined and monitoring of reactions as addressed in question 24 and 25) |
| There is very limited published research (except expert opinion) where volume above 2 l per day have been tried. But from my clinical experience, 1.5 l can be infusion per site per day without problems.  | No change to recommendation (limited data acknowledged in recommendation grade)  |
| Recommendation 12: From my clinical experience on older adults with the placement of the subcutaneous access on the abdominal wall this is never necessary, but it depends on what is meant with excess hair. | (No change to recommendation (Assessment of “excess hair” is a clinical judgement and advised in best practice guidelines to promote dressing adhesion) |
| Recommendation 14: I agree with the statement if it only concerns the subcutaneous infusion of medicine. When infusing fluid, I would recommend a larger gauge eg, 22G. | Recommendation to be amended |
| Consideration should be given to needle-phobia patients and appropriate treatment provided i.e., desensitising device, emla cream. Anchoring of devices and IV lines should be considered to prevent dislodgement. | Recommendation to be amended  |
| Recommendation 14: I agree only with the use of the non-metal cannula. | No change to recommendation (recommendation re needle size is acknowledged as weak- as indicated by the term “preferably”) |

## **Recommendations for Best Practice in Subcutaneous Infusions Management**

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| --- | --- | --- | --- |
| **Recommendation** | **N** | **Median****(IQR)** | **Range** |
| Valid | Missing |
| 21. Initiate and regulate the flow rate of the infusion at prescribed rate. Use the infusion control device appropriate for the type of therapy. (The following devices have been reported for use with: (i) hydration- electronic infusion device and gravity infusion6,11,21–23; and (ii) medications- mechanical infusion device [eg, syringe driver, elastomeric], electronic infusion device.)3,10,11,13,24,25  | 10 | 0 | 9 (8-9) | 7-9 |
| 22. Change administration sets used for continuous infusions at least every 7 days, every 24 hours for intermittent infusions, and immediately if system integrity is compromised, or as per organizational policy.2,8,13  | 10 | 0 | 9 (6-9) | 3-9 |
| 23. Prime all air out of administration set prior to initiation of therapy. Label administration sets with date initiated and initials. Place label identifying subcutaneous access device near device connection on administration set.8,14  | 10 | 0 | 9 (8-9) | 8-9 |
| 24. Monitor patient, assessing site and infusion, one hour after starting infusion and then regularly (eg, every shift/visit).8,13  | 10 | 0 | 9 (7-9) | 1-9 |
| 25. Assess patient’s tolerance and response to treatment. For subcutaneous hydration, initially include at least daily reassessments of response to therapy, clinical fluid status, laboratory values (urea, creatinine and electrolytes), fluid balance charts, vital signs, and weight measurement twice weekly and adjust care plan accordingly. Patients on longer-term subcutaneous hydration whose condition is stable may be monitored less frequently, although decisions to reduce monitoring frequency should be detailed in their care plan.9 | 10 | 0 | 9 (8-9) | 5-9 |
| 26. Employ strategies to prevent, identify, and manage infusion complications, which depend mainly on the infusate and infusion rate.1,10  | 10 | 0 | 9 (8-9) | 8-9 |
| 27. For initiation and maintenance of subcutaneous hydration and some medications, consider the use of hyaluronidase for continuous subcutaneous infusions to facilitate the dispersion and absorption of the infusate, particularly if the infusion is not well tolerated due to swelling or pain or is running slowly.1,10,13,26–29 Consider hyaluronidase with the administration of the following medications which have been shown to enhance absorption of medications (eg, ceftriaxone, hydromorphone, immunoglobulin, midazolam, morphine, ondansetron, potassium, and trastuzumab).4,10,31  | 10 | 0 | 8(4-9) | 1-9 |
| 28. Hyaluronidase dosage and protocols vary. Consider injecting hyaluronidase prior to infusion (eg, 150-300 units) or, if compatible, to the hydration fluid. Patients taking salicylates (eg, aspirin), steroids or antihistamines may require a larger dose of hyaluronidase for equivalent dispersing effect.1,10,13,26–29,31  | 10 | 0 | 8 (4-9) | 1-9 |
| 29. Consult drug information references or to determine stability/compatibility of hyaluronidase with infusates.2  | 10 | 0 | 9 (8-9) | 1-9 |
| 30. Assess for adverse reactions to hyaluronidase (eg, mild local access site reactions, allergic or anaphylactic-like reactions).2  | 10 | 0 | 9 (8-9) | 1-9 |
| 31. Prior to accessing a needlefree connector on end of access device, perform active disinfection with a vigorous mechanical scrub using an antiseptic wipe, or use a disinfectant cap, and allow solution to dry.9  | 10 | 0 | 9 (9-9) | 0 |
| 32. For administration of multiple solution/medications, consider using separate subcutaneous access device for each medication (flushing after each dose is not required). If using one device, and solutions/medications are compatible, do not flush between medications; if not compatible, flush device with sterile preservative-free 0.9% sodium chloride (volume of device and any add-on devices). The use of multiple sites versus multi-use sites for medication administration is an unresolved issue due to lack of evidence.7,8,16  | 10 | 0 | 8 (7-9) | 1-9 |
| 33. Replace access device, using new subcutaneous access device and site: i) every 24 to 48 hours or after 1.5 to 2 litres of hydration solution has infused;  ii), every 2-7 days  for continuous medication infusions; with each intermittent infusion (eg, SCIG, deferoxamine); or iii) As clinically indicated based on patient comfort and access site assessment findings (eg, erythema, swelling, leaking, local bleeding, bruising, burning, abscess, or pain).1,8,10,13,32  | 10 | 0 | 8 (5-9) | 1-9 |
| 34. Change the dressing with each subcutaneous site rotation and immediately if the integrity of the dressing is compromised.8,13  | 10 | 0 | 9 (8-9) | 8-9 |
| 35. Teach patient and/or caregiver to monitor the site, response to therapy, infusion device, and post-removal care. If self-administration is being performed, validate learning of patient and/or caregiver in subcutaneous infusion management.6  | 10 | 0 | 9 (8-9) | 8-9 |
| 36. Discontinue infusion therapy when indicated: stop the infusion, remove the dressing and subcutaneous set, and apply dry dressing over site. [C] | 10 | 0 | 9 (8-9) | 6-9 |
| 37. Document fluid/medication type, volume, rate and time administered, care provided, and assessments, complications, response to treatment, other related interventions or communications. [C] | 10 | 0 | 9 (9-9) | 8-9 |

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| **Qualitative Data** (Participants’ Comments) | **Research Committee Response** |
| Recommendation 22: I think administration sets should be changed every 24 h also for continuous infusions.  | No change to recommendation (No supporting evidence provided; recommendation supported by cited best practice guidelines) |
| Recommendation 24: needs to allow for latitude in monitoring frequency for home care patients as nurse will not be there for extended period of time - patient/caregiver education regarding frequency and what to look for is essential. | Recommendation to be amended  |
| Recommendation 24: Monitoring the patient with medications in a syringe pump would need to be done sooner than one hour and the site and infusion every 4 hours. | Recommendation to be amended |
| Recommendation 24: Assessment, specifically in home infusion, is not possible in high frequency due to limitations in nurse visits. I would suggest to delineate that out of the above in order to make note and not set a standard that would eliminate ability to provide the service at all. | Recommendation to be amended |
| Recommendation 27: There is no literature that supports the need for hyaluronidase when administrating subcutaneous hydration in adults on the indication of mild to moderate dehydration or in patients at risk of dehydration. Therefore, I don’t think it should be considered to use hyaluronidase. For infusion of medicine, there is some literature supporting enhanced absorption, why it could be considered.  | No change to recommendation as consensus threshold met (limited supporting evidence23 available for use with hypodermoclysis in adults (weak recommendation is acknowledged through the use of “consider” and specific situations suggested) |
| Recommendation 28: As with 27, I disagree with the statement that there is a need for hyaluronidase when infusing fluid.  | No change to recommendation (as per previous comment) |
| There is little evidence for using Hyaluronidase to prevent development of site reactions in CSCI via syringe pumps. | No change to recommendation (Recommendation does not address specific devices and uses the term “consider”) |
| Recommendations 27-30: There is little evidence for using Hyaluronidase to prevent development of site reactions in CSCI via syringe pumps.  | No change to recommendation (as per previous comment) |
| Recommendation 32: If a medication is administered via a stand-alone subcutaneous cannula eg, for PRN medication if there is no flush after each dose this would mean that the complete dose of the medication wasn't given. | No change to recommendation (Recommendation does not refer to bolus) |
| Recommendation 33: I agree if it is only statement iii that is kept. I have no knowledge if any research that recommends that the access device need to be changed after 1.5-2 l of fluid has been infused. | Recommendation to be amended  |
| Recommendation 33: I think access device should be replaced every 48 h-72 h at latest for continuous medication infusions. | Recommendation to be amended |
| Recommendation 33: The access device should last more than 48 hours before replacement.  | Recommendation to be amended |
| Recommendation 37: Include diluent also for meds delivered via CSCI. | Recommendation to be amended |

## **Recommendations for Competency and Quality in Subcutaneous Infusion Therapy**

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| **Recommendation** | **N** | **Median****(IQR)** | **Range** |
| **Valid** | **Missing** |
| 38. Organizations should establish systems to ensure that all health care professionals involved in prescribing and/or administering subcutaneous infusions are trained on the principles covered in these recommendations and are then formally assessed and reassessed at regular intervals to demonstrate competence (knowledge, skills and judgment).6,9,13,15  | 10 | 0 | 9 (9-9) | 8-9 |
| 39. Organizations should have a designated clinical lead for infusion therapy, responsible for training, clinical governance, audit and review of subcutaneous fluid prescribing and patient outcomes.10  | 10 | 0 | 9 (6-9) | 1-9 |
| 40. Organizations should monitor quality outcomes related to subcutaneous infusion therapy. [C] | 10 | 0 | 9 (8-9) | 7-9 |
| 41. Consider quality standards such as: i) infusion fluids clinical lead; ii) health care professionals’ competencies in hospitals; and iii) identifying and reporting consequences of fluid mismanagement (eg, pulmonary edema, hypovolemia, etc.)10  | 10 | 0 | 9 (8-9) | 5-9 |
| 42.Encourage and participate in research to promote evidence-based decision-making and clinical practice in the administration of subcutaneous infusions of hydration and medications.15  | 10 | 0 | 9 (9-9) | 8-9 |
| **Qualitative Data** (Participants’ Comments) | **Research Committee Response** |
| Recommendation 39: While I generally agree with statement, having a clinical lead in small organizations is not always possible - may have to narrow to adequacy of resources for education, training, and follow-up for questions/concerns and adequacy of policies and procedures -may be a resource outside of the organization such as an infusion pharmacy for a nursing facility. | Recommendation to be amended |
| Recommendation 41: What about health care provider competency in home health and skilled nursing facilities? Rated as 5 because too narrow. | Recommendation to be amended  |
| I would caution dictating roles and responsibilities but be more open and state what should be monitored and how an organization should competency staff. Allow the organization the ability to assign responsibility and oversight as needed to meet those goals. | Recommendation to be amended |