1.0 Purpose
The purpose of this protocol is to:
• Direct nursing staff on the safe insertion of a butterfly cannula for the administration of subcutaneous (SC) fluids.
• Direct nursing staff on the safe preparation and administration of SC fluids to service users in line with evidence-based practice.
• Direct care staff on the monitoring of a service user during the administration of subcutaneous fluids.

2.0 Scope
The protocol refers to all Cheshire Ireland Services where subcutaneous fluids have been prescribed by a doctor for Cheshire service users and are administered by Cheshire staff.

A subcutaneous line may be inserted only by a trained registered nurse. The monitoring of the service user undergoing subcutaneous fluid administration may be carried out by a Cheshire Ireland care support worker in line with this protocol.

3.0 Responsibility
• It is the responsibility of all staff involved in the administration of subcutaneous fluids to be familiar with and adhere to this protocol.
• It is the responsibility of all service managers to ensure staff are familiar with the protocol and to monitor compliance.

4.0 Definitions
Subcutaneous: is defined as the loose connective tissue between the epidermis and the muscle.

Subcutaneous fluid administration: (sometimes referred to as hypodermoclysis) is defined as the infusion of a solution into the subcutaneous tissue to supply the service user with a continuous and sufficient amount of fluid, medication, electrolytes or nutrients (Sasson and Shvartzman, 2001). The fluid enters the blood plasma and is absorbed through the blood capillary networks, or is drained by way of the lymphatic system.
5.0 Processes

5.1 Indications

The decision to commence SC fluids may vary depending on the underlying status of the service user. SC fluids may be initiated as a supplement to oral fluid intake or as a total replacement of oral fluid intake (Dasgupta et al. 2000).

SC fluids must be prescribed by a doctor.

Factors that will prompt the consideration of subcutaneous fluids are:
- Dehydration not requiring rapid correction of fluid and electrolyte status.
- Decreased oral intake e.g. < 500-1000mls/daily x 2 consecutive days
- Increased thirst
- Poor skin turgor (can be difficult to assess in elderly).
- Confusion
- General weakness
- Postural hypotension
- Persistent dysphagia i.e. - Only as a temporary measure until a more permanent means of hydrating a service user is established e.g. Nasogastric Tube
- Inaccessible or fragile veins, so that establishing or maintaining intravenous access presents problems.

5.2 Contraindications/Cautions

Contraindications
- When fluids must be administered rapidly and in large amounts such as may occur in shock, severe electrolyte disturbance or marked dehydration.
- Decreased urinary output i.e. less than 0.5 to 1ml/kg/hr. where it may be necessary to administer fluids IV to prevent the development of pre-renal acute renal failure.
- Marked tissue oedema
- Moderate to severe renal disease
- Service users with coagulation disorders
- Phlebitis/cellulitis at the infusion site/s

Cautions
- Use cautiously in service users with cardiac disorders
- Should be used cautiously on skin sites where previous radiotherapy has been given, because of the possibility of fibrosis causing decreased fluid absorption.
- Use cautiously on tissue that has previously been damaged e.g. Burn Site.

5.3 Suitable SC Sites

SC fluids can be administered where a good depth of subcutaneous tissue is present. When deciding on a suitable site, service user mobility, access, comfort and skin condition should be considered. Service user preference should be considered where possible.

Common Sites (see Fig.1):
- Abdomen: medial or lateral
- Anteromedial / anterolateral aspect of thigh
- Over the scapula
- Chest wall: Anterior
- Outer aspects of upper arm

Fig. 1.
5.4 Types of Subcutaneous Infusion Fluids
The type of infusion fluid administered depends on the service user’s requirements, i.e. fluid for hydration, electrolyte replacement or nutrition. Isotonic fluids as opposed to hypertonic solutions should be used. The following fluids/additives should only be used:
- Sodium Chloride 0.9%
- 0.45% Sodium Chloride
- Dextrose 5%
- The administration of subcutaneous fluids with potassium additives is not advised in Cheshire Ireland services without specific advice, rationale and supervision from the multi-disciplinary team.

5.5 Rate of Subcutaneous Infusion
- Ideally no more than 1.5 litres of fluid should be administered subcutaneously in 24 hours. Subcutaneous fluid administration should never exceed 2 litres over a 24 hour period.
- Solutions must be infused by gravity rather than a pump as this reduces the chance of local oedema formation.
- To calculate rate of subcutaneous fluid infusion i.e. drops per minute, it is necessary to know how many drops of fluid are contained in one millilitre (ml) with regards to the administration infusion set being used. This information is found on the packaging of the administration set. The known figure for the drops per ml is then multiplied by prescribed volume of infusion. This figure is then divided by the total calculation obtained from multiplying the time prescribed (Hours) for the administration of fluid multiplied by 60 (Minutes). This result will give the required drops per minute (see Appendix 1).
- Subcutaneous fluids for infusion should be administered by a 500ml bag or less.

6.0 Procedure for the Placement and Administration of Subcutaneous Fluids.

6.1 Equipment Required
- Butterfly cannula - 21 gauge,
- Standard fluid Infusion Set and sterile cap
- Infusion Fluid
- 2 ml syringe and 0.9% Sodium Chloride (NaCl)
- Gloves
- 70% alcohol swab
- Semipermeable transparent dressing e.g. Tegaderm®/ IV 3000 Opsite®
- Drip Stand
- Sharps Box
### 6.2 Procedural Actions

<table>
<thead>
<tr>
<th>ACTION</th>
<th>RATIONALE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Inserting the subcutaneous line and setting up the fluids (Cheshire Nurse only)</strong></td>
<td></td>
</tr>
<tr>
<td><strong>6.2.1</strong> Select for service user the prescribed subcutaneous fluid adhering to the principles of medication management by ABA (2007) and Cheshire Ireland Medication Management Policy</td>
<td>To ensure that the correct solution/drug additive is administered to the correct service user. Establish the correct rate setting using the calculation in appendix 1. To ensure that subcutaneous fluid is safely infused.</td>
</tr>
<tr>
<td><strong>6.2.2</strong> Check the solution for clarity, sterility and expiry date.</td>
<td>To ensure quality of solution.</td>
</tr>
<tr>
<td><strong>6.2.3</strong> Explain the procedure to the service user and family/carer as appropriate.</td>
<td>To allay anxiety and ensure implied consent.</td>
</tr>
<tr>
<td><strong>6.2.4</strong> Check the hypersensitivity and allergy status of the service user.</td>
<td>To prevent any adverse effects to the service user.</td>
</tr>
<tr>
<td><strong>6.2.5</strong> Perform hand hygiene.</td>
<td>To reduce the risk of cross infection.</td>
</tr>
<tr>
<td><strong>6.2.6</strong> Connect the solution to a standard giving set, prime with solution and cap with a red sterile bung.</td>
<td>To prevent air bubble formation throughout the system and minimise cross-infection.</td>
</tr>
<tr>
<td><strong>6.2.7</strong> Prime the butterfly cannula with a 2 ml syringe containing 0.9% sodium chloride. Leave the syringe attached.</td>
<td>To prevent air bubble formation in the cannula.</td>
</tr>
<tr>
<td><strong>6.2.8</strong> Place the service user in a comfortable position.</td>
<td>To facilitate insertion of cannula.</td>
</tr>
<tr>
<td><strong>6.2.9</strong> Perform hand hygiene again and apply gloves.</td>
<td>To reduce the risk of cross infection</td>
</tr>
<tr>
<td><strong>6.2.10</strong> Clean the infusion site with a 70% alcohol swab and allow to dry for 30 seconds. Using a non-touch technique remove cannula cover</td>
<td>To maintain asepsis.</td>
</tr>
<tr>
<td><strong>6.2.11</strong> Insert the cannula beneath the skin at an angle of 45 degrees with the bevel pointing upwards.</td>
<td>To ensure that the cannula is inserted into the subcutaneous space.</td>
</tr>
<tr>
<td><strong>6.2.12</strong> Lightly draw back on the syringe. If blood appears in the line of the butterfly cannula-withdraw immediately and repeat the process with new equipment.</td>
<td>To ensure that a blood vessel has not been cannulated.</td>
</tr>
<tr>
<td><strong>6.2.13</strong> Cover the cannula with a semi-permeable transparent dressing- ensure label recording time and date is applied.</td>
<td>To secure the cannula, allow visualisation of the insertion site and prevent the introduction of infection.</td>
</tr>
<tr>
<td><strong>6.2.14</strong> Remove the syringe, attach the primed giving set to the cannula and open the roller clamp until the correct flow rate is achieved.</td>
<td>To ensure that the service user tolerates the fluid at the prescribed rate.</td>
</tr>
<tr>
<td><strong>6.2.15</strong> Secure line and ensure service user comfort.</td>
<td>To prevent movement and possible dislodgement.</td>
</tr>
<tr>
<td><strong>6.2.16</strong> Label the giving set with date/time and document this in service user’s care plan.</td>
<td>To ensure giving set is changed every 72 hours in line with best practice.</td>
</tr>
<tr>
<td>Section</td>
<td>Instruction</td>
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<tr>
<td>6.2.17</td>
<td>Remove gloves and perform hand hygiene. Dispose of all sharps/used equipment safely</td>
</tr>
<tr>
<td>6.2.18</td>
<td>Record time, solution type, rate and site on the service user’s fluid chart and sign for administration in the service user’s prescription sheet</td>
</tr>
<tr>
<td><strong>7.0</strong></td>
<td><strong>Service User Monitoring (Cheshire Nurse or Care Support Worker)</strong></td>
</tr>
<tr>
<td>7.1</td>
<td>Record any instructions in relation to monitoring of service user and maintenance of infusion in the service user’s care plan</td>
</tr>
<tr>
<td>7.2</td>
<td>Check site at least 4 hourly for irritation, oedema, inflammation, infection and butterfly cannula displacement</td>
</tr>
<tr>
<td>7.3</td>
<td>Site dressing and giving set should be changed routinely every 72 hrs. If site infection suspected, contact Cheshire Nurse or GP. Line should be removed and a swab sent from the site.</td>
</tr>
<tr>
<td>7.4</td>
<td>Check rate of subcutaneous infusion at least 4 hourly and record on fluid balance sheet</td>
</tr>
</tbody>
</table>
References:


Health Service Executive (2007) HSE Dublin Mid Leinster Department Care of the Older Person Standard Operating Procedure for the Placement and Administration of Subcutaneous Infusion. Health service Executive:Dublin.


### CALCULATING THE RATE OF SUBCUTANEOUS INFUSION

The fluid is infused by gravity so there is no need for a pump to regulate administration. To set up a manually controlled drip accurately by eye, you need to be able to count the number of drops per minute, which will equate to the amount prescribed. The formula for calculation is:

\[
\text{Rate} = \frac{\text{Volume (in drops)}}{\text{Time (in minutes)}}
\]

To calculate the volume in drops, you need to know how many drops of the fluid ordered are contained in one millilitre (ml). You should find this information on the packaging of the administration set.

The volume in mls is then multiplied by the number of drops per ml to give the volume in drops. Similarly, to find the rate in minutes, you need to change the hours into minutes, by multiplying by 60 (Hutton, 1998)

**NB. Different size infusion controllers are available therefore staff must ensure they select the correct set.**

**Example**

\[
\begin{align*}
500\text{mls (volume of infusion)} & \times 20 \text{ drops per ml} = 10,000 \text{ drops} \\
6\text{(hours)} & \times 60 \text{ (minutes)} = 360
\end{align*}
\]

\[
\frac{10,000}{360} = 27.7 \text{ drops per minute (Rate)}
\]

**NB. Since we are trying to work out a number of drops it is sensible to round up to a whole number, i.e. 28 drop per minute**

**Maximum volume to be administered over 24 hours = 2 litres.**

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Taken from: **Calculator/Rate of Subcutaneous Fluids** by Darlington Primary Care NHS trust, 2008.
### Document Log

**Protocol Title:** Protocol on subcutaneous (SC) fluids (hypodermoclysis) administration  

**Protocol Number:** CLSP 16

<table>
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<th>Revision Date</th>
<th>Description of changes</th>
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<td>1</td>
<td>June 2012</td>
<td>New document</td>
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