Cannulation and I/V
Drug Administration

I/V Fluids and Manual Drip

Practical Skills Teaching

Year 3 Medical Students
MB BCh

2012 - 2013
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Introduction to workshop

Welcome!

Thank you for agreeing to participate in Year 3 Practical Skills Teaching.

The workshop outcomes for the students are to learn the skills required to perform venous cannulation in an adult patient and how to safely administer intravenous drugs and fluids as well as setting up a pump. We also hope to use the opportunity to ask the students to develop their communication skills. The students must learn to communicate the risks so as to allow for an informed consent.

At the end of the workshop we will be asking you to complete evaluation forms. Please give as much information as you can, as we will use this data to develop the workshop for 2013/14.

Just as a reminder, more information about this skill is found at the Clinical Skills Resource site for tutors. The link to the module is:

http://medic.cardiff.ac.uk/clincialsks/

Please find the Venous Cannulation, I/V Drug Administration, Drug Calculation and I/V fluids and Pump Set up modules within the list of e-modules.

We are aiming for the students to be:

Accurate  Efficient  Compassionate

Thank you again for your participation.

The Clinical Skills Team
Overall Session Aim

For students to provide practical evidence of their competency in performing the clinical procedure of venous cannulation, administering intravenous drugs and fluids and also setting up a pump.

Intended Learning Outcomes

By the end of this workshop the students should be able to:

1. Define the reasons why venous cannulation may be necessary.

2. Identify the appropriate sites for venous cannulation.

3. Demonstrate, to a level expected of the students stage of training, a degree of competence in the procedural steps required to carry out venous cannulation on a simulation model.

4. Understand the knowledge behind the correct method of administration of intravenous drug.

5. Demonstrate, to a level expected of the student’s stage of training, a degree of competence in the procedural steps required to administer a drug intravenously using an aseptic method.

6. State the common risk factors associated with intravenous fluid therapy.

7. Discuss the various fluid types, how much fluid and electrolytes to give and how to assess a patient receiving fluids.

8. Display a professional manner and good communication skills towards the patient (student colleague) if present, and throughout the skills simulation session.

9. Evaluate own learning and recognise how improvements can be made.
Workshop Structure – Guidance for Tutors

Please Note: Students arrive 15 minutes prior to taught session for registration and housekeeping

<table>
<thead>
<tr>
<th>Taught Session Time: 90 minutes</th>
<th>Session Progression</th>
<th>Additional Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cannulation and I/V Drug Administration</td>
<td></td>
<td></td>
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</tbody>
</table>
| 15 minutes | Introduction  
Question and Answer Session (See Appendix A) | Questions and Answers detailed in Appendix A |
| 10 minutes | Demonstration  
Demonstration and discussion of Venous Cannulation and I/V Drug Administration by Tutor(s) | Advanced Venepuncture Arm |
| 2 minutes | Questions and Answers  
Students given the opportunity to ask any questions that may have arisen during demonstration | -- |
| 18 minutes | Practice  
Students work in pairs and practice performing Venous Cannulation  
Tutor to support and lend guidance where necessary  
Tutors to encourage patient / student communication – Student pair can act out student-patient relationship | Advanced Venepuncture Arm |
| 5 minutes | Documentation  
Students to recapulate the contents required for documentation within patients notes  
Re-address:  
Indications  
Contra-indications  
Risks | -- |
| I/V Fluids and Setting up a Pump |
| 10 minutes | Demonstration  
Demonstration and Discussion of Intravenous Fluid Administration and Setting up a Drip by Tutor(s) | Advanced Venepuncture Arm |
| 2 minutes | Questions and Answers  
Students given the opportunity to ask any | -- |
<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>18 minutes</td>
<td>Practice</td>
<td><strong>Advanced Venepuncture Arm</strong></td>
</tr>
<tr>
<td></td>
<td>Students work in pairs and practice performing manual fluid drip set up</td>
<td>Tutors to support and lend guidance where necessary Tutors to encourage patient / student communication – Student pair can act out student-patient relationship</td>
</tr>
<tr>
<td>5 minutes</td>
<td>Documentation</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td>Students to recapulate the contents required for documentation within patients notes Re-address: Indications Contra-indications Risks</td>
<td>Assessment sheets</td>
</tr>
<tr>
<td>5 minutes</td>
<td>Assessment and Final Question and Answer</td>
<td>Tutors to complete student assessment sheets Address any questions raised</td>
</tr>
</tbody>
</table>
Introduction:

Venous Cannulation

Venous cannulation is required in most hospital in-patients. It provides access to a vein without a need for repeated skin puncture, and is convenient for both the patient and staff. Most venous cannula have a port through which drugs may be injected without the need for a needle, and intravenous fluids, including blood, may be administered through the cannula itself.

If inadvertent arterial puncture occurs, and is identified after insertion this is not usually a major problem; removal and pressure on the site for about five minutes will usually cause no problems. However, inadvertent injection of drugs into an artery through a malpositioned catheter may result in serious damage to the patient. If this has occurred, the catheter should be left in situ until further advice is obtained.

Intravenous Drug Administration

A majority of in-patients receive intravenous injections. Drugs given intravenously reach the blood stream directly and reach their target site immediately. This ensures the drug activity starts without any delay.
Intravenous injection is associated with anaphylaxis, risk of introducing infection and air embolism. There is also a risk of extravasation and wrong drug given in the wrong dose. Therefore intravenous injection should not be taken lightly.

Remember the 5 R’s

- **Right Patient**
- **Right Drug**
- **Right Dose**
- **Right Time**
- **Right Route**

Calculate the rate of infusion in drops per minute (dpm) using the following formula:

\[
\text{Rate (dpm)} = \frac{\text{FluidVolume (ml)} \times \frac{20}{\text{Infusion time (hrs)}}}{60} \text{ (rate per minute)}
\]

For example, for a 1 L bag of intravenous fluids over 8 hours:

\[
\frac{1000}{8} \times \frac{20}{60} = 42 \text{ dpm}
\]

**Intravenous Fluid Administration**

The best method of giving fluid is orally however, in patient unable to take oral fluids, then other forms of enteral delivery are preferred (e.g. nasogastric, gastrostomy) if
the gut is working. If the patient cannot take enteral fluids, then intravenous fluids can be given, and can be life saving.

### Indications
- Volume replacement
- Provide Electrolytes
- Provide metabolic substrates
- Improve oxygen carriage
- Correct coagulopathy
- Dilute drugs
- For Osmotic Effects
- To Reduce Blood Viscosity
- To Manipulate Acid-Base Balance

### Contra-Indications
- Lack of Consent

### Risks
- Excessive fluids given, causing pulmonary oedema, peripheral oedema and dilution of plasma clotting factors
- Electrolyte disturbances
- Wrong fluid given
- Extravasation, causing swelling, irritation and occasional skin necrosis
- Air Embolism
Assessment:

For the purposes of this workshop, students will be assessed on a formative basis. This will take place in two parts:

1. A quiz at the start of the session based on prior self-directed learning (Appendix A).

2. The practical component is assessed through observation and feedback on the student performance with the aim of encouraging further practice and improvement. Throughout the session it is proposed that frequent questions should be posed to the students, encouraging each student as the session progresses. A formative assessment sheet is provided, on which the tutor has to indicate that the student has participated in the practical component. There is room for ‘comments’ regarding student performance if required.
## Appendix A – Questions and Answers

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1</strong> The larger the catheter the.........the flow rate. Fill in the blank</td>
<td>Higher</td>
</tr>
<tr>
<td><strong>2</strong> What is the preferred site for venous cannulation to be preformed?</td>
<td>Dorsum of the hand</td>
</tr>
<tr>
<td><strong>3</strong> Name three risks associated with intravenous drug administration</td>
<td>1. Anaphylaxis</td>
</tr>
<tr>
<td></td>
<td>2. Infection</td>
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<tr>
<td></td>
<td>3. Air Embolism</td>
</tr>
<tr>
<td><strong>4</strong> What are the 5 R’s that should be remembered when administering an intravenous drug to a patient?</td>
<td>R. Right Patient</td>
</tr>
<tr>
<td></td>
<td>R. Right Drug</td>
</tr>
<tr>
<td></td>
<td>R. Right Dose</td>
</tr>
<tr>
<td></td>
<td>R. Right Time</td>
</tr>
<tr>
<td></td>
<td>R. Right Route</td>
</tr>
<tr>
<td><strong>5</strong> Name three of at least 9 reasons why you would give fluids</td>
<td>1. As Volume Replacement</td>
</tr>
<tr>
<td></td>
<td>2. To Provide Electrolytes</td>
</tr>
<tr>
<td></td>
<td>3. To Provide Metabolic Substrates</td>
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<td>4. To Improve Oxygen Carriage</td>
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<td></td>
<td>5. To Correct Coagulopathy</td>
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<td></td>
<td>6. To Dilute Drugs</td>
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<td></td>
<td>7. For Osmotic Effects</td>
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<td></td>
<td>8. To Reduce Blood Viscosity</td>
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<td></td>
<td>9. To Manipulate Acid-Base Balance, e.g. forced alkaline diuresis</td>
</tr>
<tr>
<td><strong>6</strong> What are the three classes of fluid?</td>
<td>1. Crystalloid</td>
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<tr>
<td></td>
<td>2. Celluloid</td>
</tr>
<tr>
<td></td>
<td>3. Blood</td>
</tr>
<tr>
<td>#</td>
<td>Question</td>
</tr>
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<td>--------------------------------------------------------------------------</td>
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</tbody>
</table>
| 7  | What is the sequence of Fluid Therapy?                                   | 1. Resuscitation Fluid  
2. Maintenance Fluid  
3. Replacement of Ongoing Losses |
| 8  | In terms of resuscitation fluids what does the 4-2-1 formula mean?       | 4ml/kg/hr for the first 10 kg of body weight  
+ 2ml/kg/hr for the next 10 kg of body weight  
+ 1ml/kg/hr for the remainder of body weight |
| 9  | In terms of I/V fluids, what are the four ways to deliver fluid to a patient? | 1. Syringe (manually)  
2. Syringe Driver (electrical)  
3. Gravity Line  
4. Infusion Pump |
| 10 | What is the best method of giving fluid?                                 | Orally                                                                 |
Appendix B – Venous Cannulation Procedure Checklist

☐ Explain procedure to the patient
☐ Wash hands
☐ Select and inspect appropriate vein. Dorsum of the hand preferable (avoid using antecubital fossa if possible)
☐ Support the limb and apply a tourniquet to the upper arm
☐ Select appropriate cannula
☐ Put on gloves
☐ Clean the patient’s skin with the swab and allow to dry
☐ Anchor the vein by applying traction to the skin a few centimetres below the proposed insertion site
☐ Insert the cannula smoothly into the vein at an angle of approx. 30 degrees
☐ Withdraw the internal needle until a flashback of blood is seen in the tubing.
☐ Advance the tube with the internal needle for approx. 1-2 mm into the vein and release the tourniquet
☐ Withdraw the internal needle completely leaving the outer tubing inside the vein and seal the system with the hub/cap provided.
☐ Apply the adhesive plaster / tape provided to secure the cannula
☐ Flush the cannula with saline
☐ Ensure that the patient is comfortable
☐ Discard sharps and waste in the appropriate containers
☐ Remove gloves and discard
☐ Wash hands
☐ Record procedure in patient’s notes.
Appendix C - Useful resources:

Colloids versus crystalloids for fluid resuscitation in critically ill patients. Cochrane Database Systematic Review 2000


