Session 3: Application of fractions in calculations of dosages of tablets, syrups and injections

Drugs are administered via several routes, including by injections, by intravenous infusion or orally. Oral medication is the first medication that a student nurse will learn to calculate for patients.

Worked Examples for ORAL MEDICATION:

1) A patient is prescribed Furosemide 120mg, orally. The stock available is 40mg tablets.

\[ \text{Volume required} = \frac{\text{medicine prescribed}}{\text{stock strength}} \times \text{volume of stock solution} \]

\[ = \frac{120}{40} \times 1 \]

\[ = \frac{120 \times 1}{40} \]

\[ = \frac{120}{40} = \frac{12 \times 10}{4 \times 10} = \frac{12}{4} = \frac{3 \times 4}{1 \times 4} = \frac{3}{1} = 3 \]

\[ = 3 \text{ tablets}. \]

2) A patient is prescribed 450 mg of soluble Aspirin. Stock available is 300mg tablets. How many tablets should the patient receive?

\[ \text{Volume required} = \frac{\text{medicine prescribed}}{\text{stock strength}} \times \text{volume of stock solution} \]

\[ = \frac{450}{300} \times 1 \]

\[ = \frac{450}{300} = \frac{45 \times 10}{30 \times 10} = \frac{45}{30} = \frac{15 \times 3}{15 \times 2} \]

\[ = \frac{3}{2} = 1 \frac{1}{2} \text{ tablets} = 1.5 \text{ tablets}. \]
3) The stock available of Codene is 5mg tablets. How many tablets does a patient require if the prescription of Codene is 12.5mg?

\[
\text{Volume required} = \frac{\text{medicine prescribed}}{\text{stock strength}} \times \text{volume of stock solution}
\]

\[
= \frac{12.5}{5} = \frac{12.5 \times 10}{5 \times 10} = \frac{125}{50}
\]

\[
= \frac{125}{50} = \frac{25 \times 5}{25 \times 2} = \frac{5}{2}
\]

\[
= \frac{5}{2} = 2 \frac{1}{2} \text{ tablets} = 2.5 \text{ tablets.}
\]

4) A patient is prescribed 0.25mg of Aspirin. Tablets available are 125 micrograms. How many tablets should be given?

It is essential to have both weights in the same units for appropriate dosage to be calculated.

\[
\text{Volume required} = \frac{\text{strength prescribed}}{\text{stock strength}} \times \text{volume of stock solution}
\]

\[
= \frac{0.25 \text{mg}}{125 \text{ micrograms}} \times 1 = \frac{0.25 \times 1000 \text{ micrograms}}{125 \text{ micrograms}} \times 1
\]

\[
= \frac{250}{125} \times 1 = \frac{250}{125} = \frac{125 \times 2}{125 \times 1} = \frac{2}{1} = 2 \text{ tablets.}
\]
### Exercises to work out tablets for ORAL MEDICATION

Calculate the number of tablets to be given to patients from the following questions.

<table>
<thead>
<tr>
<th></th>
<th>Strength required</th>
<th>Stock strength</th>
</tr>
</thead>
<tbody>
<tr>
<td>1)</td>
<td>1 gram</td>
<td>500mg tablets</td>
</tr>
<tr>
<td>2)</td>
<td>15mg</td>
<td>30 mg tablets</td>
</tr>
<tr>
<td>3)</td>
<td>60mg</td>
<td>40mg tablets</td>
</tr>
<tr>
<td>4)</td>
<td>0.06 gram</td>
<td>30mg tablets</td>
</tr>
<tr>
<td>5)</td>
<td>750mg</td>
<td>500mg tablets</td>
</tr>
<tr>
<td>6)</td>
<td>150mg</td>
<td>300mg tablets</td>
</tr>
<tr>
<td>7)</td>
<td>450mg</td>
<td>300mg tablets</td>
</tr>
<tr>
<td>8)</td>
<td>25mg</td>
<td>50mg tablets</td>
</tr>
<tr>
<td>9)</td>
<td>12.5mg</td>
<td>5mg tablets</td>
</tr>
<tr>
<td>10)</td>
<td>125mcg</td>
<td>0.25mg tablets</td>
</tr>
</tbody>
</table>
Worked Examples for SYRUPS and INJECTIONS

1) A patient needs 750mg of penicillin. Stock suspension contains 250mg/5ml. Calculate the volume required.

Volume required = \( \frac{\text{strength prescribed}}{\text{stock strength}} \times \text{volume of stock solution} \)

\[
\begin{align*}
\text{Volume required} &= \frac{750\text{mg}}{250\text{mg}} \times 5\text{ml} \\
&= \frac{750}{250} \times \frac{5}{1} = \frac{75}{25} \times \frac{5}{1} = \frac{25 \times 3 \times 5}{25 \times 1} \\
&= \frac{3 \times 5}{1} = 15\text{ml}
\end{align*}
\]

2) An injection of digoxin 60mg is prescribed. Stock on hand of digoxin is 80mg in 2ml. Calculate the volume required for injection.

Volume required = \( \frac{\text{strength prescribed}}{\text{stock strength}} \times \text{volume of stock solution} \)

\[
\begin{align*}
\text{Volume required} &= \frac{60\text{mg}}{80\text{mg}} \times 2\text{ml} \\
&= \frac{60}{80} \times \frac{2}{1} = \frac{6 \times 2}{8 \times 1} = \frac{12}{8} = \frac{4 \times 3}{4 \times 2} \\
&= \frac{3}{2} = 1 \frac{1}{2} = 1.5 \text{ml}.
\end{align*}
\]
### Exercises to work of dosages for INJECTIONS & SYRUPS

Calculate the amount of stock solution to be drawn up for injection. Give answers greater than 1ml correct to one decimal place and answers less than 1ml correct to two decimal places.

<table>
<thead>
<tr>
<th></th>
<th>Prescribed</th>
<th>Stock</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>200mg</td>
<td>300mg in 10 ml</td>
</tr>
<tr>
<td>2</td>
<td>7mg</td>
<td>10mg in 2ml</td>
</tr>
<tr>
<td>3</td>
<td>1750 units</td>
<td>1000 units per ml</td>
</tr>
<tr>
<td>4</td>
<td>50mg</td>
<td>50mg in 3ml</td>
</tr>
<tr>
<td>5</td>
<td>1500mg</td>
<td>1g in 10ml</td>
</tr>
<tr>
<td>6</td>
<td>3000 units</td>
<td>5000 units per ml</td>
</tr>
<tr>
<td>7</td>
<td>80mg</td>
<td>100mg in 2ml</td>
</tr>
<tr>
<td>8</td>
<td>200 micrograms</td>
<td>400 micrograms in 2 ml</td>
</tr>
<tr>
<td>9</td>
<td>150mg</td>
<td>250mg/5ml</td>
</tr>
<tr>
<td>10</td>
<td>5mg</td>
<td>4mg in 2ml</td>
</tr>
</tbody>
</table>
Questions for exam preparation for injections and syrups

Paper 1

1) Change 0.067 grams to mg.

2) Change 100.5 mg to grams.

3) Convert 0.0105 grams to micrograms.

4) Convert 0.0005 mg to micrograms.

5) A patient is prescribed 750 mg orally. In the ward are 250 mg capsules. What number of capsules should be given?

6) How many 30 mg tablets of codeine should be given for a prescription of codeine 75 mg?

7) The stock available is 2.5 mg tablets. How many tablets are to be administered if the prescription requires 10 mg?

8) A patient is prescribed 0.5 mg of digoxin orally. The digoxin available is in tablets of 125 micrograms. How many of these tablets should be given to the patient?

9) A patient is prescribed 280 mg of medicine. The strength of the stock syrup is 140 mg per 4 ml. Calculate the volume required.

10) A patient is prescribed 1250 mg of penicillin. Stock contains 1.2 g in 5 ml. Is the volume to be drawn up for injection equal to 5 ml, less than 5 ml or more than 5 ml?

11) Stock of erythromycin contains 300 mg/10 ml. Calculate the volume required for injection when a patient is prescribed 450 mg.

12) 2400 mg of medicine is to be given IV. Stock available is 600 mg in 2.5 ml.

13) A girl is prescribed 140 mg of penicillin. Stock contains 200 mg/5 ml. What volume must be withdrawn for injection?

14) A child is prescribed 300 mg of medicine. Stock contains 1 g in 2 ml. What volume of stock should be drawn up in the syringe?

15) A solution contains fluoxetine 20 mg/5 ml. How many milligrams of fluoxetine are in:
   a) 4 ml  
   b) 10 ml  
   c) 32 ml.
16) 1250 mg of medicine is to be given orally. Stock mixture contain 1 g in 2 ml. Calculate the mixture to be given.

17) A woman is prescribed 120 mg of paracetamol elixir. Stock on hand has a strength of 40 mg/2.5 ml. What volume should be given?

18) A vial of amoxicillin 500 mg is reconstituted with WFI to give a concentration of 200 mg/2ml. Calculate the volume of this solution to be drawn up for injection if the prescription is for: a) 50 mg  b) 90 mg  c) 120 mg.

19) Stock ampoules contain 0.4 mg/2 ml. 0.2 mg of medicine is prescribed. Calculate the volume to be drawn up for injection.

20) Pethidine 140 mg is to be given to a patient. Calculate the volume of stock required if ampoules contain pethidine 100 mg in 2 ml.
1) Change 2.5kg to grams.

2) Change 750g to kilograms.

3) Change 0.7g to milligrams.

4) Change 1.02l to millilitres.

5) Change 705,000 micrograms to grams.

6) Change 0.75mg to grams.

7) A patient is to receive an injection gentamicin 50mg. I.M. Ampoules on hand contain 75mg/3ml. Calculate the volume required.

8) Stock of a medicine has strength 4000 units per ml. What volume must be drawn up to give 6000 units?

9) A patient is prescribed 0.8mg of syrup. Stock contains 0.4mg/3ml. What volume should be drawn up for the injection?

10) Morphine 2.5mg is prescribed. Stock contains 10mg/4ml. What volume should be drawn up for injection?

11) A patient is to be given 20mg. Stock ampoules have strength of 30mg/3ml. What volume of stock should be injected?

12) Calculate the volume to be given orally for these dosages. The strength of the stock is given in brackets.

   a) 50mg of paracetamol elixir (75mg/3ml)
   b) 5.5mg of paracetamol elixir (5mg/5ml)
   c) 7.5mg of penicillin syrup (2.5mg/ml)
   d) 250mg of amoxicillin syrup (1g/10ml)
   e) 35mg of penicillin syrup (70mg/5ml)
   f) 4.5mg of paracetamol syrup (9mg/3ml)
   g) 750mg of syrup (1g/2ml)
Paper 3

1) Change 1.005g to milligrams.

2) Change 0.012l to millilitres.

3) Change 0.0007g to micrograms.

4) Change 0.75 micrograms to milligrams.

5) Change 0.0007g to milligrams.

6) Change 12 micrograms to milligrams.

7) Penicillin 2250mg is ordered. Stock contains 750mg in 5ml. What volume is needed?

8) Heparin is available at strength of 150 units/5ml. What volume is needed to give 450 units?

9) Buscopan 0.15 is ordered. Stock contains 0.45/6ml. Calculate the volume to be drawn up for injection.

10) A boy is prescribed 35mg. Stock contains 50mg per ml. What volume must be withdrawn for injection?

11) A patient is prescribed 375mg. Stock in hand is 750mg/5ml. Calculate the volume to be drawn up for injection.

12) Calculate the volume to be given by injection for these dosages. The strength of the stock is given in brackets.

   a) 0.05mg of Nalaxone (0.1mg/4ml)
   b) 40mg of morphine (80mg/1.5ml)
   c) 6.5mg of morphine (13mg/4ml)
   d) 250mg of Omnopon (1g/12ml)
   e) 0.16mg of medicine (0.4mg/2ml)
   f) 700mg of Vancomycin (1g/10ml)
   g) 1.4mg of medicine (5.6mg/10ml)