The Unofficial Guide to Prescribing

EDITED BY
Zeshan Qureshi
Simon Maxwell
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The Unofficial Guide to Prescribing is the sequel to The Unofficial Guide to Passing OSCEs, which has now sold copies in over 30 countries. We have taken the same principle and applied it to prescribing.

We believe that recent graduates have a unique perspective on what works for students and so have captured their unique insight and language to make complex material more easily digestible. The textbook has been written by junior doctors, with additional reviewing by senior clinicians in the various specialties.

The book is designed to take the theoretical knowledge of medical school and apply it to real life practical situations. When a 55-year-old man with a new diagnosis of Hodgkin lymphoma is confused with a sodium of 118, what do you do? When a 17-year-old girl is unresponsive with a blood sugar of 1.8, what do you do?

Prescribing is a major challenge for students because of its volume and complexity, and the need to gather experience. It is the thing that new graduates fear the most and feel least prepared for, and it's the commonest thing new graduates do which directly affects patient safety and can produce clinical errors.

The Unofficial Guide, much like its OSCE companion, will take you through the practical steps of how you assess, investigate and manage each individual patient, with a focus on prescribing, specifically what you prescribe, and how you prescribe it; with clear examples of generic drug charts showing you how the prescriptions would look in real life.

The book is aimed not just at medical students, but also junior doctors, nursing staff, pharmacists and all those involved in prescribing and hospital care of patients. This book aims to empower you to excel at dealing with emergencies and handling complex prescribing scenarios.

We wish you all the best in any upcoming examinations and your future career. Please get in touch if you have any questions, or you want to get involved in any book writing projects. You could also join our facebook group to learn about new projects: https://www.facebook.com/TheUnofficialGuideToMedicine

Zeshan Qureshi, (zeshanqureshi@doctors.org.uk)
We would like to acknowledge the hard work of the authors and reviewers in the production of this book. I would also like to thank my family, particularly my father, Umer Suleman-Qureshi. He sadly passed away during the development of this book. Dad has been an inspiration in developing my career as a doctor, and I will always be grateful for his love and advice.
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Each scenario is broken down into the following:

- **The scenario as it might present itself to you within hospital practice.**
- **Initial ABCDE assessment of the patient,** divided into three sections: (a) how you will assess each parameter: ‘airway’, ‘breathing’, ‘circulation’, ‘disability’, ‘exposure’; (b) what the assessment findings are in the particular scenario; (c) what immediate management is required.
- **Initial investigations**—what tests are needed to allow you to ascertain: (a) the diagnosis; (b) the severity of the condition; (c) any complications that have arisen. The results of any suggested tests are given.
- **Initial management**—what needs to be done to stabilize the patient, and to start treating the initial diagnosis.
- **Reassessment**—whether the treatment has been effective, or whether there is a need to escalate treatment or consider an alternative diagnosis.
- **Definitive treatment**—what needs to be done to ensure this patient is optimally managed. Other treatments outstanding, who else might need to be involved.
- **Handing over the patient**—summarizing the findings and your involvement to either the specialist, or to your colleague who is taking over responsibility for the patient.

**PRESCRIBING**

Throughout the text are ‘Prescribe’ alerts that tell you exactly what needs to be prescribed. We have emphasized drug classes rather than individual drugs, because of the variability in prescribing practice. Individual drugs are given merely as practical examples, and we have used a variety of drugs within the same broad area (e.g. dalteparin and enoxaparin for thromboprophylaxis) to illustrate different reasonable approaches to the same prescribing challenge.

This is followed by the prescription charts as they would look in these cases. The aim is to show you exactly what will need to be produced in practical prescribing, rather than just theoretically. Please note that prescription charts vary between hospitals. There may also be specialist charts available for oxygen, anticoagulants, insulin and certain IV infusions.

The blank prescription charts on the following pages can be photocopied freely for studying and exam preparations.
# PRESCRIPTION AND ADMINISTRATION RECORD

## Standard Chart

<table>
<thead>
<tr>
<th>Hospital/Ward:</th>
<th>Consultant:</th>
<th>Name of Patient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight:</td>
<td>Height:</td>
<td>Hospital Number:</td>
</tr>
<tr>
<td>If re-written, date:</td>
<td></td>
<td>D.O.B:</td>
</tr>
</tbody>
</table>

## DISCHARGE PRESCRIPTION

Date completed: | Completed by: |

## OTHER MEDICINE CHARTS IN USE

<table>
<thead>
<tr>
<th>Date</th>
<th>Type of Chart</th>
<th>Complete by</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>None known</td>
<td></td>
</tr>
</tbody>
</table>

## PREVIOUS ADVERSE REACTIONS

This section must be completed before any medicine is given

<table>
<thead>
<tr>
<th>Date</th>
<th>Type of Chart</th>
<th>Complete by</th>
</tr>
</thead>
</table>

## CODES FOR NON-ADMINISTRATION OF PRESCRIBED MEDICINE

If a dose is not administered as prescribed, initial and enter a code in the column with a circle drawn round the code according to the reason as shown below. **Inform the responsible doctor in the appropriate timescale.**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Patient refuses</td>
</tr>
<tr>
<td>2</td>
<td>Patient not present</td>
</tr>
<tr>
<td>3</td>
<td>Medicines not available – CHECK ORDERED</td>
</tr>
<tr>
<td>4</td>
<td>Asleep/drowsy</td>
</tr>
<tr>
<td>5</td>
<td>Administration route not available – CHECK FOR ALTERNATIVE</td>
</tr>
<tr>
<td>6</td>
<td>Vomiting/nausea</td>
</tr>
<tr>
<td>7</td>
<td>Time varied on doctor’s instructions</td>
</tr>
<tr>
<td>8</td>
<td>Once only/as required medicine given</td>
</tr>
<tr>
<td>9</td>
<td>Dose withheld on doctor’s instructions</td>
</tr>
<tr>
<td>10</td>
<td>Possible adverse reaction/side effect</td>
</tr>
</tbody>
</table>

## ONCE-ONLY

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Medicine (Approved Name)</th>
<th>Dose</th>
<th>Route</th>
<th>Prescriber – Sign + Print</th>
<th>Time Given</th>
<th>Given By</th>
</tr>
</thead>
</table>

## OXYGEN

| Start Date | Time | Route | Mask (%) | Prongs (L/min) | Prescriber – Sign + Print | Administered by | Stop Date | Stop Time |
|------------|------|-------|----------|---------------|---------------------------|----------------|-----------|-----------|-----------|
**REGULAR THERAPY**

<table>
<thead>
<tr>
<th>Medicine (Approved Name)</th>
<th>Dose</th>
<th>Route</th>
<th>Notes</th>
<th>Start Date</th>
<th>Prescriber – sign + print</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>6</td>
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<td>14</td>
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<td>22</td>
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</table>

**PRESCRIPTION**

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<thead>
<tr>
<th>Medicine (Approved Name)</th>
<th>Dose</th>
<th>Route</th>
<th>Notes</th>
<th>Start Date</th>
<th>Prescriber – sign + print</th>
</tr>
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**PRESCRIPTION**

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<th>Medicine (Approved Name)</th>
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<th>Route</th>
<th>Notes</th>
<th>Start Date</th>
<th>Prescriber – sign + print</th>
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**PRESCRIPTION**

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<thead>
<tr>
<th>Medicine (Approved Name)</th>
<th>Dose</th>
<th>Route</th>
<th>Notes</th>
<th>Start Date</th>
<th>Prescriber – sign + print</th>
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</thead>
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**PRESCRIPTION**

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<thead>
<tr>
<th>Medicine (Approved Name)</th>
<th>Dose</th>
<th>Route</th>
<th>Notes</th>
<th>Start Date</th>
<th>Prescriber – sign + print</th>
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<td>12</td>
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<td>22</td>
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</tbody>
</table>
## INTRAVENOUS FLUID PRESCRIPTION CHART

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<th>Hospital/Ward:</th>
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<th>Name of Patient:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight:</td>
<td>Height:</td>
<td>Hospital Number:</td>
</tr>
<tr>
<td>D.O.B:</td>
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<td>D.O.B:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Date/Time</th>
<th>FLUID</th>
<th>VOLUME</th>
<th>RATE</th>
<th>PRESCRIBER – SIGN AND PRINT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ADDED DRUGS</td>
<td>DOSE</td>
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</tbody>
</table>
### How to use this book

#### Date

<table>
<thead>
<tr>
<th>Blood Glucose (mmol/L)</th>
<th>Insulin (units)</th>
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<tbody>
<tr>
<td>Before breakfast</td>
<td></td>
</tr>
<tr>
<td>Before lunch</td>
<td></td>
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<tr>
<td>Before dinner</td>
<td></td>
</tr>
<tr>
<td>Before bed</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Prescribed by</th>
<th>Given by</th>
</tr>
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<tbody>
<tr>
<td>Before breakfast</td>
<td></td>
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<tr>
<td>Before lunch</td>
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<tr>
<td>Before dinner</td>
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<tr>
<td>Before bed</td>
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</table>

<table>
<thead>
<tr>
<th>Prescribed by</th>
<th>Given by</th>
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</thead>
<tbody>
<tr>
<td>Before evening meal</td>
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</table>

<table>
<thead>
<tr>
<th>Prescribed by</th>
<th>Given by</th>
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<tbody>
<tr>
<td>Before bedtime</td>
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</table>

**Date of Birth:**

<table>
<thead>
<tr>
<th>Pharmacy Stamp</th>
<th>Age</th>
<th>Title, Forename, Surname &amp; Address</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

**Number of days’ treatment N.B. Ensure dose is stated**

**Endorsements**

**Signature of Prescriber**

**Date**

**For Dispenser No. of Prescns. on form**

**FP10NC0105**
# THERAPY REQUIRING LEVEL MONITORING

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Medicine (Approved Name)</th>
<th>Dose</th>
<th>Route</th>
<th>Notes</th>
<th>Start Date</th>
<th>Prescriber–sign + print</th>
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<tr>
<td>ABG</td>
<td>arterial blood gas</td>
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<td>ABPA</td>
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<td>AKI</td>
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<tr>
<td>ALP</td>
<td>alkaline phosphatase</td>
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<tr>
<td>AMT/AMTS</td>
<td>abbreviated mental test/score</td>
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<td>AP</td>
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<tr>
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<td>TA-GvHD</td>
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<td>urea and electrolyte</td>
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<td>VBG</td>
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<td>thiopurine S-methyl transferase</td>
<td>VTE</td>
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<td>TRALI</td>
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<td>WCC</td>
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Station 8.1: Venous thromboembolism (VTE) prophylaxis

You are the surgical junior doctor. A 23-year-old woman (Nicole Smith 05/03/91) is brought to the emergency department with periumbilical pain that has radiated to the right iliac fossa. She also has fever. She is on the oral contraceptive pill and previously her mother had a DVT. Your registrar has reviewed the patient and has decided that this patient requires an appendicectomy tomorrow. She has normal renal function, raised CRP and raised white cell count. The registrar wants you to start regular pain killers (paracetamol and codeine), IV fluids, and IV antibiotics (cefuroxime and metronidazole). Please also perform a VTE prophylaxis assessment and prescribe the appropriate treatment.

### Patient Details

- **Name:** Nicole Smith
- **DOB:** 05/03/91
- **Hospital Number:** 1208973948
- **Weight:** 60kg
- **Height:** 1.6m
- **Consultant:** Mr King
- **Hospital/Ward:** WGH Ward 3
- **Current Medications:** Oral contraceptive pill only
- **Allergies:** No known drug allergies
- **Admission date:** 22/09/14

### General surgery

**Anatole V Wiik**

---

**Station 8.1:** Venous thromboembolism (VTE) prophylaxis

**Station 8.2:** Acute pancreatitis

**Station 8.3:** Intestinal obstruction

**Station 8.4:** Diabetes in the surgical patient

**Station 8.5:** Postoperative fluid loss

---

**THROMBOPROPHYLAXIS**

All patients admitted to hospital require a VTE prophylaxis assessment.

**ASSESSMENT OF VENOUS THROMBOSIS RISK FACTORS**

Surgical patients are at increased risk of VTE (venous thromboembolism) if they have one or more of the following risk factors [1]:

1. Age > 60
2. Dehydration

---

Stop all antiplatelets prior to procedures/operations to prevent bleeding, ideally 10 days (t½ of platelets).

Warfarin should be stopped and covered with LMWH. If INR is significantly raised, consider reversal with Vitamin K, and take advice from haematology. Recommence all as soon as bleeding risk is minimal (which will vary depending on the procedure).
3. Obesity (BMI) > 30
4. Known thrombophilia
5. Critical care admission
6. Pregnancy or post-partum
7. Varicose veins with phlebitis
8. Oestrogen therapy (HRT/OCP)
9. Active cancer or chemotherapy
10. Reduced mobility
11. Personal or family history of DVT
12. Significant medical co-morbidities
13. Surgical procedures taking longer than 90 minutes in theatre
14. Acute admission with infection/inflammation/intra-abdominal condition

GENERAL MEASURES TO REDUCE VTE RISK
1. Keep patient well hydrated
2. Encourage early mobilization
3. Aspirin or clopidogrel is not adequate VTE prophylaxis
4. Consider caval filter if prophylaxis is contraindicated (CI)
5. Utilize regional rather than general anaesthesia

VTE prophylaxis (pharmacological or mechanical) does not need to be routinely offered to all surgical patients. For example, it is not indicated in a patient undergoing a surgical procedure with local anaesthesia by local infiltration with no limitation of mobility.

However, most surgical patients at increased risk of VTE (by the above criteria) should receive mechanical VTE prophylaxis as well as pharmacological (unless contraindicated).

MECHANICAL THROMBOPROPHYLAXIS

Prescribing mechanical thromboprophylaxis
There are several types of mechanical VTE prophylaxis available. Graduated compression stockings, e.g. TED stockings, are the most common. Other possible options used less commonly are intermittent pneumatic compression (thigh or knee), and foot impulse devices.

Contraindications to mechanical VTE prophylaxis
1. Peripheral arterial disease, suspected or proven
2. Peripheral arterial bypass graft
3. Severe leg or pulmonary oedema
4. Peripheral neuropathy
5. Deformity or unusual shape to prevent correct fitting
6. Allergies to materials
7. Ulcers/wounds/cellulitis.

PHARMACOLOGICAL THROMBOPROPHYLAXIS

Risk of bleeding on VTE prophylaxis
Potential contraindications to pharmacological VTE prophylaxis:
1. Active bleeding
2. On anticoagulants INR > 2
3. Significant procedure-related bleeding risk
4. Acute stroke: haemorrhagic or large infarct
5. Untreated inherited or acquired bleeding disorders (e.g. haemophilia, Von Willebrand disease)
6. Severe/acute liver disease
7. Platelets < 75 x 10^9/L or abnormal clotting screen
8. BP > 230 mmHg systolic or > 120 mmHg diastolic
9. Lumbar puncture/epidural/spinal anaesthesia in previous 4 hours or within next 12 hours

Offer to patient and/or families information on:
1. Risks and possible consequence of VTE
2. Importance of VTE prophylaxis and its possible side effects
3. The correct use of VTE prophylaxis
4. How patients themselves can reduce their risk of VTE.

In those whom thromboprophylaxis is felt not indicated, this should be reassessed on a daily basis while in hospital.
**PRESCRIBING PHARMACOLOGICAL THROMBOPROPHYLAXIS**

The option depends on renal function.

If normal renal function, prescribe subcutaneous LMWH/factor Xa inhibitor (e.g. enoxaparin, or dalteparin, or fondaparinux).

Several possible variants occur in reduced renal function, so consult your local hospital formulary. Both the definition of reduced renal function, and the management will vary from trust to trust.

Two example protocols:

- **Definition of reduced renal function:** eGFR < 30 mL/min
  - **Action in reduced renal function:** prescribe subcutaneous unfractionated heparin instead of LMWH
- **Definition of reduced renal function:** eGFR < 20 mL/min
  - **Action in reduced renal function:** standard dose of dalteparin can be prescribed, but antifactor Xa levels need to be monitored. The peak level is measured 4 hours post-dose, and trough level immediately pre-dose. This should be done every 4–5 days while on LMWH. Peaks > 0.6 and troughs > 0.3 anti-Xa units/mL indicate a need for dose reduction.

**NICOLE’S RISK FACTORS AND BLEEDING RISK**

1. Nicole is a surgical patient
2. She is an acute admission with an inflammatory/infective/intra-abdominal condition
3. She currently is using the OCP, which promotes a prothrombotic state
4. She has a family history of DVTs, which gives her a theoretical risk of thrombosis
5. She potentially could be a critical care admission if she becomes septic
6. If she has a complicated appendicectomy and her procedure could potentially take longer than 90 minutes.

Nicole has no bleeding risk factors. Therefore, in addition to mechanical VTE prophylaxis, heparin prophylaxis is required as her VTE risk is high.

Note that the patient will need to be fasted preoperatively. Policy for this will vary between units. Once a time for surgery is settled, the patient, for instance, would not be allowed water or oral medications for 4 hours preoperatively. Therefore, oral medications would not be allowed in this time window.

**ADDITIONAL VTE PROPHYLAXIS EXAMPLES: SEE PRESCRIBE BOXES IN MARGIN (DRUG CHARTS NOT SHOWN)**

**EXAMPLE 1**

Mr Smith is a 58-year-old gentleman with pancreatic cancer, admitted for a Whipple’s resection. He is known to have peripheral arterial disease, and has normal renal function.

**EXAMPLE 2**

Mrs Mercury is a 59-year-old lady with cholecystitis secondary to gall stones. She is scheduled for an emergency cholecystectomy. She has chronic kidney disease (eGFR 20 mL/min).

---

**PRESCRIBE (see Figs 8.1 & 8.2)**

**Pharmacological VTE Prophylaxis, e.g.**

**DALTEPARIN 5000 units SC OD**

**Mechanical VTE Prophylaxis, e.g.**

**TED STOCKINGS 1 pair TOP CONT**

**Additional prescriptions for analgesia, infection and fluid support:**

- Analgesia, e.g. **PARACETAMOL 1 g ORAL QDS**
- **CODEINE PHOSPHATE 30 mg ORAL QDS**
- **CEFUROXIME 750 mg IV (over 30 mins) TDS**
- **METRONIDAZOLE 500 mg IV (over 20–30 mins) TDS**
- **Fluids, e.g. 0.9% SODIUM CHLORIDE 1000 mL (with 20 mmol KCl) 100 mL/h, followed by 5% GLUCOSE 1000 mL (with 20 mmol KCl) 100 mL/h, followed by 5% GLUCOSE 1000 mL (with 20 mmol KCl) 100 mL/h**

**PRESCRIBE EXAMPLE 1**

Pharmacological VTE Prophylaxis, (e.g. **ENOXAPARIN 40 mg OD SC**), but do not give mechanical VTE prophylaxis due to peripheral artery disease.

**PRESCRIBE EXAMPLE 2**

Subcutaneous unfractionated heparin (e.g. **HEPARIN 5000 units BD SC**) and mechanical VTE prophylaxis (e.g. **TED STOCKINGS 1 pair TOP CONT**).
<table>
<thead>
<tr>
<th>Medicine (Approved Name)</th>
<th>Dose</th>
<th>Route</th>
<th>Notes</th>
<th>Prescriber – sign + print</th>
<th>Start Date</th>
<th>Date</th>
<th>Time</th>
<th>Date</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>PARACETAMOL</td>
<td>1 g</td>
<td>ORAL</td>
<td></td>
<td></td>
<td>22/09/14</td>
<td>6</td>
<td>12</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>CODEINE PHOSPHATE</td>
<td>30 mg</td>
<td>ORAL</td>
<td></td>
<td></td>
<td>22/09/14</td>
<td>6</td>
<td>12</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>CEFUROXIME</td>
<td>750 mg</td>
<td>IV</td>
<td></td>
<td></td>
<td>22/09/14</td>
<td>6</td>
<td>12</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>METRONIDAZOLE</td>
<td>500 mg</td>
<td>IV</td>
<td></td>
<td></td>
<td>22/09/14</td>
<td>6</td>
<td>12</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>DALTEPARIN</td>
<td>5000 units</td>
<td>SC</td>
<td></td>
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<td>12</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>TED STOCKINGS</td>
<td>1 pair</td>
<td>TOP</td>
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<td>22/09/14</td>
<td>6</td>
<td>12</td>
<td>14</td>
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</table>

Figure 8.1
**INTRAVENOUS FLUID PRESCRIPTION CHART**

<table>
<thead>
<tr>
<th>Hospital/Ward: WGH WARD 3</th>
<th>Consultant: MR KING</th>
<th>Name of Patient: NICOLE SMITH</th>
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<td>Height: 1.6 m</td>
<td>Hospital Number: 1208973948</td>
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<tr>
<td></td>
<td></td>
<td>D.O.B: 05/03/91</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Date/Time</th>
<th>FLUID</th>
<th>VOLUME</th>
<th>ADDED DRUGS</th>
<th>DOSE</th>
<th>RATE</th>
<th>PRESCRIBER – SIGN AND PRINT</th>
</tr>
</thead>
<tbody>
<tr>
<td>22/09/14</td>
<td>0.9% SODIUM CHLORIDE</td>
<td>1000mL</td>
<td>POTASSIUM CHLORIDE</td>
<td>20mmol</td>
<td>100mL/h</td>
<td>J. Meyer JOHN MEYER</td>
</tr>
<tr>
<td>23/09/14</td>
<td>5% GLUCOSE</td>
<td>1000mL</td>
<td>POTASSIUM CHLORIDE</td>
<td>20mmol</td>
<td>100mL/h</td>
<td>J. Meyer JOHN MEYER</td>
</tr>
<tr>
<td>23/09/14</td>
<td>5% GLUCOSE</td>
<td>1000mL</td>
<td>POTASSIUM CHLORIDE</td>
<td>20mmol</td>
<td>100mL/h</td>
<td>J. Meyer JOHN MEYER</td>
</tr>
</tbody>
</table>

Figure 8.2
Station 8.2: Acute pancreatitis

You are the surgical junior doctor in the emergency department. A 42-year-old obese female with a background of gallstones presents with severe epigastric pain radiating to the back. She has vomited on multiple occasions and feels that she is becoming more breathless. Please assess her and commence appropriate management.

### Initial Assessment

**Airway**
- Assess the patency of her airway. Does she have any vomitus obstructing her airway?

> ‘The airway is secure and patent, as she is responding to questions.’

Continue to monitor the airway, but no intervention currently required.

**Breathing**
- Assess the rate and depth of respiration. Is she using her accessory muscles for respiration? Check oxygen saturations. Auscultate her chest: does she have any degree of lung impairment, crackles or wheeze?

> ‘RR 28/min, oxygen saturations are 92% pre-oxygen therapy. She is using her accessory muscles of respiration. She has reduced air entry and crackles are heard throughout both lung fields bilaterally with some wheeze. She is complaining that she cannot catch her breath.’

This lady is tachypnoeic and unable to maintain normal saturations. She requires high-flow oxygen on a non-rebreather mask, and optimization of pain control. Could consider NSAIDs or other opiates such as pethidine or tramadol, but trial morphine if pain is severe: a PCA may be required to control the pain.

**Circulation**
- Assess her CRT, pulse and blood pressure. Check her mucus membranes and assess her hydration status by looking at her tongue and skin turgor

> ‘HR 115 bpm, BP 90/60 mmHg, and CRT 3 seconds peripherally. Her hands are moist and cool with a thready pulse. Her mucous membranes are dry. Her eyes appear sunken. Her heart sounds are normal with no murmurs.’

This lady is intravascularly depleted. She needs aggressive fluid resuscitation. Two large bore IV cannulae (14 or 16 G) should be inserted (while simultaneously taking bloods) and a fluid challenge should be given (e.g. over 15 minutes). A urinary catheter should be inserted to assess end-organ perfusion.

---

**Differential diagnosis of epigastric pain**
- Inferior MI
- Peptic ulcer disease
- Perforated peptic ulcer
- Symptomatic gallstones
- Dissecting aortic aneurysm
- Small bowel obstruction
- Oesophagitis

**Causes of acute pancreatitis**
- Gallstones (40%)
- Alcohol (40%)
- Idiopathic (10%)
- ERCP
- Hyperlipidaemia
- Viral (mumps, coxsackie)
- Drugs (azathioprine, tamoxifen, corticosteroids, valproate, ASA)
- Autoimmune (vasculitides)

**Complications of pancreatitis**
- Early: shock, acute respiratory distress syndrome (ARDS), SIRS, hypocalcaemia, renal failure, hyperglycaemia, retroperitoneal haemorrhage
- Late: pseudocyst formation, pancreatic abscess formation, necrotizing pancreatitis, recurrent pancreatitis, pancreatic cancer

**Management summary: acute pancreatitis**
- Aggressive resuscitation
- Assessment of disease severity
- Early ITU involvement in severe pancreatitis
- Imaging to identify aetiology and severity
- Early nutritional support
- Avoid antibiotics unless disease identified
- Treatment in specific aetiology (i.e. ERCP)

---

**Patient Details**

| Name:     | Jane Smith          |
| DOB:      | 05/03/72            |
| Hospital Number: | J345789          |
| Weight:  | 85 kg               |
| Height:  | 1.6 m               |
| Consultant: | Mr King            |
| Hospital/Ward: | BFH Surgical        |
| Current Medications: | None             |
| Allergies: | No known drug allergies |
| Admission date: | 22/09/14          |
DISABILITY
- Assess her GCS and her glucose levels

‘She has normal neurological function with a 15/15 GCS and her last blood sugar was 10 mmol/L.’

No action currently required.

EXPOSURE
- Examine the abdomen as this is the source of the pain. Does she have any bruising around the flanks or periumbilical region? Does she have any tenderness on palpation? Are there any signs of peritonism, such as rebound, guarding or percussion-induced pain? Assess for flank tenderness. Measure temperature

‘This lady does not have any ecchymosis in the flank (Grey–Turner’s sign) or periumbilical (Cullen’s sign) area. Her abdomen is soft, but extremely tender throughout, mainly around the epigastric region. There is voluntary guarding, but no abdominal distension, or percussion tenderness. Her bowel sounds are present and her temperature is 37.5°C.’

INITIAL INVESTIGATIONS
- Arterial blood gas: A metabolic acidosis is characterized by a low pH and bicarbonate with an increasingly negative base excess and elevated lactate. She may be compensating her pH by hyperventilating; a low CO₂ would confirm this

- Baseline bloods: FBC, U&E, CRP, LFT, amylase, LDH, calcium, coagulation profile and blood sugar. A raised amylase, 3 times its upper limit, is highly sensitive for acute pancreatitis. Assess her LFTs, raised ALP and bilirubin may be due to a stone in her common bile duct, and this could be causing pancreatitis. A CRP is a good surrogate to assess inflammation, the greater the more aggressive the inflammatory process. A raised WCC count may indicate infection (sometimes upper abdominal pain can be caused by a lower lobe pneumonia, or abdominal sepsis) but may be raised purely due to pancreatitis. A dropping Hb may be a sign of retroperitoneal haemorrhage. Additional bloods listed are used for severity scoring

- Imaging: A CXR is extremely important to assess any element of ARDS. Diffuse bilateral pulmonary infiltrates are indicative of severe pancreatitis and that respiratory support may be pending. No free air under the diaphragm reduces the likelihood of perforation. An ultrasound is important; this will determine the aetiology and severity of the pancreatitis. 40% of pancreatitis is due to gallstones. The presence of stones and a dilated CBD is a good indicator of its origin. A non-dilated CBD does not exclude gallstones as the cause of pancreatitis

Table 8.1 Miss Smith’s blood results, and ABG result

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Normal range (Units)</th>
</tr>
</thead>
<tbody>
<tr>
<td>WCC</td>
<td>18 x 10⁹/L</td>
<td>4–11 (x 10⁹/L)</td>
</tr>
<tr>
<td>Neutrophil</td>
<td>12 x 10⁹/L</td>
<td>2–7.5 (x 10⁹/L)</td>
</tr>
<tr>
<td>Lymphocyte</td>
<td>4 x 10⁹/L</td>
<td>1.4–4 (x 10⁹/L)</td>
</tr>
<tr>
<td>Platelet</td>
<td>300 x 10⁹/L</td>
<td>150–400 (x 10⁹/L)</td>
</tr>
<tr>
<td>Haemoglobin</td>
<td>135 g/L</td>
<td>Men: 135–177 (g/L)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Women: 115–155 (g/L)</td>
</tr>
<tr>
<td>PT</td>
<td>12 seconds</td>
<td>11.5–13.5 seconds</td>
</tr>
<tr>
<td>APTT</td>
<td>30 seconds</td>
<td>26–37 seconds</td>
</tr>
<tr>
<td>CRP</td>
<td>250 mg/L</td>
<td>0–5 (mg/L)</td>
</tr>
<tr>
<td>Urea</td>
<td>16.5 mmol/L</td>
<td>2.5–6.7 (mmol/L)</td>
</tr>
<tr>
<td>Creatinine</td>
<td>175 μmol/L</td>
<td>79–118 (μmol/L)</td>
</tr>
<tr>
<td>Sodium</td>
<td>138 mmol/L</td>
<td>135–146 (mmol/L)</td>
</tr>
</tbody>
</table>

(Cont’d)
Table 8.1 (Cont’d)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Normal range (Units)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potassium</td>
<td>4 mmol/L</td>
<td>3.5–5.0 (mmol/L)</td>
</tr>
<tr>
<td>eGFR</td>
<td>36 mL/min</td>
<td>&gt;60 (mL/min)</td>
</tr>
<tr>
<td>Bilirubin</td>
<td>50 μmol/L</td>
<td>&lt;17 (μmol/L)</td>
</tr>
<tr>
<td>ALT</td>
<td>45 IU/L</td>
<td>&lt;40 (IU/L)</td>
</tr>
<tr>
<td>ALP</td>
<td>200 IU/L</td>
<td>39–117 (IU/L)</td>
</tr>
<tr>
<td>Amylase</td>
<td>477 IU/L</td>
<td>25–125 (IU/L)</td>
</tr>
<tr>
<td>LDH</td>
<td>460 IU/L</td>
<td>240–480 (IU/L)</td>
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<tr>
<td>Glucose</td>
<td>5.6 mmol/L</td>
<td>4.5–5.6 (mmol/L) (fasting)</td>
</tr>
<tr>
<td>Calcium (corrected)</td>
<td>2.20 mmol/L</td>
<td>2.20–2.67 (mmol/L)</td>
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<tr>
<td>Albumin</td>
<td>40 g/L</td>
<td>35–50 (g/L)</td>
</tr>
<tr>
<td>Lactate</td>
<td>3 mmol/L</td>
<td>0.6–2.4 (mmol/L)</td>
</tr>
<tr>
<td>pH</td>
<td>7.32</td>
<td>7.35–7.45</td>
</tr>
<tr>
<td>PaCO₂</td>
<td>4 kPa</td>
<td>4.8–6.1 (kPa)</td>
</tr>
<tr>
<td>HCO₃⁻</td>
<td>18 mmol/L</td>
<td>22–26 (mmol/L)</td>
</tr>
<tr>
<td>PaO₂</td>
<td>10 kPa</td>
<td>10.6–13.3 (kPa) on air</td>
</tr>
<tr>
<td>BE</td>
<td>−4 mmol/L</td>
<td>±2 (mmol/L)</td>
</tr>
</tbody>
</table>

‘ABG shows a pH of 7.32, PaCO₂ 4 kPa, PaO₂ 10 kPa, HCO₃⁻ 18 mmol/L, lactate 3 mmol/L and BE is −4 mmol/L. Hb 135g/L, CRP 250mg/L, WCC 18 × 10⁹/L, amylase 477IU/L, bilirubin 50μmol/L, ALT 45IU/L, ALP 200IU/L, potassium 4mmol/L, sodium 138mmol/L, creatinine 175μmol/L and urea 16.5mmol/L (eGFR 36 mL/min). Initial Imrie score is 2 (WCC and urea). CXR shows mild bilateral pulmonary infiltrates, no free air under the diaphragm. USS shows multiple gallstones with a CBD diameter of 12 mm. The pancreas is markedly inflamed, but no obvious collections.’

INITIAL MANAGEMENT [2]

- **Get help early**: ITU team and senior surgical team members
- **Airway and breathing support**: High-flow oxygen with a non-rebreather mask, maintain oxygen saturation > 94%
- **Analgesia**: Opioids early to prevent any splinting of diaphragm due to pain. Patients generally require a PCA to control the pain; the ITU team will help you with this, but you can start with a regular oral morphine preparation
- **Fluid support**: Monitor intravascular fluid volume with serial creatinine and urine output. Patients with severe pancreatitis normally need > 5L within the first 24 hours due to third space loss (the space between tissues where fluid does not normally collect). May require central access for blood pressure monitoring and accurate fluid balance
- **Nutrition**: Acute pancreatitis is a catabolic event and promotes nutritional deterioration. Early feeding plays an important role in accelerating recovery. Start with oral fluids and avoid fatty foods. NG/NJ feeds may be required if unable to tolerate oral feeds. TPN is used for specific indications such as a paralytic ileus
- **Supportive**: VTE prophylaxis as guided by trust guidelines, both mechanical and pharmacological
- **Gastric protection**: A lot of patients will get started on proton pump inhibitors since they present with epigastric pain initially, which could be caused by a gastric ulcer. It would be reasonable to start one in this case. However, they are not indicated routinely in pancreatitis, particularly if it is mild
- **The patient should be placed nil by mouth given the severe pain and vomiting. Oral medications (plus fluid and diet) can be restarted as soon as the patient can tolerate them. This could be after as little as a day if the pancreatitis is mild, but may be several weeks.

**Modified glasgow score (IMRIE)**

- **Age** > 55 years
- **WCC** > 15 × 10⁹/L
- **Blood glucose** > 10 mmol/L
- **AST or ALT** > 200 IU/L
- **LDH** > 600 IU/L
- **Serum urea** > 16 mmol/L
- **Serum Ca** < 2 mmol/L
- **Serum albumin** < 32 g/L
- **PaO₂** < 7.9 kPa on air
  
  Score ≥ 3 is indicative of severe pancreatitis. Carries a 40% mortality. In this case, the score is 2 due to the WCC of 18 × 10⁹/L and urea of 16.5 mmol/L.

**PRESCRIBE (see Figs 8.3–8.4)**

- **Proton pump inhibitor**, e.g. **ESOMEPRAZOLE 40 mg IV (over 10–30 mins) OD**
- **Thromboprophylaxis**, e.g. **DALTEPARIN 5000 units OD SC and TED STOCKINGS TOP CONT**
- **Regular analgesia**, e.g. **MORPHINE SULFATE 5 mg IV 4 HOURLY (titrate to response) IV (with antiemetic, e.g. CYCLIZINE 50 mg IV TDS)**
**REASSESSMENT**

It is integral to continue monitoring these patients. They can deteriorate rapidly. Early and continued disease scoring (at least every 24 hours) with the modified Glasgow score (Imrie) is helpful. A score of 3 and greater signifies severe disease. The important aspects to consider early are pain control, fluid resuscitation and diagnostic/therapeutic tools to aid in diagnosing and treating the underlying condition. If no improvement, high resolution CT scan would be necessary to look for complications such as pseudocyst formation and, in the event of positive findings the case would need to be managed at a specialist pancreatic centre.

‘After initial fluid resuscitation, and analgesia, Mrs Smith is more stable. Airway is patent, RR is 18/min, saturating 100% on 15 L/min oxygen. The patient is less dehydrated with HR 80 bpm, BP 110/75 mmHg and CRT < 2 seconds. Urine output is 0.4 mL/kg/h. No further vomiting. Pain is still severe, rated at 7/10 despite morphine regularly.’

Oxygen should be titrated down while maintaining saturations above 94%. The patient has responded well to a fluid bolus. However, on-going fluids will be required, as the patient is currently NBM. On top of this, the patient is in acute renal failure, is slightly tachycardic, with a poor urine output, so giving fluids at a faster rate than maintenance is required. Fluid requirement will need to be assessed frequently. Anaesthetic input is likely needed for pain review: a PCA is probably now required.

**HANDING OVER THE PATIENT**

‘Miss Smith is a 42-year-old lady with acute pancreatitis. She presented with severe epigastric pain and dehydration. She has been stabilized with regular morphine sulfate and paracetamol analgesia, a 500 mL 0.9% sodium chloride bolus and oxygen therapy.

Admission ABG showed a lactic acidosis, pH of 7.32, PaCO₂ 4 kPa, HCO₃⁻ 18 mmol/L, lactate 3 mmol/L, BE -4 mmol/L. Amylase is 477 IU/L. There is evidence of cholestasis with a bilirubin 50 µmol/L, ALP 200 IU/L, and pre-renal renal failure with creatinine 175 µmol/L and urea 16.5 mmol/L. Glucose is normal. CXR shows mild bilateral pulmonary infiltrates, with no free air under the diaphragm.

She has had early scorings (currently Imrie 2) pancreatitis and an USS has demonstrated GB disease with a dilated CBD. Her pancreas is moderately inflamed but appears uncomplicated.

She is currently haemodynamically stable. Her urine output is approximately 0.4 mL/kg/h. Current observations, RR 18/min, oxygen saturations 95% on 8 L/min oxygen, HR 80 bpm, BP 110/75 mmHg, apyrexial, with 7/10 pain.

She has been placed nil by mouth and is on intravenous fluids. IV morphine is being used to control pain, with cyclizine as an antiemetic. An endoscopic retrograde cholangiopancreatography (ERCP) referral has been made for the gallstones.

The plan is to continue 500 mL/h of 0.9% sodium chloride for the next 4 hours, and commence discussion with anaesthetics about starting a PCA to optimize pain control. She needs to be discussed with the ITU team. She also will require a fluid review, repeat bloods and a repeat gas later this evening.’

**PRESCRIBE**

(see Figs 8.3–8.5)

Further fluids, e.g. 0.9% SODIUM CHLORIDE 1L with 20mmol KCl 500 mL/h

OXYGEN, e.g. 8 L/min via MASK

STOP

---

Initial oxygen prescription
General surgery

PRESCRIPTION AND ADMINISTRATION RECORD

Standard Chart

<table>
<thead>
<tr>
<th>Hospital/Ward: BFH SURGICAL</th>
<th>Consultant: MR KING</th>
<th>Name of Patient: JANE SMITH</th>
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<tbody>
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<td>Height: 1.6m</td>
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</tr>
<tr>
<td>If re-written, date:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DISCHARGE PRESCRIPTION</td>
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<td>Completed by:</td>
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OTHER MEDICINE CHARTS IN USE

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PREVIOUS ADVERSE REACTIONS

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<tbody>
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<td></td>
<td>Non known</td>
<td></td>
</tr>
</tbody>
</table>

Completed by: J. Meyer JOHN MEYER Date: 22/09/14

CODES FOR NON-ADMINISTRATION OF PRESCRIBED MEDICINE

If a dose is not administered as prescribed, initial and enter a code in the column with a circle drawn round the code according to the reason as shown below. Inform the responsible doctor in the appropriate timescale.

1. Patient refuses
2. Patient not present
3. Medicines not available – CHECK ORDERED
4. Asleep/drowsy
5. Administration route not available – CHECK FOR ALTERNATIVE
6. Vomiting/nausea
7. Time varied on doctor’s instructions
8. Once only/as required medicine given
9. Dose withheld on doctor’s instructions
10. Possible adverse reaction/side effect

ONCE-ONLY

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Medicine (Approved Name)</th>
<th>Dose</th>
<th>Route</th>
<th>Prescriber – Sign + Print</th>
<th>Time Given</th>
<th>Given By</th>
</tr>
</thead>
<tbody>
<tr>
<td>22/09/14</td>
<td>19.30</td>
<td>MORPHINE SULFATE</td>
<td>5 to 10 mg</td>
<td>IV</td>
<td>J. Meyer JOHN MEYER</td>
<td>19.30</td>
<td>JS</td>
</tr>
<tr>
<td>22/09/14</td>
<td>19.30</td>
<td>CYCLIZINE</td>
<td>50mg</td>
<td>IV</td>
<td>J. Meyer JOHN MEYER</td>
<td>19.30</td>
<td>JS</td>
</tr>
</tbody>
</table>

OXYGEN

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Mask (%)</th>
<th>Prongs (L/min)</th>
<th>Prescriber – Sign + Print</th>
<th>Administered by</th>
<th>Stop Date</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>22/09/14</td>
<td>19.30</td>
<td>1/2L/m via NON-REBREATHER MASK</td>
<td>J. Meyer JOHN MEYER</td>
<td>JS</td>
<td>22/09/14 20.30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>22/09/14</td>
<td>20.30</td>
<td>8L/m via MASK</td>
<td>J. Meyer JOHN MEYER</td>
<td>JS</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 8.3
<table>
<thead>
<tr>
<th>Medicine (Approved Name)</th>
<th>Dose</th>
<th>Route</th>
<th>Notes</th>
<th>Start Date</th>
<th>Prescriber – sign + print</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESOPEMPAZOLE</td>
<td>40mg</td>
<td>IV</td>
<td>over 10-30 mins</td>
<td>22/09/14</td>
<td>John Meyer JOHN MEYER</td>
</tr>
<tr>
<td>MORPHINE SULFATE</td>
<td>5mg</td>
<td>IV</td>
<td>Titrate to response</td>
<td>22/09/14</td>
<td>John Meyer JOHN MEYER</td>
</tr>
<tr>
<td>TED STOCKINGS</td>
<td></td>
<td>TOP</td>
<td></td>
<td>22/09/14</td>
<td>John Meyer JOHN MEYER</td>
</tr>
<tr>
<td>DALTEPARIN</td>
<td>5000 units</td>
<td>SC</td>
<td></td>
<td>22/09/14</td>
<td>John Meyer JOHN MEYER</td>
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<tr>
<td>CYCLIZINE</td>
<td>50mg</td>
<td>IV</td>
<td></td>
<td>22/09/14</td>
<td>John Meyer JOHN MEYER</td>
</tr>
</tbody>
</table>

**Figure 8.4**
### INTRAVENOUS FLUID PRESCRIPTION CHART

**Hospital/Ward:** BFH SURGICAL  
**Consultant:** MR KING  
**Name of Patient:** JANE SMITH  
**Hospital Number:** J345789  
**D.O.B:** 05/03/72

<table>
<thead>
<tr>
<th>Weight: 85kg</th>
<th>Height: 1.6m</th>
</tr>
</thead>
</table>

#### FLUID PRESCRIPTION

<table>
<thead>
<tr>
<th>Date/Time</th>
<th>FLUID</th>
<th>VOLUME</th>
<th>RATE</th>
<th>PRESCRIBER – SIGN AND PRINT</th>
</tr>
</thead>
<tbody>
<tr>
<td>22/09/14 19.30</td>
<td>0.9% SODIUM CHLORIDE</td>
<td>500mL</td>
<td>Over 15min</td>
<td>J. Meyer JOHN MEYER</td>
</tr>
<tr>
<td>22/09/14 20.00</td>
<td>0.9% SODIUM CHLORIDE</td>
<td>1L</td>
<td>500mL/h</td>
<td>J. Meyer JOHN MEYER</td>
</tr>
</tbody>
</table>

**Figure 8.5**
Station 8.3: Intestinal obstruction

You are the surgical junior doctor on-call clerking in the emergency department. You are asked to see a 62-year-old man who presents with colicky abdominal pain and distension associated with nausea and vomiting. On closer questioning, you realize he has not opened his bowels for the past 3 days and in the past has had an appendicectomy for a perforated appendix.

**Patient Details**
- **Name:** Julio Smith
- **DOB:** 05/03/52
- **Hospital Number:** J345333
- **Weight:** 70kg
- **Height:** 1.6 m
- **Consultant:** Mr Sing
- **Hospital/Ward:** GDH Surgical
- **Current Medications:** None
- **Allergies:** Penicillin (rash)
- **Admission date:** 22/09/14

**Initial Assessment**

**Airway**
- Assess the patency of his airway. Does he have any vomitus obstructing his airway?

  ‘The airway is patent.’

  No additional airway support is required.

**Breathing**
- Assess the rate and depth of respiration. Assess his work of breathing and his oxygen saturations. Percuss the lung fields. Auscultate to assess air entry or presence of crackles.

  ‘RR 20/min, oxygen saturation 96% in room air. He has slightly reduced air entry bilaterally and minimal crackles at the base, otherwise is normal. He is complaining of worsening abdominal pain on deep inspiration.’

  The patient is saturating well in air, but there is possible evidence of atelectasis, or aspiration pneumonia. Abdominal distension and pain can cause atelectasis, which will impair proper ventilation and perfusion. Prescribe analgesia, and order a CXR.

**Circulation**
- Assess the haemodynamic stability by assessing the pulse, blood pressure with pulse pressure width, CRT, skin temperature and mucous membranes.

  ‘HR 110 bpm, BP 110/90 mmHg, CRT 3 seconds and mucous membranes are pink and dry. During the past 48 hours, he mentions that he has passed less urine and that it appears concentrated.’

  This man will require 2 large-bore IV cannulae (with bloods taken simultaneously) and a fluid challenge. Reassessment should occur immediately after. The best way to assess his response is by assessing his urine output and vital signs. A narrow pulse pressure is a good indicator of an intravascularly depleted patient.

**Disability**
- Assess the patient’s consciousness using the Glasgow coma scale. Is the patient confused or agitated? What’s the capillary glucose reading?

  ‘This man’s GCS is E4, M6, V4 = 14/15. He seems a bit confused and his blood sugar currently is 7 mmol/L.

  His confusion is probably due to his depleted intravascular volume, or due to infection, and this should be thoroughly assessed, as well as considering other potential causes of confusion, e.g. metabolic disturbances.
Expose and examine this gentleman’s abdomen and hernial orifices thoroughly. Complete the assessment by doing a digital rectal examination. Pay extra attention to any signs of peritonism as this may indicate a perforated viscus.

‘The abdomen is generally distended but particularly centrally, and he has an appendicectomy scar in the RIF. On palpation his abdomen is tender, but there is no local tenderness, guarding or rigidity. On percussion his abdomen is tympanic and his bowels sounds are hyperactive. The rectal and hernial examination was unremarkable.’

This patient has the cardinal signs of intestinal obstruction. It is important to rule out any hernias as this is a common cause of obstruction; check previous incision sites. Rigidity, guarding and absent/reduced bowel sounds are features of perforation or strangulation. These features warrant a surgical emergency.

**INITIAL INVESTIGATIONS**

- **Bloods:** Haemoglobin, FBC, CRP, electrolytes, coagulation, amylase, LFTs, group and save. Raised WCC and CRP may indicate perforation or strangulation. A raised creatinine and urea may indicate acute renal failure due to dehydration. Electrolyte disturbances can cause a non-mechanical cause of intestinal obstruction. A raised amylase may indicate this is pancreatitis (presenting as an ileus). Abdominal pain may be due to gallstones/liver dysfunction. A group and save and coagulation screen should also be sent if you think the patient may require surgical intervention.

- **ABG:** An acidosis on ABG with a raised lactate may indicate ischaemia secondary to strangulation.

- **Erect CXR:** Identifies any free air under the diaphragm with intestinal perforation. Assess if there is any evidence of aspiration pneumonia such as consolidation.

- **AXR:** Assessing for dilated loops of bowel. Small bowel obstruction has complete bands through the bowel wall called plica circularis (or valvulae conniventes). Large bowel dilatation is markedly larger and has haustra. Small bowel tends to be more central, whereas large bowel tends to be more peripheral. A CT scan will be able to definitely say where the obstruction might be, and might identify a secondary cause, e.g. an obstructing tumour.

- **Urine dipstick:** To assess for evidence of a UTI. β-hCG if female as she may be pregnant. Urinary glucose as may be a newly diagnosed diabetic presenting with abdominal pain.

‘ABG is normal. WCC 8 × 10^9/L, CRP 7 mg/L, sodium 138 mmol/L, potassium 4.1 mmol/L, urea 12 mmol/L, and creatinine 130 µmol/L (eGFR 53 mL/min), other bloods normal. Erect CXR shows no free air under the diaphragm and no abnormalities in the lung zones. AXR shows multiple centrally positioned dilated bowel loops. The bowel loops appear to be of small bowel as the presence of valvulae conniventes are seen. The maximum diameter is 5 cm.’

Table 8.2 Mr Smith’s blood results and ABG result

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Normal range (Units)</th>
</tr>
</thead>
<tbody>
<tr>
<td>WCC</td>
<td>8 × 10^9/L</td>
<td>4–11 (× 10^9/L)</td>
</tr>
<tr>
<td>Platelet</td>
<td>300 × 10^9/L</td>
<td>150–400 (× 10^9/L)</td>
</tr>
<tr>
<td>Haemoglobin</td>
<td>140 g/L</td>
<td>Men: 135–177 (g/L)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Women: 115–155 (g/L)</td>
</tr>
<tr>
<td>PT</td>
<td>13 seconds</td>
<td>11.5–13.5 seconds</td>
</tr>
<tr>
<td>APTT</td>
<td>32 seconds</td>
<td>26–37 seconds</td>
</tr>
<tr>
<td>CRP</td>
<td>7 mg/L</td>
<td>0–5 (mg/L)</td>
</tr>
<tr>
<td>Urea</td>
<td>12 mmol/L</td>
<td>2.5–6.7 (mmol/L)</td>
</tr>
<tr>
<td>Creatinine</td>
<td>130 µmol/L</td>
<td>79–118 (µmol/L)</td>
</tr>
</tbody>
</table>

(Cont’d)
Table 8.2 (Cont’d)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Normal range (Units)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium</td>
<td>138 mmol/L</td>
<td>135–146 (mmol/L)</td>
</tr>
<tr>
<td>Potassium</td>
<td>4.1 mmol/L</td>
<td>3.5–5.0 (mmol/L)</td>
</tr>
<tr>
<td>eGFR</td>
<td>53 mL/min</td>
<td>&gt;60 (mL/min)</td>
</tr>
<tr>
<td>Bilirubin</td>
<td>7 μmol/L</td>
<td>&lt;17 (μmol/L)</td>
</tr>
<tr>
<td>ALT</td>
<td>20 IU/L</td>
<td>&lt;40 (IU/L)</td>
</tr>
<tr>
<td>ALP</td>
<td>100 IU/L</td>
<td>39–117 (IU/L)</td>
</tr>
<tr>
<td>Amylase</td>
<td>100 IU/L</td>
<td>25–125 (IU/L)</td>
</tr>
<tr>
<td>Calcium (corrected)</td>
<td>2.20 mmol/L</td>
<td>2.20–2.67 (mmol/L)</td>
</tr>
<tr>
<td>Albumin</td>
<td>40 g/L</td>
<td>35–50 (g/L)</td>
</tr>
<tr>
<td>pH</td>
<td>7.40</td>
<td>7.35–7.45</td>
</tr>
<tr>
<td>PaCO₂</td>
<td>5 kPa</td>
<td>4.8–6.1 (kPa)</td>
</tr>
<tr>
<td>HCO₃</td>
<td>25 mmol/L</td>
<td>22–26 (mmol/L)</td>
</tr>
<tr>
<td>PaO₂</td>
<td>12 kPa</td>
<td>10.6–13.3 (kPa) on air</td>
</tr>
<tr>
<td>BE</td>
<td>−1 mmol/L</td>
<td>±2 (mmol/L)</td>
</tr>
</tbody>
</table>

INITIAL MANAGEMENT [3]

- **Airway support**: Airway patent in this case, with no intervention required
- **Supplementary oxygen**: If saturations < 94%
- **Decompression**: This patient should be made NBM and have a large bore nasogastric (NG) tube inserted to encourage free drainage of stomach contents
- **Fluid resuscitation**: This patient requires two large bore intravenous access points and a fluid bolus due to being significantly dehydrated. His gastric/NG losses should be matched with an isotonic crystalloid. He will also require his normal maintenance fluid. As he is NBM, all fluid will be given IV. Minimum urine output should be 0.5 mL/kg/h and ideally around 1 mL/kg/h
- **Medications**: Patient will require regular analgesia and a centrally acting antiemetic (e.g. cyclizine). Medications that promote gastric emptying (e.g. domperidone) should be avoided as this may exacerbate the patient’s symptoms or cause a perforation. Withold any nephrotoxic drugs if the patient is in acute renal failure
- **Proton pump inhibitors**: Practice varies on the prescription of proton pump inhibitors in small bowel obstruction. If there is obstruction, the stomach is not emptying and therefore with the stomach still producing acid, there is a risk of it building up in the stomach and ulcers developing. Also, when a patient initially presents with epigastric pain, both small bowel obstruction and gastric ulceration are possible diagnoses to think about. Therefore, it is reasonable to start a proton pump inhibitor, either IV or SL (such as lansoprazole)
- **VTE thromboprophylaxis**: Follow local thromboprophylaxis guide, the patient is at an increased risk of thromboembolic event. Measure renal function before prescribing thromboprophylaxis if there is a concern about significant renal failure.

REASSESSMENT

- After NG decompression along with a fluid bolus, the patient is reassessed

  ‘The patient looks mildly improved. The airway is patent. RR 18/min, oxygen saturation is 97% in room air. His breathing is satisfactory and his abdomen continues to be distented. HR 70bpm, BP 120/75mmHg, CRT 2 seconds and urine output 1 mL/kg/h. NG has drained 1.5 L of bilious fluid. After one dose of morphine, pain is well controlled on regular paracetamol.’

The patient has responded well to a fluid bolus, but has ongoing losses with significant bilious aspirates. Another fluid bolus isn’t necessary at the moment, but fluids will be needed at a rate faster than maintenance fluid to replace bilious loss and insensible losses. Fluid requirement will need to be assessed frequently.
‘Julio Smith is a 62-year-old patient with a previous appendicectomy who has now presented with a 3-day history of signs and symptoms of bowel obstruction. On his initial assessment he was dehydrated and in pain. He has been stabilized with an NG tube and given a 500 mL fluid bolus and analgesia/antiemetics. AXR demonstrated small bowel obstruction, with no evidence of perforation. Bloods show evidence of acute renal failure with urea 12 mmol/L and creatinine 130 µmol/L. He is currently haemodynamically stable with good urine output. Oxygen saturations are 95% in room air.

Julio is currently on 250 mL/h of 0.9% sodium chloride. The patient is awaiting a CT abdomen to determine the level of the obstruction. Please do a fluid review, and re-examine the abdomen later this evening.’
### PRESCRIPTION AND ADMINISTRATION RECORD

**Hospital/Ward:** GDH SURGICAL  
**Consultant:** MR SING  
**Name of Patient:** JULIO SMITH  
**Weight:** 70kg  
**Height:** 1.6m  
**Hospital Number:** J345333  
**D.O.B:** 05/03/52

#### Standard Chart

<table>
<thead>
<tr>
<th>Hospital/Ward:</th>
<th>Consultant:</th>
<th>Name of Patient:</th>
<th>Hospital Number:</th>
<th>D.O.B:</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDH SURGICAL</td>
<td>MR SING</td>
<td>JULIO SMITH</td>
<td>J345333</td>
<td>05/03/52</td>
</tr>
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</table>

#### DISCHARGE PRESCRIPTION

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<tr>
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<th>Completed by:</th>
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<tr>
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</tr>
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#### OTHER MEDICINE CHARTS IN USE

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<tr>
<th>Date</th>
<th>Type of Chart</th>
<th>Description of Reaction</th>
<th>Completed by</th>
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</thead>
<tbody>
<tr>
<td>22/04/14</td>
<td>PENICILLIN</td>
<td>RASH</td>
<td>JOHN MEYER</td>
</tr>
</tbody>
</table>

#### PREVIOUS ADVERSE REACTIONS

If a dose is not administered as prescribed, initial and enter a code in the column with a circle drawn round the code according to the reason as shown below. **Inform the responsible doctor in the appropriate timescale.**

1. Patient refuses  
2. Patient not present  
3. Medicines not available – CHECK ORDERED  
4. Asleep/drowsy  
5. Administration route not available – CHECK FOR ALTERNATIVE  
6. Vomiting/nausea  
7. Time varied on doctor’s instructions  
8. Once only/as required medicine given  
9. Dose withheld on doctor’s instructions  
10. Possible adverse reaction/side effect

#### CODES FOR NON-ADMINISTRATION OF PRESCRIBED MEDICINE

If a dose is not administered as prescribed, initial and enter a code in the column with a circle drawn round the code according to the reason as shown below. **Inform the responsible doctor in the appropriate timescale.**

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Medicine (Approved Name)</th>
<th>Dose</th>
<th>Route</th>
<th>Prescriber – Sign + Print</th>
<th>Given By</th>
</tr>
</thead>
<tbody>
<tr>
<td>22/04/14</td>
<td>19:30</td>
<td>MORPHINE SULFATE (hydrate to response)</td>
<td>5 to 10 mg</td>
<td>IV</td>
<td>JOHN MEYER</td>
<td>19.30</td>
</tr>
<tr>
<td>22/04/14</td>
<td>19:30</td>
<td>CYCLIZINE</td>
<td>50 mg</td>
<td>IV</td>
<td>JOHN MEYER</td>
<td>19.30</td>
</tr>
</tbody>
</table>

#### OXYGEN

<table>
<thead>
<tr>
<th>Start Date</th>
<th>Time</th>
<th>Mask (%)</th>
<th>Route</th>
<th>Prongs (L/min)</th>
<th>Prescriber – Sign + Print</th>
<th>Administered by</th>
<th>Stop Date</th>
<th>Time</th>
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</table>

**Figure 8.6**
### REGULAR THERAPY

<table>
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<tr>
<th>Medicine (Approved Name)</th>
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<th>Route</th>
<th>Date</th>
<th>Time</th>
<th>Notes</th>
<th>Prescriber – sign + print</th>
</tr>
</thead>
<tbody>
<tr>
<td>MORPHINE SULFATE</td>
<td>5 mg</td>
<td>IV</td>
<td>22/09/14</td>
<td>22</td>
<td>QW</td>
<td>John Meyer JOHN MEYER</td>
</tr>
<tr>
<td>ESOMEPRAZOLE</td>
<td>40 mg</td>
<td>IV</td>
<td>22/09/14</td>
<td>14</td>
<td>QW</td>
<td>John Meyer JOHN MEYER</td>
</tr>
<tr>
<td>ENOXAPARIN</td>
<td>40 mg</td>
<td>SC</td>
<td>22/09/14</td>
<td>14</td>
<td>QW</td>
<td>John Meyer JOHN MEYER</td>
</tr>
<tr>
<td>TED STOCKINGS</td>
<td>One pair</td>
<td>TOP</td>
<td>22/09/14</td>
<td>14</td>
<td>QW</td>
<td>John Meyer JOHN MEYER</td>
</tr>
<tr>
<td>CYCLIZINE</td>
<td>50 mg</td>
<td>IV</td>
<td>22/09/14</td>
<td>14</td>
<td>QW</td>
<td>John Meyer JOHN MEYER</td>
</tr>
</tbody>
</table>

**Figure 8.7**
## INTRAVENOUS FLUID PRESCRIPTION CHART

**Hospital/Ward:** GDH SURGICAL  
**Consultant:** MR SING  
**Name of Patient:** JULIO SMITH  
**Hospital Number:** J345333  
**D.O.B:** 05/03/52

**Weight:** 70 kg  
**Height:** 1.6 m

Date/Time | FLUID | VOLUME | DOSE | RATE | PRESCRIBER – SIGN AND PRINT
--- | --- | --- | --- | --- | ---
22/09/14 20:00 | 0.9% SODIUM CHLORIDE | 500mL | | Over 15min | J. Meyer JOHN MEYER
22/09/14 20:30 | 0.9% SODIUM CHLORIDE | 1L | 20mmol | 250mL/h | J. Meyer JOHN MEYER

**Figure 8.8**
You are the junior doctor on a general surgical ward. Your registrar has asked you to see a patient he has reviewed in the emergency department. The patient is a 67-year-old Type 2 diabetic, normally only on metformin, who requires a below knee amputation for his infected and gangrenous right foot. Please assess the patient and instigate the appropriate management plan in preparation for theatre tomorrow.

**AIRWAY**

- Assess patency of the airway. Does he have any stridor?

  > ‘The airway is patent’. No additional airway support is required.

**BREATHING**

- Assess the rate and depth of respiration. Assess his work of breathing and his oxygen saturations. Percuss the different lung zones for any abnormalities. Auscultate the lungs to assess air entry or presence of crackles.

  > ‘The respiratory rate is 28/min with saturations of 96%. He is taking deep breaths, in visible pain, with accessory muscles of breathing apparent. Despite his tachypnoea, he has good air entry with no crackles or wheeze.’ No additional breathing support is required.

**CIRCULATION**

- Assess the haemodynamic stability by measuring pulse, blood pressure, CRT, skin temperature and assessing the mucous membranes.

  > ‘HR 110 bpm, BP 120/70 mmHg, CRT 3 seconds and mucous membranes are pink and moist. His distal peripheries are clammy and sweaty with thready pulses.’

  This man will require IV access, bloods, and a fluid bolus. A reassessment should occur immediately after. A urinary catheter should be placed to monitor his urinary output.

**DISABILITY**

- Assess the patient’s level of consciousness using the Glasgow coma scale. Is the patient confused or agitated? What’s the capillary glucose reading?

  > ‘This patient’s GCS is E4, M6, V4 = 14/15. He seems a bit confused and his blood sugar currently is 16 mmol/L (post-fluid challenge).

  His confusion is probably due to being septic with uncontrolled hyperglycaemia. He will require a variable rate IV insulin infusion (VRIII) [4] to control the blood sugar. Note that blood sugar is often corrected just with adequate crystalloid (non-glucose) resuscitation but, in this situation, he needs the VRIII to prevent hypoglycaemia.

---

**Diabetic complications**

- **Microvascular disease:**
  - Retinopathy
  - Nephropathy
  - Neuropathy.

- **Macrovascular disease:**
  - Coronary heart disease
  - Cerebral vascular disease
  - Peripheral vascular disease.

**Diagnosis of diabetes mellitus (WHO)**

- Random plasma glucose > 11.1 mmol/L
- Fasting plasma glucose > 7 mmol/L × 2 (occasions)

**Symptoms of diabetes**

- Polyuria/polydipsia
- Unintentional weight loss
- Worsening blurred vision
- Recurrent infections
- Lethargy/weakness
- Sensory loss

**PRESCRIBE**

(see Figs 8.9–8.11)

Fluid challenge, e.g. 500 mL 0.9% SODIUM CHLORIDE (over 15 min)
case, it is inadequate, and a VRIII is required anyway preoperatively. (Note VRIII was previously called a sliding scale regimen).

**EXPOSURE**

- Examine this gentleman ensuring adequate exposure of all possible sites of infection. Examine for both macrovascular and microvascular complications of diabetes. Assess his core body temperature for pyrexia.

‘His right foot and distal leg is markedly erythematous, malodorous, swollen and red with exudative pyogenic material oozing from the foot. The patient has no sensations below the knee. His core temperature is 38.5°C and there are no other sites of infection.’

Commence antipyretics to reduce his temperature. Swab the wound for M/C/S and dress the wound appropriately until formal surgical intervention tomorrow.

**INITIAL INVESTIGATIONS**

- **Arterial blood gas:** An acute metabolic acidosis is indicated by a low pH, a normal/reduced pCO$_2$, and reduced bicarbonate/base excess. Tachypnoea may result in low pCO$_2$ (respiratory compensation for metabolic acidosis).
- **Bloods:** FBC, U&Es, CRP, blood culture, serum glucose. Look for evidence of infection, assess renal function and hydration status. Serum glucose is important to assess severity of hyperglycaemia.
- **Wound swab:** Used to identify the organism and guide correct antibiotic treatment. Organism resistance is growing, especially in diabetics as they have probably had more courses of treatment and hospital admissions.
- **CXR and foot/leg X-rays:** Baseline CXR should be completed to rule out any other focus of infections and identify any cardiomegaly. Limb X-rays determine the presence and extent of any osteomyelitis.
- **ECG:** To assess for ischaemic heart disease. Diabetic patients can have a silent MI due to autonomic neuropathy.
- **Urine dipstick:** It is important to ensure that this patient is not going into diabetic ketoacidosis. Look for ketones in the urine. Will also pick up a possible UTI.

**Table 8.3 VRIII regimen**

<table>
<thead>
<tr>
<th>Blood glucose (mmol/L) (target range 6–10 mmol/L)</th>
<th>Insulin (Actrapid®) infusion (units/h = mL/h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;20</td>
<td>5</td>
</tr>
<tr>
<td>15–19.9</td>
<td>4</td>
</tr>
<tr>
<td>10–14.9</td>
<td>3</td>
</tr>
<tr>
<td>7–9.9</td>
<td>2</td>
</tr>
<tr>
<td>4–6.9</td>
<td>1</td>
</tr>
<tr>
<td>&lt;3.9</td>
<td>0.5</td>
</tr>
</tbody>
</table>

VRIII fluids = 5% glucose/0.45% sodium chloride/0.15% potassium chloride 1000 mL 125 mL/h. 50 units of insulin (Actrapid®) is made up in 50 mL of 0.9% sodium chloride to give a concentration of 1 unit/mL of insulin. This means that 1 unit/h of insulin equates to 1 mL/h.

**Table 8.4 Mr Smith’s blood results and ABG result**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Normal range (Units)</th>
</tr>
</thead>
<tbody>
<tr>
<td>WCC</td>
<td>$25 \times 10^9$/L</td>
<td>4–11 ($\times 10^9$/L)</td>
</tr>
<tr>
<td>Neutrophil</td>
<td>$18 \times 10^9$/L</td>
<td>2–7.5 ($\times 10^9$/L)</td>
</tr>
<tr>
<td>Lymphocyte</td>
<td>4 $\times 10^9$/L</td>
<td>1.4–4 ($\times 10^9$/L)</td>
</tr>
<tr>
<td>Platelet</td>
<td>$200 \times 10^9$/L</td>
<td>150–400 ($\times 10^9$/L)</td>
</tr>
<tr>
<td>Haemoglobin</td>
<td>135 g/L</td>
<td>Men: 135–177 (g/L)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Women: 115–155 (g/L)</td>
</tr>
</tbody>
</table>

(Cont’d)
Table 8.4 (Cont’d)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Normal range (Units)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRP</td>
<td>267 mg/L</td>
<td>0–5 (mg/L)</td>
</tr>
<tr>
<td>Urea</td>
<td>9.3 mmol/L</td>
<td>2.5–6.7 (mmol/L)</td>
</tr>
<tr>
<td>Creatinine</td>
<td>120 µmol/L</td>
<td>79–118 (µmol/L)</td>
</tr>
<tr>
<td>Sodium</td>
<td>135 mmol/L</td>
<td>135–146 (mmol/L)</td>
</tr>
<tr>
<td>Potassium</td>
<td>4.9 mmol/L</td>
<td>3.5–5.0 (mmol/L)</td>
</tr>
<tr>
<td>eGFR</td>
<td>54 mL/min</td>
<td>&gt;60 (mL/min)</td>
</tr>
<tr>
<td>Lactate</td>
<td>2.8 mmol/L</td>
<td>0.6–2.4 (mmol/L)</td>
</tr>
<tr>
<td>Glucose</td>
<td>13 mmol/L</td>
<td>4.5–5.6 (mmol/L)</td>
</tr>
<tr>
<td>pH</td>
<td>7.28</td>
<td>7.35–7.45</td>
</tr>
<tr>
<td>PaO₂</td>
<td>12 kPa</td>
<td>10.6–13.3 (kPa) on air</td>
</tr>
<tr>
<td>PaCO₂</td>
<td>4 kPa</td>
<td>4.8–6.1 (kPa)</td>
</tr>
<tr>
<td>HCO₃⁻</td>
<td>22 mmol/L</td>
<td>22–26 (mmol/L)</td>
</tr>
<tr>
<td>BE</td>
<td>−4 mmol/L</td>
<td>±2 (mmol/L)</td>
</tr>
</tbody>
</table>

‘Arterial blood gas shows a pH 7.28, PaCO₂ of 4.0 kPa, PaO₂ 12 kPa, HCO₃⁻ 22 mmol/L, BE −4.0 mmol/L, lactate 2.8 mmol/L. Hb is 135 g/L, WCC 25 × 10⁹/L, neutrophils 18 × 10⁹/L. Na 135 mmol/L, K 4.9 mmol/L, urea 9.3 mmol/L, creatinine 120 µmol/L (eGFR = 54 mL/min). CRP is 267 mg/L. Glucose is 13 mmol/L. Wound swab/blood culture microscopy shows Gram negative rods. Leg X-rays show osteomyelitic changes to the distal tibia. ECG and CXR are normal. Urine dipstick shows no glucose and no ketones.’

**INITIAL MANAGEMENT** [4–5]

- **Airway support:** The airway is patent in this case, with no intervention required.
- **Supplementary oxygen:** If saturations < 94%.
- **Fluid support:** All patients require maintenance fluids while nil by mouth. Insensible losses will be increased due to being septic. Urine output should be monitored with a urinary catheter, aiming for a minimum rate of 0.5 mL/kg/h. This patient required a fluid bolus due to being dehydrated, and responded well to it.
- Since this patient is getting 3 L of fluid every 24 hours through the VRIII, and has received a 500 mL bolus, if he is not clinically dehydrated anymore, maintenance fluids are accounted for, and further resuscitation fluid is not currently required. Fluid balance needs to be carefully monitored. Further crystalloid fluids at a later stage (via a second line to the insulin infusion) may be necessary. Note that with the VRIII, the fluid is generally not changed if the blood sugar drops or increases. The blood sugar is unlikely to fluctuate dramatically in this clinical situation, and it avoids unnecessarily changing between different fluid bags.
- **Blood glucose:** All non-diet controlled diabetic patients (Type 1 or 2) requiring major surgery (unable to eat and drink for > 4 h after surgery) will need to start a VRIII preoperatively.
- In this scenario, as the patient is septic with elevated blood sugar readings, a VRIII should be commenced as soon as possible. The regimen involves drawing up 50 units of human soluble insulin in 50 mL of 0.9% saline in a syringe-pump. This will give a concentration of 1 unit/mL of insulin. Repeated blood glucose levels are required to be tested hourly and rate adjusted accordingly. 5% glucose with 0.45% sodium chloride and with 0.15% potassium chloride at a rate of 125 mL/h should be used with the VRIII regimen. If the serum potassium is low use the 0.30% potassium chloride instead of 0.15% solution.
- The goal is to maintain the blood glucose levels between 6 and 10 mmol/L.
- All patients with Type 2 diabetes should stop their oral hypoglycaemics when on VRIII. Metformin ideally should be stopped as it may cause lactic acidosis. It should be restarted once eating and drinking safely.
- If this were an elective procedure, in a well patient (with non-diet controlled diabetes), then the VRIII could be delayed. If they were on the morning list, they could fast from midnight, and could be started on a VRIII from the early morning (e.g. 06.00) of the day.
of the procedure. If they are on the afternoon list (ideally this should not be the case), they could fast from the early morning, e.g. 07.00 and commence the VRIII in the late morning (e.g. 11.00)

- Patients having minor operations (able to eat within 4 hours after surgery or day cases) do not require a VRIII regimen unless stated otherwise. Patients with diabetes should omit their morning short-acting insulin, but continue with their long-acting insulin on the day of the operation. For patients having minor operations, oral hypoglycaemics such as metformin and glitazones should be continued as normal, but sulphonylureas and gliptins shouldn’t be taken on the morning of the operation

- Diet controlled diabetes patients do not require any form of treatment for either minor or major surgery as they are not at significantly increased risk of glucose instability [5,6]

- **Empirical antibiotics:** Antibiotics should be commenced (as per trust guidelines) immediately once cultures are taken. These antibiotics vary from trust to trust; however, all patients should be treated as suspected MRSA positive until confirmed negative. After 48 hours, blood culture results can tailor antibiotic therapy. One option would be teicoplanin (Gram positive cover), fusidic acid (MRSA cover) and piperacillin/tazobactum (broad-spectrum antibiotic)

- **Analgesia:** Start with simple analgesia and titrate upwards as required

- **VTE prophylaxis:** Commence pharmacological prophylaxis if there are no contraindications, adjusted to renal function. Mechanical prophylaxis is contraindicated due to neuropathy and infection

- **Potassium monitoring:** This will have to be monitored closely: if it falls significantly, the fluid would need to be changed to 0.45% sodium chloride and 5% glucose with 0.3% potassium chloride.

### REASSESSMENT

- After a fluid bolus, commencement of the VRIII, supplemental oxygen, and empirical antibiotics the patient is reassessed

  ‘The patient looks significantly better. Airway is patent. RR 20/min, oxygen saturations are 95%, in air, with mild accessory muscle of respiration use. The chest is clear. HR 80 bpm, BP 140/80 mmHg, CRT < 1 second. Glucose is now 9 mmol/L on the VRIII.’

  Note: All oral regular medications should resume as normal once the patient is able to eat and drink safely. VRIII regimens may continue for some time postoperatively due to the effects of stress hormones. Fine control can be best achieved with a variable rate intravenous insulin infusion. The decision to stop the VRIII depends on the trend of stable blood sugar control.

### HANDING OVER THE PATIENT

‘Mr Smith is a 67-year-old type 2 diabetic, with probable E. coli osteomyelitis/infected right foot, awaiting a below right knee amputation tomorrow. He presented with an infected foot, with associated osteomyelitis, and sepsis. Respiratory wise, he has required supplementary oxygen. In terms of circulation, he was significantly dehydrated requiring a fluid bolus. Blood sugar was high, so a VRIII regimen was also started.

Currently, he is much improved. RR 20/min, oxygen saturations are 95%, in air. He is haemodynamically stable, well hydrated, and glucose has been maintained within normal limits.

Investigations showed an initial partially compensated metabolic acidosis. His WCC was 25 x 10^9/L and neutrophils 18 x 10^9/L with a CRP of 267 mg/L. Initial microscopy demonstrates Gram negative rods, which most likely will be E. coli.

The plan is to transfer to the ward in a side room due to infection risk, NBM, continue on the VRIII regimen, and IV antibiotics. Most recent blood sugars are stable.

He will require hourly blood sugar checks and insulin adjusted accordingly. Repeat ABG should be done prior to his operation in the morning: he is already first on the list in view of his diabetes. Keep an eye on his urine output to make sure he is properly rehydrated, and please do a fluid review later this evening.’

---

**PRESCRIBE**

(see Figs 8.9–8.11)

**Thromboprophylaxis,** e.g. ENOXAPARIN 40 mg SC OD

**Regular analgesia,** e.g. PARACETAMOL 1 g ORAL QDS

**Antibiotics,** e.g. TEICOPLANIN 400 mg IV (over 30 mins) STAT then BD on DAY 1, OD from DAY 2 and PIPERACILLIN/TAZOBACTAM 4.5 g IV (over 30 mins) STAT the TDS and FUSIDIC ACID 750 mg ORAL STAT then TDS
PRESCRIPTION AND ADMINISTRATION RECORD

Standard Chart

Hospital/Ward: CGH SURGICAL  Consultant: MR. WOOD  Name of Patient: ADAM SMITH
Weight: 70 kg  Height: 1.6 m  Hospital Number: J345400  D.O.B: 5/3/1947

If re-written, date:

DISCHARGE PRESCRIPTION
Date completed:-  Completed by:-

OTHER MEDICINE CHARTS IN USE  PREVIOUS ADVERSE REACTIONS
This section must be completed before any medicine is given  Completed by (sign & print)  Date

Date | Type of Chart | Medicine/Agent | Description of Reaction | J. Meyer JOHN MEYER 22/09/14
--- | --- | --- | --- | ---
None known

CODES FOR NON-ADMINISTRATION OF PRESCRIBED MEDICINE
If a dose is not administered as prescribed, initial and enter a code in the column with a circle drawn round the code according to the reason as shown below. Inform the responsible doctor in the appropriate timescale.

1. Patient refuses
2. Patient not present
3. Medicines not available – CHECK ORDERED
4. Asleep/drowsy
5. Administration route not available – CHECK FOR ALTERNATIVE
6. Vomiting/nausea
7. Time varied on doctor’s instructions
8. Once only/as required medicine given
9. Dose withheld on doctor’s instructions
10. Possible adverse reaction/side effect

ONCE-ONLY

Date | Time | Medicine (Approved Name) | Dose | Route | Prescriber – Sign + Print | Time Given | Given By
--- | --- | --- | --- | --- | --- | --- | ---
22/09/14  09.30 | TEICOPHANIN (over 30 mins) | 400mg | IV | J. Meyer JOHN MEYER | 09.30 | JS
22/09/14  09.30 | PIPERACILLIN/TAZOBACTAM (over 30 mins) | 4.5g | IV | J. Meyer JOHN MEYER | 09.30 | JS
22/09/14  09.30 | FUSIDIC ACID | 750mg | ORAL | J. Meyer JOHN MEYER | 09.30 | JS
22/09/14  09.30 | 50 units INSULIN (ACTRAPID) IN 50mL 0.9% SODIUM CHLORIDE | VARIABLE RATE INSULIN INFUSION BELOW | IV | J. Meyer JOHN MEYER | 09.40 | JS

BLOOD GLUCOSE (mmol/L) (target range 6–10mmol/L)

<table>
<thead>
<tr>
<th>Value</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;20</td>
<td>5</td>
</tr>
<tr>
<td>15–19.9</td>
<td>4</td>
</tr>
<tr>
<td>10–14.9</td>
<td>3</td>
</tr>
<tr>
<td>7–9.9</td>
<td>2</td>
</tr>
<tr>
<td>4–6.9</td>
<td>1</td>
</tr>
<tr>
<td>&lt;3.9</td>
<td>0.5</td>
</tr>
</tbody>
</table>

Figure 8.9
### REGULAR THERAPY

<table>
<thead>
<tr>
<th>Medicine (Approved Name)</th>
<th>Dose</th>
<th>Route</th>
<th>Start Date</th>
<th>Notes</th>
<th>Prescriber – sign + print</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PARACETAMOL</strong></td>
<td>1 g</td>
<td>ORAL</td>
<td>22/09/14</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>TEICOPLANIN</strong></td>
<td>400 mg</td>
<td>IV</td>
<td>22/09/14</td>
<td>loading dose:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Day 1—400 mg bd then after</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>400 mg OD. For infected wound review in 48h. Give over 30 mins</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>PIPERACILLIN/TAZOBACTAM</strong></td>
<td>4.5 g</td>
<td>IV</td>
<td>22/09/14</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>FUSIDIC ACID</strong></td>
<td>750 mg</td>
<td>ORAL</td>
<td>22/09/14</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>ENOXAPARIN</strong></td>
<td>40 mg</td>
<td>SC</td>
<td>22/09/14</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Notes**: For infected wound. Review in 48 h. Give over 30 mins.

---

**Figure 8.10**
**INTRAVENOUS FLUID PRESCRIPTION CHART**

<table>
<thead>
<tr>
<th>Date/Time</th>
<th>FLUID</th>
<th>VOLUME</th>
<th>RATE</th>
<th>PRESCRIBER – SIGN AND PRINT</th>
</tr>
</thead>
<tbody>
<tr>
<td>22/09/14 09.30</td>
<td>0.9% SODIUM CHLORIDE</td>
<td>500 mL</td>
<td>Over 15 min</td>
<td>J. Meyer JOHN MEYER</td>
</tr>
<tr>
<td>22/09/14 11.00</td>
<td>5% GLUCOSE/0.45% SODIUM CHLORIDE/0.15% POTASSIUM CHLORIDE</td>
<td>1000 mL</td>
<td>125 mL/h</td>
<td>J. Meyer JOHN MEYER</td>
</tr>
<tr>
<td>22/09/14 19.00</td>
<td>5% GLUCOSE/0.45% SODIUM CHLORIDE/0.15% POTASSIUM CHLORIDE</td>
<td>1000 mL</td>
<td>125 mL/h</td>
<td>J. Meyer JOHN MEYER</td>
</tr>
</tbody>
</table>

Figure 8.11
Station 8.5: Postoperative fluid loss

You are the junior doctor on call, covering the wards. You have been asked by the surgical ward nurse to prescribe some fluids for a postoperative patient. The patient is a 62-year-old man who underwent a lobectomy of the left lung yesterday.

Patient Details

Name: Jake Smith
DOB: 05/03/52
Hospital Number: J345600
Weight: 75 kg
Height: 1.6 m
Consultant: Mr Walker
Hospital/Ward: REI Surgical
Current Medications: Paracetamol 1 g oral QDS, ibuprofen 400 mg oral TDS, morphine sulfate IV PCA (started postoperatively for analgesia)
Enoxaparin 40 mg SC OD and TED stocking one pair TOP continuous (started this admission for thromboprophylaxis)
Cyclizine 50 mg oral TDS (started this admission, to reduce morphine related nausea)
Esomeprazole 20 mg oral OD (started this admission to reduce ibuprofen relate gastric irritation)
Allergies: No known drug allergies
Admission date: 22/09/14

INITIAL ASSESSMENT

AIRWAY

Assess patency of the airway. Does he have any stridor? Is his trachea central?

‘The airway is patent and his trachea is central.’

No additional airway support is required.

BREATHING

Assess the rate and depth of respiration. Assess his work of breathing and his oxygen saturations. Percuss the different lung zones for dullness or hyper-resonance. Auscultate the lungs to assess air entry or presence of crackles. Check the chest drain is functioning normally (Is it swinging/bubbling? Does it look blocked?)

‘RR 20/min, oxygen saturation at 100% with an 8L/min oxygen face mask. There is a chest drain on the left side, which has drained 300 mL of haemoserous fluid in the last 6 hours (500 mL in 24 hours). He has reduced air entry at the base of the left lung, with dullness to percussion. He is complaining of pain on deep inspiration.’

Given the above, it is unlikely he has a pneumothorax; however, there may be a haemothorax. A CXR should be done to exclude these problems. Avoid any splinting due to pain by prescribing appropriate analgesia. Supplementary oxygen should be given to maintain oxygen saturations above 94%.

CIRCULATION

Assess the haemodynamic stability by assessing the pulse, blood pressure with pulse pressure, CRT and mucous membranes. Check the vital signs records and assess the trends rather than isolated findings. Also note the patient’s urine output and fluid input for the past 24 hours.
‘HR 110 bpm, BP 110/90 mmHg, CRT 3 seconds and mucous membranes are pale and dry.’

This man will require IV access, bloods, and a fluid bolus. Give the fluid bolus as 500 mL, followed by reassessment.

**DISABILITY**
- Assess the patient’s consciousness using the Glasgow coma scale. Is the patient confused or agitated? What’s the capillary glucose reading?

‘This man’s GCS is E4, M6, V4 = 14/15. He seems a bit confused and his blood sugar currently is 7 mmol/L.’

His confusion is probably due to his depleted intravascular volume, though other causes such as infection need to be considered.

**EXPOSURE**
- Expose and examine this gentleman thoroughly and examine all possible sources of bleeding. Have a proper assessment of his fluid balance. Assess all drains and their respective volume over the past 24 hours. Assess his core body temperature for pyrexia as this is a cause of an increased insensible loss.

‘As noted before, this man has a chest drain and it has drained 500 mL of serosanginous fluid in the past 24 hours. His urine output for the day has been approximately 800 mL. His oral input has been 800 mL. His fluid balance works out to be negative 500 mL plus insensible losses. His temperature is normal.’

**INITIAL INVESTIGATIONS**
- **Bloods:** FBC, U&Es, CRP. Look for evidence of anaemia or drop in Hb. Assess renal function and hydration status. A group and save, and a coagulation screen should also be sent if you think the patient is bleeding. CRP trend may suggest possible infection.
- **Arterial blood gas:** Quick investigation to assess acid–base status, arterial PaCO$_2$ and PaO$_2$ levels. It also gives an approximate Hb, electrolyte, lactate and glucose level.
- **CXR:** Will demonstrate the presence of a haemothorax or pneumothorax. 250 mL of blood in the pleural space is required before anything is seen on a CXR. 750 mL of blood will fill half of a lung field. It appears as a diffuse opacification or white-out and loss of the costophrenic angles.
- **ECG:** To look for any cardiac abnormalities.

‘ABG shows a pH of 7.36, PaCO$_2$ 4.9 kPa, PaO$_2$ 12 kPa, HCO$_3$ 23 mmol/L, Hb 93 g/L, WCC 8 × 10$^9$/L, CRP 7 mg/L, urea 14 mmol/L, creatinine 160 µmol/L and eGFR 41 mL/min (baseline Hb 110 g/L, baseline urea 7 mmol/L and creatinine 80 µmol/L). CXR shows a correctly placed chest drain with no haemo/pneumothorax. ECG is normal.’

Table 8.5  Mr Smith’s blood results and ABG result

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Normal range (Units)</th>
</tr>
</thead>
<tbody>
<tr>
<td>WCC</td>
<td>8 × 10$^9$/L</td>
<td>4–11 (× 10$^9$/L)</td>
</tr>
<tr>
<td>Platelet</td>
<td>200 × 10$^9$/L</td>
<td>150–400 (× 10$^9$/L)</td>
</tr>
<tr>
<td>Haemoglobin</td>
<td>93 g/L</td>
<td>Men: 135–177 (g/L) Women: 115–155 (g/L)</td>
</tr>
<tr>
<td>CRP</td>
<td>7 mg/L</td>
<td>0–5 (mg/L)</td>
</tr>
<tr>
<td>Urea</td>
<td>14 mmol/L</td>
<td>2.5–6.7 (mmol/L)</td>
</tr>
<tr>
<td>Creatinine</td>
<td>160 µmol/L</td>
<td>79–118 (µmol/L)</td>
</tr>
<tr>
<td>eGFR</td>
<td>41 mL/min</td>
<td>&gt;60 (mL/min)</td>
</tr>
<tr>
<td>Sodium</td>
<td>134 mmol/L</td>
<td>135–146 (mmol/L)</td>
</tr>
<tr>
<td>Potassium</td>
<td>5.2 mmol/L</td>
<td>3.5–5.0 (mmol/L)</td>
</tr>
</tbody>
</table>

(Cont’d)
Table 8.5 (Cont’d)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Normal range (Units)</th>
</tr>
</thead>
<tbody>
<tr>
<td>eGFR</td>
<td>41 mL/min</td>
<td>&gt;60 (mL/min)</td>
</tr>
<tr>
<td>pH</td>
<td>7.36</td>
<td>7.35–7.45</td>
</tr>
<tr>
<td>PaO₂</td>
<td>12 kPa</td>
<td>10.6–13.3 (kPa) on air</td>
</tr>
<tr>
<td>PaCO₂</td>
<td>4.9 kPa</td>
<td>4.8–6.1 (kPa)</td>
</tr>
<tr>
<td>HCO₃⁻</td>
<td>23 mmol/L</td>
<td>22–26 (mmol/L)</td>
</tr>
<tr>
<td>BE</td>
<td>1 mmol/L</td>
<td>±2 (mmol/L)</td>
</tr>
</tbody>
</table>

**INITIAL MANAGEMENT**

- **Airway support**: Airway patent in this case, with no intervention required
- **Supplementary oxygen**: If saturations < 94%
- **Gastric protection**: A PPI is often given to ITU patients, particularly if taking ibuprofen for analgesia, to reduce risk of ulcers. The patient is already on esomeprozole
- **Analgesia**: Paracetamol, opioids and ibuprofen (with daily U&Es and gastric protection) can be used. Regular and PRN morphine sulfate can be used to ensure good control, but usually a PCA system will be needed to allow the patient to titrate morphine to pain. Speak to the anaesthetic team about increasing analgesia via a PCA, and ensure on appropriate additional medications. The patient is already on paracetamol, ibuprofen and a morphine sulfate PCA (with regular cyclizine). Ibuprofen should be stopped in this case due to worsening renal function
- **Haemoglobin level**: For proper wound healing and good respiratory and haemodynamic function. Transfusion thresholds vary between surgeons and surgical units. A threshold of 70–80 g/L for transfusion is typical. A higher haemoglobin is generally aimed for in patients with ischaemic heart disease, or peripheral vascular disease. Aiming for a haemoglobin above 90 g/L might be reasonable with a history of angina. Each unit of blood is approximately 250 mL, and raises the Hb by 10 g/L. This patient does not require a transfusion at present as the haemoglobin is 93 g/L
- **Ensure on appropriate thromboprophylaxis**: Should be on mechanical VTE prophylaxis. Consider withholding enoxaparin if signs of active bleeding. In this case, there is not strong evidence of active bleeding: only 500 mL has drained in 24 hours, there is no haemothorax on the CXR, and the fluid is haemoserous rather than frank blood
- **Ensure appropriate fluid balance**: Prescribing 100 mL/hr of fluid over 24 hours (plus a 500 mL fluid challenge) will ensure appropriate fluid balance. Maintenance fluids would need to be given, plus replenishment of the 500 mL fluid deficit (and insensible losses). This will need to be continually reassessed, and when the patient is more stable, and drinking well, they can be switched to oral fluids.

**REASSESSMENT**

- After a fluid bolus, and commencement of maintenance fluid, the patient is reassessed
  
  *The patient looks significantly improved. The airway is patent. RR 18/ min and, oxygen saturation is 97% on 2L/min nasal cannula oxygen. There continue to be crackles at the base of the right lung, but air entry is fine. HR 70 bpm, BP 120/75 mmHg, CRT is 2 seconds and urine output 0.8 mL/kg/h. Patient GCS is 15/15 with a blood sugar of 6 mmol/L.*

**HANDING OVER THE PATIENT**

*Mr Smith is a 62-year-old patient who is 1 day postop left lung upper lobectomy (for lung cancer), with anaemia and dehydration. On his initial assessment he was pale, dehydrated, and in significant pain. He has been stabilized with a 500 mL 0.9% sodium chloride bolus. Analgesia wise, he is on regular paracetamol, and a morphine PCA. Ibuprofen has been stopped due to worsening renal function. Postoperative CXR shows no further bleeding in the chest and no pneumothorax. Bloods showed a haemoglobin...*
of 93 g/L, so he hasn’t been transfused. He is currently haemodynamically stable with good urine output.

The plan is to continue on maintenance IV fluids, to monitor this patient’s vital signs, keeping close attention to the heart rate and blood pressure. If these worsen, repeat FBC and U&E should be sent to see if the patient is actively bleeding. The on-call surgical registrar is aware of the patient and is happy to be contacted if there are any further concerns. The anaesthetist is coming later this evening to review the morphine PCA and optimize analgesia.”
### PRESCRIPTION AND ADMINISTRATION RECORD

**Standard Chart**

<table>
<thead>
<tr>
<th>Hospital/Ward:</th>
<th>Consultant:</th>
<th>Name of Patient:</th>
<th>Weight: 75 kg</th>
<th>Height: 1.6 m</th>
<th>D.O.B: 5/3/1952</th>
</tr>
</thead>
<tbody>
<tr>
<td>REI SURGICAL</td>
<td>MR WALKER</td>
<td>JAKE SMITH</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Hospital Number:** J345600

**If re-written, date:**

**DISCHARGE PRESCRIPTION**

Date completed:-

Completed by:-

---

### OTHER MEDICINE CHARTS IN USE

<table>
<thead>
<tr>
<th>Date</th>
<th>Type of Chart</th>
<th>Medicine/Agent</th>
<th>Description of Reaction</th>
<th>Completed by</th>
</tr>
</thead>
<tbody>
<tr>
<td>22/09/14</td>
<td>MORPHINE PCA CHART</td>
<td></td>
<td></td>
<td>J. Meyer</td>
</tr>
</tbody>
</table>

**PREVIOUS ADVERSE REACTIONS**

This section must be completed before any medicine is given

<table>
<thead>
<tr>
<th>Date</th>
<th>Type of Chart</th>
<th>Medicine/Agent</th>
<th>Description of Reaction</th>
<th>Completed by</th>
</tr>
</thead>
<tbody>
<tr>
<td>22/09/14</td>
<td></td>
<td></td>
<td></td>
<td>J. Meyer</td>
</tr>
</tbody>
</table>

**CODES FOR NON-ADMINISTRATION OF PRESCRIBED MEDICINE**

If a dose is not administered as prescribed, initial and enter a code in the column with a circle drawn round the code according to the reason as shown below. *Inform the responsible doctor in the appropriate timescale.*

1. Patient refuses
2. Patient not present
3. Medicines not available – CHECK ORDERED
4. Asleep/drowsy
5. Administration route not available – CHECK FOR ALTERNATIVE
6. Vomiting/nausea
7. Time varied on doctor’s instructions
8. Once only/as required medicine given
9. Dose withheld on doctor’s instructions
10. Possible adverse reaction/side effect

---

### ONCE-ONLY

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Medicine (Approved Name)</th>
<th>Dose</th>
<th>Route</th>
<th>Prescriber – Sign + Print</th>
<th>Time Given</th>
<th>Given By</th>
</tr>
</thead>
</table>

---

### OXYGEN

<table>
<thead>
<tr>
<th>Start Date</th>
<th>Start Time</th>
<th>Route</th>
<th>Prescriber – Sign + Print</th>
<th>Administered by</th>
<th>Stop Date</th>
<th>Stop Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>23/04/14</td>
<td>19.30</td>
<td>8L/min via MASK</td>
<td>J. Meyer JOHN MEYER</td>
<td>JS</td>
<td>23/04/14</td>
<td>20.30</td>
</tr>
<tr>
<td>23/04/14</td>
<td>20.30</td>
<td>2L/min via NASAL CANNULAE</td>
<td>J. Meyer JOHN MEYER</td>
<td>JS</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**Figure 8.12**
<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>PARACETAMOL</th>
<th>ESOMEPRAZOLE</th>
<th>MORPHINE SULFATE PCA</th>
<th>IBUPROFEN</th>
<th>ENOXAPARIN</th>
<th>CYCLIZINE</th>
</tr>
</thead>
<tbody>
<tr>
<td>22/09/14</td>
<td>6</td>
<td>FG</td>
<td>FG</td>
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<tr>
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</tr>
<tr>
<td>12</td>
<td>FG</td>
<td>FG</td>
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<tr>
<td>18</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

**Notes:**
- **No longer required as ibuprofen stopped 23/09/14.**
- **Stopped due to worsening renal function 23/09/14.**

**Medicine (Approved Name):**
- PARACETAMOL
- ESOMEPRAZOLE
- MORPHINE SULFATE PCA
- IBUPROFEN
- ENOXAPARIN
- CYCLIZINE

**Dose:**
- 1g
- 20mg
- 400mg
- 40mg
- 50mg

**Route:**
- ORAL
- IV
- SC

**Prescriber – sign & print:**
- JOHN MEYER
Name: JAKE SMITH  
Date of Birth: 05/03/1952

**REGULAR THERAPY**

<table>
<thead>
<tr>
<th>Medicine (Approved Name)</th>
<th>Dose</th>
<th>Route</th>
<th>Notes</th>
<th>Prescriber – sign + print</th>
</tr>
</thead>
<tbody>
<tr>
<td>TED STOCKINGS</td>
<td>1 pair</td>
<td>TOP</td>
<td>Start Date: 22/09/14</td>
<td>J. Meyer JOHN MEYER</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>22/09/14</th>
</tr>
</thead>
<tbody>
<tr>
<td>22</td>
<td>09</td>
<td>14</td>
</tr>
</tbody>
</table>

**PRESCRIPTION**

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>22/09/14</th>
</tr>
</thead>
<tbody>
<tr>
<td>22</td>
<td>09</td>
<td>14</td>
</tr>
</tbody>
</table>

Figure 8.14
### INTRAVENOUS FLUID PRESCRIPTION CHART

<table>
<thead>
<tr>
<th>Date/Time</th>
<th>FLUID</th>
<th>VOLUME</th>
<th>RATE</th>
<th>PRESCRIBER – SIGN AND PRINT</th>
</tr>
</thead>
<tbody>
<tr>
<td>23/09/14</td>
<td>0.9% SODIUM CHLORIDE</td>
<td>500mL</td>
<td>Over 15 min</td>
<td>J. Meyer JOHN MEYER</td>
</tr>
<tr>
<td>19.30</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>23/09/14</td>
<td>0.9% SODIUM CHLORIDE</td>
<td>500mL</td>
<td>100mL/h</td>
<td>J. Meyer JOHN MEYER</td>
</tr>
<tr>
<td>19.45</td>
<td>POTASSIUM CHLORIDE</td>
<td>20mmol</td>
<td></td>
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</tbody>
</table>

Figure 8.15
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in hyperkalaemia, 193
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for bacterial peritonitis, 105
for bradycardia, 53
for community-acquired pneumonia (CAP), 80
for diabetes in surgical patient, 279
for hospital-acquired pneumonia, 86
for hypercalcaemia, 201
for hyperemesis gravidarum, 247
for hyperkalaemia, 194
for hyperosmolar hyperglycaemic state, 179
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