Dedicated to Dept of General Surgery
Hospital Ampang

THE
GENERAL SURGERY

HO GUIDE

My Short Notes on Rx
Assessment, Inspection, Surgery, Hospitality
Ampang Hospital

Gerard Loh
THE SURGICAL GUIDE
By Dr Gerard Loh

Dedicated to Dept of General Surgery Hospital Ampang

Special Thanks
Ms Nor Aishah, Mr Lee Yuk Loong, Mr Kumareson, Mr Hamsan, Ms Tong, Mr Arief, Ms Rosliza
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Dr Maziah, Dr Faizal, Dr Rakesh, Dr Syafiz, Dr Choo, Dr Denesh, Dr Fairuz, Dr Collin, Dr Ainul

Introduction

The surgical HO duties:
Surgical ward 5B, 5C, peripheral cases
Emergency OT / ED
Clinic – Tuesday/Thursday/Friday
Elective GOT/LOT – Monday / Wed
Daycare – Scope – Wed / Friday

Contents

GS clerking

GS ward forms - NST, Ca notification,

OT surgery
Scheduling scope/OT cases
Posting cases to anest

Preop Care

Post op Care

Short notes of common problems

Common Problems Table

Appendix

Front cover in commemoration of Surgical Night 2012

Compiled by
Dr Gerard Loh
CSMU 2011
Surgical Posting Oct 2012-Feb 2013

A project by
House Officers Workshop
www.myhow.wordpress.com
**General Surgery Clerking**

(presentation should be in the similar order)

1. **Patient’s name, age, sex**
2. **Underlying known medical illness (K/C/O)**
3. **Chief Complaint** – short summarized complains (eg: abdominal pain 3/7, vomiting 2/7, fever 2/7)

4. **History of presenting illness** – short summary about the illness, associated sx, onset etc

   eg: Abdominal pain 3/7
   - Localized at RIF, starting 3 days ago, colicky, radiating to lower abdomen
   - a/w vomiting and fever 2/7
   - aggravated by movement, no relieving factor
   - pain score 8/10

**Other relevant hx**

Hx of taking outside food….travelling…etc
Hx of gastritis, OGDS done, findings…etc

5. **negative sx**

   Otherwise
   no URTI, no Dysuria….etc

6. **Further History**

   **Medical hx / Surgical hx**
   **Social Hx** – Occupation, social status, living environment, habits-smoking/alcohol, allergies
   **Family Hx** – Malignancy, medical illness

   **Reproductive hx** (female) – menstrual cycle/menopause, children, contraception etc

7. **Physical Examination**

   General
   Head & Neck
   Chest
   Abdomen
   Groin & genitalia
   Lymph nodes

8. **Provisional Diagnosis** : Imp: Acute Appendicitis
   DDx : UTI

9. **Investigations (to support Prov dx)**

   Laboratory Ix: list them down
   Radiology: CXR/AXR, CT etc

10. **Management**: admit ward 5b/5C/4B under surgical…

   * present cases in chronological manner
   – progress since admission to ward, we have done __ (Ix(scan or surgery)) __ with findings ____ etc,
   - currently patient is well, tolerating orally, no more abdominal pain…..we plan for ….. etc
# NST FORM

## Borang Saringan Pemakanan / Nutrition Screening Form

### A. Maklumat Pesakit / Patient Information

<table>
<thead>
<tr>
<th>Nama</th>
<th>Tarikh:</th>
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<th>Wad / Klinik</th>
<th>No. Tel Wad / Klinik</th>
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<td>Melayu</td>
<td>Lelaki</td>
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<td>Cina</td>
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<td></td>
<td>Perempuan</td>
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<tr>
<th>Lain-lain</th>
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### B. Anthropometri

<table>
<thead>
<tr>
<th>Berat (kg)</th>
<th>LIT / BMI (kg/m²)</th>
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<tbody>
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</table>

<table>
<thead>
<tr>
<th>Tinggi (m)</th>
<th>LIT = Berat (kg) / Tinggi (m) X Tinggi (m)</th>
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### Tindakan Yang Perlu Diambil / Action to be Taken

- Jika LIT / score LIT ≥ 25.0 atau LIT ≤ 18.5 (risiko malpemakanan / at risk of malnutrition)
  - Rujuk kepada Pegawai Dietetik / Refer to Dietitian - Borang Rujukan Dietetik Pesakit Dalam

### C. Alat Penyaringan Malpemakanan / Malnutrition Screening Tool

* Sila bulatkan jawapan di dalam ruangan yang disediakan / Please circle the answer in the space column

1. Apakah anda mengalami kehilangan berat badan sejak kebelakangan ini (dalam tempoh 6 bulan) tanpa usaha?
   - SKOR / Score
   - *Have you lost weight recently (within the last 6 months) without trying?*
   - Tidak / No: 0
   - Tidak pasti / Unsure: 1
   - Ya / Yes: 2

2. Jika Ya, berapakah berat yang anda hilangkan?
   - *If yes, how much weight have you lost?*
   - 1-5 kg: 1
   - 6-10 kg: 2
   - 11-15 kg: 3
   - > 15 kg: 4
   - Tidak pasti / Unsure: 2

3. Apakah pengambilan pemakanan anda kurang disebabkan oleh kurang selera makan?
   - *Have you been eating poorly because of decreased appetite?*
   - Tidak / No: 0
   - Ya / Yes: 1

### Jumlah Skor / Total Score

#### Tindakan Yang Perlu Diambil / Action to be Taken

- Skor / score MST ≥ 2 (risiko malpemakanan / at risk of malnutrition)
  - Rujuk kepada Pegawai Dietetik / Refer to Dietitian - Borang Rujukan Dietetik Pesakit Dalam

- Skor / score MST < 2 (tidak risiko malpemakanan / not at risk of malnutrition)
  - Saringan semula / Re-screen: a) Mingguan (kes akut) / Weekly (acute case)
    - b) Bulanan (kes kronik) / Monthly (chronic case)

### Disaring Oleh / Screened By

<table>
<thead>
<tr>
<th>NAMA &amp; COP / NAME &amp; STAMP</th>
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</thead>
<tbody>
<tr>
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</tbody>
</table>
2) Cancer notification form

CANCER NOTIFICATION FORM
(Explanatory notes overleaf)
Unit Pembangunan Kesihatan Keharga
 Jabatan Kesihatan Negeri Selangor
 Tingkat 11, Wisma SunwayMas,
 Lot 1, Jln Persiaran Kayangan
 40100 Shah Alam, Selangor Darul Ehsan.
 Tel: 03-5123 7316/313

1. PATIENT
Identification No : [Redacted]
Name : [Redacted]
Residential Address : [Redacted]
Post Code : [Redacted]
Date of Birth
DD / MM / YY
Age: [Redacted] Years
Ethnic :
1 Malay
2 Chinese
3 Indian
4 Other Indig. (Please specify)

2. SOURCE OF INFORMATION
1 Hospital/Clinic
Registration Number :
2 Pathology Lab
Lab No :
3 Other Sources

3. DIAGNOSIS [Specify primary organ/Site of cancer/
Exact location/Laterality if possible]
Topography (Site) :
Morphology (Histology) :

4. DATE OF DIAGNOSIS :
DD / MM / YY

5. BASIS OF DIAGNOSIS :
0 Death Certificate Only
1 Clinical
2 Clinical Investigations
4 Specific Tumor Markers
5 Cytology
6 Histology of Metastasis
7 Histology of Primary Tumor
9 Unknown

6. STAGE AT DIAGNOSIS (At time of Diagnosis)
Stage I
Stage II
Stage III
Stage IV
Unknown

7. TYPE OF TREATMENT (Date Started :
None
Surgery (_______)
Chemotherapy (_______)
Radiotherapy
Hormonal (_______)
Other (_______) (Please specify) Unknown

8. PRESENT STATUS
1 Alive
2 Dead If Dead,
Date of last seen:
Date of Death:
Cause of Death:

9. Remarks :
DATE OF NOTIFICATION :

PLEASE FILL THIS FORM WITH ANY INFORMATION AVAILABLE WITH YOU AND SEND IT AS SOON AS POSSIBLE
PLEASE MAINTAIN CONFIDENTIALITY AT ALL TIME
THANK YOU FOR YOUR COOPERATION
DATA FOR WOUND SURVEILLANCE
HOSPITAL AMPANG

NAME: ________________________________
MRN: ________________________________
WARD/Bed: ____________________________
SEX: ________________________________
AGE: ________________________________
DOA: ________________________________

DIAGNOSIS: ____________________________________________________________

UNDERLYING DISEASE: 1) ____________________________________________
2) ____________________________________________
3) ____________________________________________

DATE OPERATION: ________________________________
TYPE OF PROCEDURE: ________________________________________________
OTHER RELEVANT INFORMATION: ______________________________________
OPERATION TYPE: (EMERGENCY/ELECTIVE) DURATION: __________
OT ROOM: ________________
OT TEAM:

SURGEON: 1) ____________________________________________
2) ____________________________________________
3) ____________________________________________
SCRUB NURSE: ________________________________

WOUND CLASS (PLEASE REFER TABLE 1): ________________________________
ASA (PLEASE REFER TABLE 2): ______________________________________

PROPHYLAXIS ANTIBIOTIC:

PRE-OP: __________ INTRA-OP: __________ POST-OP: __________

SKIN CLOSURE: ____________________________________________

BLOOD LOSS (MLS): __________ BLOOD GIVEN (UNIT): __________

DRAIN (SITE): ________________________________

SAMPLE TAKEN: PUS / BLOOD / ASPIRATE
Pre Op and Post op Care
by Dr Angeline Yap

Pre Op Checklist:
Routine bloods (FBC/RP/LFT/CoAg/electrolytes)
CXR, ECG, consent, NBM, mark op side, anest review
* Thyroid op: ENT review (vocal cord)

Post Op Care
Phases
1) Immediate (post anesthetic)
2) Intermediate (hospital stay)
3) Convalescent (after discharge)

Complications
1) First 24 hours \(\rightarrow\) Systemic response to trauma, Pre-existing infection
2) 24-72 hours \(\rightarrow\) Atelectasis
3) 3-7 days \(\rightarrow\) Urinary tract infection, Chest infection, Wound infection, Intra-abdominal sepsis, Anastomotic leak, Thromobophlebitis
4) 7-10 days \(\rightarrow\) DVT/PE, Prosthetic infection

Goals
1) homeostasis \(\rightarrow\) fluid and electrolytes, strict I/O charting
2) Pain control \(\rightarrow\) adequate analgesics, monitor pain score
3) Prevention of complications \(\rightarrow\) anticoagulation, TED stockings, incentive spirometry, body turning

<table>
<thead>
<tr>
<th>Fluids In</th>
<th>Fluids Out</th>
</tr>
</thead>
<tbody>
<tr>
<td>+ IVD</td>
<td>- urine output / BO</td>
</tr>
<tr>
<td>+ Parenteral feeding: TPN/peptamen/nutren diabetic etc</td>
<td>- Nasogastric Tube (aspirate/free flow)</td>
</tr>
<tr>
<td>+ Medications: inotropes, Lasix, Sedation etc</td>
<td>- Stoma / Drain</td>
</tr>
</tbody>
</table>

* Daily requirement fluid : 2000 – 2500ml
* optimal nutrition: 25-35 kcal / kg/ day
*RT feeding 50 – 70 – 100cc/hr over 5 hours with 1 hr rest maximized = 300cc/3 hourly

* Urine output : 0.5cc/kg/hr
* Stoma >500cc \(\rightarrow\)replace with 1 pint HM
* Drain \(\rightarrow\)may off if <25cc/day

Example of common post operative orders:
Monitor VS hourly till stable then 4 hourly : GCS , BP, T, RR, SpO2, DXT, I/O
Keep NBM till review (complicated procedures) with IVD
GA \(\rightarrow\) allow orally once fully conscious
Spinal \(\rightarrow\) Lie supine for 6 hours
Adequate Analgesics, antiemetics
inform if dressing soaked|
Trace Ix ( HPE/C&S etc)
WID __, STO D__
Post Op Nutrition Support

Enteral nutrition (EN)
1) Long-term nutrition: Gastrostomy, Jejunostomy
2) Short-term nutrition: Nasogastric feeding, Nasoduodenal feeding, Nasojejunal feeding

Parenteral nutrition (PN): Peripheral Parenteral Nutrition (PPN), Total Parenteral Nutrition (TPN)

TPN (Total Parenteral Nutrition)
- highly concentrated, hypertonic nutrient solution administered by way of an infusion pump through a large central vein.
- provides crucial calories, restores nitrogen balance, and replaces essential fluids, vitamins, electrolytes, minerals, and trace elements.

Indications:
post GIT surgery/ GOT disorder requiring bowel rest, short bowel syndrome, severe Crohn’s/ulcerative colitis

Components:
- Carbohydrates in the form of glucose.
- Protein in the form of amino acids.
- Lipids in the form of triglycerides.
- Electrolytes (Na/Cl/K/Ca/Mg/PO4)
- Vitamins and trace minerals.

Calculations:
Based on IBW, daily protein and non protein requirements (CHO/lipids) daily fluid requirements, energy expenditure
- Optimal 25-35kcal/kg/day

Examples: Nutriflex Lipid, Kabiven/smofkabiven

<table>
<thead>
<tr>
<th>Substance</th>
<th>Normal patient</th>
<th>High stress</th>
<th>Fluid-restricted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amino acids</td>
<td>85 g</td>
<td>128 g</td>
<td>75 g</td>
</tr>
<tr>
<td>Dextrose</td>
<td>250 g</td>
<td>350 g</td>
<td>250 g</td>
</tr>
<tr>
<td>Lipids</td>
<td>100 g</td>
<td>100 g</td>
<td>50 g</td>
</tr>
<tr>
<td>Na⁺</td>
<td>150 mEq</td>
<td>155 mEq</td>
<td>80 mEq</td>
</tr>
<tr>
<td>K⁺</td>
<td>80 mEq</td>
<td>80 mEq</td>
<td>40 mEq</td>
</tr>
<tr>
<td>Ca²⁺</td>
<td>360 mg</td>
<td>360 mg</td>
<td>180 mg</td>
</tr>
<tr>
<td>Mg²⁺</td>
<td>240 mg</td>
<td>240 mg</td>
<td>120 mg</td>
</tr>
<tr>
<td>Acetate</td>
<td>72 mEq</td>
<td>226 mEq</td>
<td>134 mEq</td>
</tr>
<tr>
<td>Cl⁻</td>
<td>143 mEq</td>
<td>145 mEq</td>
<td>70 mEq</td>
</tr>
<tr>
<td>P</td>
<td>310 mg</td>
<td>465 mg</td>
<td>233 mg</td>
</tr>
<tr>
<td>MVI-12</td>
<td>10 mL</td>
<td>10 mL</td>
<td>10 mL</td>
</tr>
<tr>
<td>Trace elements</td>
<td>5 mL</td>
<td>5 mL</td>
<td>5 mL</td>
</tr>
</tbody>
</table>
Acute Abdomen – abdomen with immense pain with +/- peritonitis

Acute abdomen can be caused by the following
1) perforation – sudden onset, generalized severe pain, aggravated by movement (tender+guarding+rebound+silent abd)
2) obstruction – colicky pain, relieved by certain position, typical location and radiation according to source
3) Inflammatory process – gradual onset, constant, starts ill defined then localized + systemic sx
4) Ischaemic process – severe abdominal pain + blood in lumen of gut

<table>
<thead>
<tr>
<th>Process</th>
<th>Organ involved</th>
<th>Disorder</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inflammation</td>
<td>Bowel</td>
<td>Inflammatory bowel disease</td>
</tr>
<tr>
<td></td>
<td>Appendix</td>
<td>Appendicitis</td>
</tr>
<tr>
<td></td>
<td>Gall bladder</td>
<td>Cholecystitis</td>
</tr>
<tr>
<td></td>
<td>Pancreas</td>
<td>Pancreatitis</td>
</tr>
<tr>
<td></td>
<td>Fallopian tube</td>
<td>Salpingitis</td>
</tr>
<tr>
<td></td>
<td>Colonic diverticulae</td>
<td>Diverticulitis</td>
</tr>
<tr>
<td>Perforation</td>
<td>Duodenum</td>
<td>Perforated duodenal ulcer</td>
</tr>
<tr>
<td></td>
<td>Stomach</td>
<td>Perforated gastric ulcer</td>
</tr>
<tr>
<td></td>
<td>Colon (diverticula or carcinoma)</td>
<td>Faecal peritonitis</td>
</tr>
<tr>
<td></td>
<td>Gall bladder</td>
<td>Biliary peritonitis</td>
</tr>
<tr>
<td></td>
<td>Appendix</td>
<td>Appendicitis</td>
</tr>
<tr>
<td>Obstruction</td>
<td>Gall bladder</td>
<td>Biliary colic</td>
</tr>
<tr>
<td></td>
<td>Small intestine</td>
<td>Acute small bowel obstruction</td>
</tr>
<tr>
<td></td>
<td>Large bowel</td>
<td>Acute large bowel obstruction</td>
</tr>
<tr>
<td></td>
<td>Ureter</td>
<td>Ureteric colic</td>
</tr>
<tr>
<td></td>
<td>Urethra</td>
<td>Acute urinary retention</td>
</tr>
<tr>
<td></td>
<td>Mesenteric artery occlusion</td>
<td>Intestinal infarction</td>
</tr>
<tr>
<td>Haemorrhage</td>
<td>Fallopian tube</td>
<td>Ruptured ectopic pregnancy</td>
</tr>
<tr>
<td></td>
<td>Spleen or liver</td>
<td>Ruptured spleen or liver (haemoperitoneum)</td>
</tr>
<tr>
<td></td>
<td>Ovary</td>
<td>Ruptured ovarian cyst</td>
</tr>
<tr>
<td></td>
<td>Abdominal aorta</td>
<td>Ruptured AAA</td>
</tr>
<tr>
<td>Torsion (ischaemia)</td>
<td>Sigmoid colon</td>
<td>Sigmoid volvulus</td>
</tr>
<tr>
<td></td>
<td>Ovary</td>
<td>Torsion ovarian cyst</td>
</tr>
<tr>
<td></td>
<td>Testes</td>
<td>Torsion of testes</td>
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</tbody>
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Approach
1. A-B-C
2. Two large bore IV lines
3. Monitor vitals: Spo2, BP, ECG
4. Output – CBD
5. Investigations: GSH/FBC/CoAg/LFT/RP/VBG/Lactate
6. NG tube if indicated (I/O), UGIB
7. Radiology – CXR, AXR
8. Evaluation
Evaluation
History
Chief complain: Pain (SOCRATES) – Site, Onset, Character, Radiation, Association, Time course, Exacerbation/Relieving factors, Severity

Radiation
- Biliary colic → Right shoulder or scapula
- Renal colic → Loin to groin
- Appendicitis → periumbilical to RLQ
- Pancreatitis → back
- Ruptured AAA → back / flank
- Perforated ulcer → right paracolic gutter (RLQ)

Associated sx
Systemic: Fever, chills, LOW, jaundice, rash
GIT: nausea/vomiting, diarrhoea, constipation, tenesmus, melena, hematochezia, hematemesis, pale stool, steatorrhea
Urinary: dysuria, hematuria, frequency, dark tea coloured urine
Gyn: LMP, vaginal discharge, sexual active
Other: oral intake, travelling, bowel habit, drugs hx, NSAIDS, fam hx

Specific signs
1. Blumberg’s sign (rebound tenderness): constant, held pressure with sudden release causes severe tenderness (peritoneal irritation)
2. Courvoisier’s sign: palpable, non-tender gall bladder with jaundice (pancreatic or biliary malignancy)
3. Cullen’s sign: blue discoloration around umbilicus (peritoneal hemorrhage)
4. Grey Turner’s sign: flank discoloration (retroperitoneal hemorrhage)
5. Iliopsoas sign: flexion of hip against resistance or passive hyperextension of hip causes pain (retrocecal appendix)
6. Murphy’s sign: inspiratory arrest on deep palpation of RUQ (cholecystitis)
7. McBurney’s point tenderness: 1/3 from anterior superior iliac spine (ASIS) to umbilicus; indicates local peritoneal irritation (appendicitis)
8. Obturator sign: flexion then external or internal rotation about the right hip causes pain (pelvic appendicitis)
9. Rovsing’s sign: palpation pressure to left abdomen causes McBurney’s point tenderness (appendicitis)
10. Boas’s sign: right subscapular pain due to cholelithiasis
The clinical approach

History

The urgency of the history will depend on the manner of presentation, whether acute or chronic. Pain has to be analysed according to its quality, quantity, site and radiation, onset, duration and offset, aggravating and relieving factors and associated symptoms and signs.

- anorexia, nausea or vomiting
- micturition
- bowel function
- menstruation
- drug intake

Key questions
Point to where the pain is and where it travels to.
Questions to ask:

- What type of pain is it: is it constant or does it come and go?
- How severe would you rate it from 1 to 10?
- Have you ever had previous attacks of similar pain?
- What else do you notice when you have the pain?
- Do you know of anything that will bring on the pain? Or relieve it?
- What effect does milk, food or antacids have on the pain?
- Have you noticed any sweats or chills or burning of urine?
- Are your bowels behaving normally? Have you been constipated or had diarrhoea or blood in your motions?
- Have you noticed anything different about your urine?
- What medications do you take?
- How much aspirin do you take?
- Are you smoking heavily or taking heroin or cocaine?
- How much alcohol do you drink?
- How much milk do you drink?
- Have you travelled recently?
- What is happening with your periods? Is it mid-cycle or are your periods overdue?
- Does anyone in your family have bouts of abdominal pain?
- Do you have a hernia?
- What operations have you had for your abdomen?
- Have you had your appendix removed?

Physical examination
A useful checklist for conducting the examination is:

- general appearance
- oral cavity
- vital parameters: temperature, pulse, BP, respiratory rate (record these in the notes)
- chest: check heart and lungs for upper abdominal pain (especially if absent abdominal signs)
- abdomen: inspection, palpation, percussion and auscultation

The abdominal examination should be performed with the patient lying flat with one pillow under the head and the abdomen uncovered from xiphisternum to groin. Ask the patient to breathe through the mouth during the examination. Consider the following:

- inguinal region (including hernial orifices) and femoral arteries
- rectal examination: mandatory
- vaginal examination (females): for suspected problems of the fallopian tubes, uterus or ovaries
- thoracolumbar spine (if referred spinal pain suspected)
- urine analysis: white cells, red cells, glucose and ketones, porphyrins
- special clinical tests
  —Murphy's sign (a sign of peritoneal tenderness with acute cholecystitis)
  —iliopsoas and obturator signs
**Guidelines**

- **Palpation**: palpate with gentleness—note any guarding or rebound tenderness
  —guarding indicates peritonitis
  —rebound tenderness indicates peritoneal irritation (bacterial peritonitis, blood). Feel for maximum site that corresponds to focus of the problem
- **Patient pain indicator**: the finger pointing sign indicates focal peritoneal irritation; the spread palm sign indicates visceral pain
- **Atrial fibrillation**: consider mesenteric artery obstruction
- **Tachycardia**: sepsis and volume depletion
- **Tachypnoea**: sepsis, pneumonia, acidosis
- **Pallor and ‘shock’**: acute blood loss
- **Auscultation**: note bowel activity or a succussion splash
  Causes of a ‘silent abdomen’:
  —diffuse sepsis
  —ileus
  —mechanical obstruction (advanced)

Hypertympany indicates mechanical obstruction.

Physical signs may be reduced in the elderly, grossly obese, severely ill and patients taking corticosteroid therapy.

**Investigations**

The following investigations may be selected:

- haemoglobin—anaemia with chronic blood loss (e.g. peptic ulcer, carcinoma, oesophagitis)
- blood film—abnormal red cells with sickle cell disease
- WCC—leucocytosis with appendicitis (75%), acute pancreatitis, mesenteric adenitis (first day only), cholecystitis (especially with empyema), pyelonephritis
- ESR—raised with carcinoma, Crohn’s disease, abscess, but non-specific
- C-reactive protein (CRP)—use in diagnosing and monitoring infection, inflammation (e.g. pancreatic). Preferable to ESR
- liver function tests—hepatobiliary disorder
- serum amylase and/or lipase if raised to greater than five times normal upper level acute pancreatitis is most likely; also raised partially with most intraabdominal disasters (e.g. ruptured ectopic, perforated peptic ulcers, ruptured empyema of gall bladder, ruptured aortic aneurysm)
- pregnancy tests—urine and serum β-HCG: for suspected ectopic
- urine:
  —blood: ureteric colic (stone or blood clot), urinary infection
  —white cells: urinary infection, appendicitis (bladder irritation)
  —bile pigments: gall bladder disease
  —porphobilinogen: porphyria (add Ehrlich's aldehyde reagent)
  —ketones: diabetic ketoacidosis
  —air (pneumaturia): fistula (e.g. diverticulitis, other pelvic abscess, pelvic carcinoma)
- faecal blood—mesenteric artery occlusion, intussusception (‘redcurrant jelly’), carcinoma colon, diverticulitis, Crohn's disease and ulcerative colitis
Radiology

The following tests can be considered according to the clinical presentation:

- plain X-ray abdomen (erect and supine)
  - kidney/uteric stones—70% opaque
  - biliary stones—only 10–30% opaque
  - air in biliary tree
  - calcified aortic aneurysm
  - marked distension sigmoid → sigmoid volvulus
  - distended bowel with fluid level → bowel obstruction
  - enlarged caecum with large bowel obstruction
  - blurred right psoas shadow → appendicitis
  - a sentinel loop of gas in left upper quadrant (LUQ) → acute pancreatitis

- chest X-ray: air under diaphragm → perforated ulcer

- ultrasound: good for hepatobiliary system, kidneys and female pelvis: look for
  - gallstones
  - ectopic pregnancy
  - pancreatic pseudocyst
  - aneurysm aorta/dissecting aneurysm
  - hepatic metastases and abdominal tumours
  - thickened appendix
  - paracolic collection

- IVP
- contrast-enhanced X-rays (e.g. Gastrografin meal): diagnosis of bowel leakage
- barium enema
- HIDA or DIDA nuclear scan—diagnosis of acute cholecystitis (good when US unhelpful)
- CT scan: gives excellent survey of abdominal organs including masses and fluid collection
- ERCP: shows bile duct obstruction and pancreatic disease
- MRI scan

Other tests:

- ECG
- endoscopy upper GIT
- sigmoidoscopy and colonoscopy

Diagnostic guidelines

General rules

- Upper abdominal pain is caused by lesions of the upper GIT.
- Lower abdominal pain is caused by lesions of the lower GIT or pelvic organs.
- Early severe vomiting indicates a high obstruction of the GIT.
- Acute appendicitis features a characteristic ‘march’ of symptoms: pain → anorexia nausea → vomiting.

Pain patterns

The pain patterns are presented in Figure 34.3. Colicky pain is a rhythmic pain with regular spasms of recurring pain building to a climax and fading. It is virtually pathognomonic of intestinal obstruction. Ureteric colic is a true colicky abdominal pain, but so-called biliary colic and kidney colic are not true colics at all.
ACUTE ABDOMEN IN RELATION TO ABDOMINAL REGIONS

RUQ
- Pneumonia
- Hepatic tumour
- Hepatic abscess
- Hepatitis
- Retrocaecal appendicitis

EPIGASTRIC
- Oesophagitis
- Duodenal ulcer
- Gastritis
- Gastric ulcer
- Pancreatitis

LUQ
- Pneumonia
- Splenic infarction
- Pancreatitis
- Renal colic
- Renal infarction

CENTRAL
- Meckel's diverticulitis
- Intussusception
- Infarction
- Crohn's disease

SUPRAPUBIC
- Ovarian cyst
- Salpingitis
- Ectopic pregnancy
- Diverticulitis
- Uterine fibroid
- Ovarian cyst

RIF
- Pelvic appendicitis
- Salpingitis
- Cystitis

LIF
- Renal colic
- UTI
- Sigmoid volvulus
- Colitis

Central abdominal regions
- Aortic aneurysm
- Enteritis
**Gastritis**

**Acute Gastritis**
- Acute, self limiting syndrome caused by irritation of the gastric mucosa

**Etiology**
- Auto-immune - 
- Bacteria – Helicobacter Pylori
- Chemical – NSAIDS, alcohol
- Other – TB, syphilis, CMV, fungal, parasitic, Sarcoïd, Crohn’s disease

**Risks:**
- smokers (2x more likely to occur, poor healing, likely to recur)
- Alcohol Damages gastric mucosa

**Signs**
- Epigastric pain- increases on food intake (mechanical irritation to mucosa)
- Erosive = bleeding, blackish-stool, melena, hematemesis altered blood

**Peptic Ulcer Disease**
- Erosion – superficial to the muscularis mucosa, no scarring
- Ulcer – penetrates the muscularis mucosa, can result in scarring

**Etiology:** H pylori, NSAIDS; Zollinger Ellison, Idiopathic, physiological stress

**Helicobacter Induced Ulceration (90%)**
- Patho – H pylori produces toxin which cause gastric mucosal inflm/necrosis
- H Pylori blocks gastrin G cells in antrum – increased gastrin – increase gastric acid \( \rightarrow \) ULCER

**Gastric** | **Duodenal**
--- | ---
Pain during increased during eating | Pain 1-3 hours after meal
more atypical symptoms – require biopsy TRO malignancy | Pain relieved by eating/antacids
Burning, interrupts sleep

**History** - previous ulcer, NSAID use, missed meals, spicy food

**Investigations**
1) Endoscopy – OGDS with biopsy HPE (GOLD STANDARD)
2) H pylori tests - Urea Breath test/rapid urease test

**Management** –
1) Stop NSAIDS
2) acid neutralization
   - antacids : Syr MMT, Maalox
   - H2B – Ranitidine (Zantac) \( \rightarrow \) preferably before OGDS (prevent false negative)
   - PPI – Omeprazole(Losec), Esomeprazole (Nexium), Pantoprazole
3) H pylori eradication (CLO test +)
   = Clarithromycin 500mg BD + Amoxicilin 1g BD, 14days + PPI

**Complications**
- Bleeding – blackish stools/melena
- Perforation – PGU (usually anterior) – severe generalized abd pain, vomiting
- Gastric outlet obstruction – early satiety, vomiting, poor oral intake
- Penetration – may cause pancreatitis (posterior)
THE SCOPE

FORREST CLASSIFICATION

I A Spurting Blood
I B Oozing Blood
II A Exposed Vessel
II B Adherent Clot
II C Hematin on ulcer base
III Clean Base

Acute hemorrhage
• Forrest I a (Spurting hemorrhage)
• Forrest I b (Oozing hemorrhage)

Signs of recent hemorrhage
• Forrest II a (Visible vessel)
• Forrest II b (Adherent clot)
• Forrest II c (Hematin on ulcer base)

Lesions without active bleeding
• Forrest III (Lesions without signs of recent hemorrhage)
Appendicitis – inflammation of the vermiform appendix

Etio: luminal obstruction, fecolith, neoplasm, parasite, foreign body

Pathogenesis:
obstruction → bacterial overgrowth → inflammation → increased pressure → ischemia → gangrene/perforation → contained abscess or peritonitis

Clinical presentation
1) Abdominal pain:
    - early – periumbilical (ill defined-visceral),
    - Late – RIF (parietal)
2) Nausea and Vomiting
3) Fever

Physical Exam
1) General condition: septic looking fever, chills/rigor, dehydrated
2) PA: soft, tender at RIF
   - Rovsing / obturator / psoas +
   - Rebound and Guarding + (perforated peritonitis)

Investigations
Lab: FBC leucocytosis - not diagnostic, TRO ddx
   (UFEME-UTI, amylase – pancreatitis, LFT-cholecystitis)
Radio: CXR – look for free air under diaphragm (perforation), calculi
   USG Abd - if suspicious to look for fluid – perforation

Provisional Dx mainly based on clinical
Ddx: UTI, diverticulitis, ileitis, PID, cholecystitis,

MX:
If suspicious, admit for observation, keep NBM with IVD, observe for worsening abdominal pain + fever + leucocytosis
If pain reducing but dx unsure, may challenge orally and observe for worsening sx

Surgical Tx
Acute appendicitis or perforated appendicitis → open appendicectomy
   * If unlikely appendicitis but worsening condition → Exploratory Laparoscopy

Intraop
- Findings upon entering peritoneal cavity – pus discharge? gush of air?
- Appendix – position, base healthy? Any perforation/macerated body or tip etc
- Adhesions? Surrounding organs?

Post Op Care
- If op findings perforated/macerated, cont antibiotics
- Wound inspection D3
The Open Appendicectomy

1. Determine site for incision
2. Perform incision and then use diathermy to incise through the SPF & deep fascia
3. Expose Ext Oblique Aponeurosis incise in direction of its fibres Split ext oblique musc bluntly i.e. Kelly clamps
4. Repeat muscle splitting and retraction with internal oblique and transverse abdominis muscle to expose transversalis fascia and peritoneum
5. Clamp the fascia and peritoneum then using Metzenbaum scissors, incise the peritoneum to allow access into the peritoneal cavity

Layers of the abd wall
Skin
Subcutaneous Tissue
SPF & Deep fascia (Camper/scarpa)
Ext Oblique APONEUROSIS
Ext Oblique muscle
Int Oblique muscle
Transversus Abdominis muscle
Transversalis Fascia
Peritoneum

Int Oblique & transversalis abd muscles
Transversalis Fascia
Peritoneum

7. Removing the appendix
The Anterograde approach
- Identify Asc colon and its tenia coli, follow to their convergence
- Identify the base of appendix, free the appendix/mesoappendix complex
- Ligate the Mesappendix (containing appendiceal artery) and separate them from the appendix
- Ligate the base of appendix (simple/purse string)
- Place clamp distal to ligation
- Divide sharply, cauterize exposed mucosa

The Retrograde approach
- Identify the base of appendix, ligate and divide sharply
- Ligate the mesoappendix

SEND FOR HPE AND PERITONEAL FLUID C&S

8. Irrigate the wound with copious amount of NS
9. Close peritoneum with Vicryl 3/0
10. Approximate all split muscles layers with vicryl 3/0
11. Close Ext Oblique aponeurosis with Vicryl 2/0
12. Approximate scarpa fascia with Vicryl 3/0
13. Close skin with Monocryl 4/0

by Gerard Leb
Pancreatitis = inflammation of exocrine pancreas due to injury to acinar cells

**Classification:**
Acute / Chronic
Mild / Moderate / Severe
Acute interstitial / Acute Hemorrhagic

**c/o:**
- Epigastric pain, radiating to back
- Respiratory failure
- a/w nausea and vomiting
- a/w fever, confusion, coma

**o/e:**
- Jaundice
- PA: tender rigid abdomen
- abdominal distension (paralytic ileus)
- pain improved on leaning forward

**Glasgow IMIRIE criteria**
- PaO2 <60
- Age >55
- Neutrophils >15
- Calcium <2
- Renal urea >16
- Enzymes ALT >100, LDH >600
- A lbumin <32
- Sugar >10
- 2+ moderate, 3+ severe

**ETIOLOGY (GET MASHED)**
- Gallstones (45%)
- Ethanol (35%) Alcohol
- Tumours: pancreas, ampulla, choledocholec
- Microbiological
  - bacterial: mycoplasma, *Campylobacter*, TB, MAI, legionella, leptospirosis
  - viral: mumps, rubella, varicella, viral hepatitis, CMV, EBV, HIV, Coxsackievirus, echovirus, adenovirus
  - parasites: *Ascariasis, Clonorchiasis, Echinococciosis*
- Autoimmune: SLE, polyarteritis nodosa (PAN), Crohn’s
- Surgery/trauma
  - manipulation of sphincter of Oddi (e.g. ERCP), post-cardiac surgery, blunt trauma to abdomen, penetrating peptic ulcer
- Hyperlipidemia (TG >11.3 mmol/L), hypercalcemia, hypothermia
- Emboli or ischemia
- Drugs/toxins: azathioprine, mercaptopurine, ddl, furosemide, estrogens, methyldopa, H2 blockers, valproic acid, antibiotics, acetaminophen, salicylates, ethanol, methanol, organophosphates
- Idiopathic: 3rd most common - thought to be hypertensive sphincter or microlithiasis

**Signs of severe pancreatitis**
- Hypovolemic shock, Coma
- Respiratory Distress Syndrome
- Renal impairment
- Retroperitoneal bleeding with flank and umbilical Bruising (Grey/Turner sign)

**Risk**
- Chronic Alcoholism
- Malignancy
- Hyperlipidemia/Calcemia
Investigations

Lab: (refer to IMRIE score values)
FBC/RP/LFT/RBS/LDH/Electrolytes

Radiology:
US HBS: look for stones in ducts, dilatation of CBD (>11mm)

CT abdomen

Endoscopic

Endoscopic Retrograde Cholangiopancreatography (ERCP)
Medical Management
Acute pancreatitis
(1) hemodynamic stability
(2) alleviate pain
(3) stop progression of damage
(4) treat local and systemic complications

Surgical Therapy
1) Acute Gallstone Pancreatitis \(\rightarrow\) Cholecystectomy, Spincterotomy (ERCP)

Biliary Sphinterotomy

2) Recurrent pancreatitis with sphincter dysfunction \(\rightarrow\) major papilla sphincterotomy

3) Pancreas Divisum (congenital anomaly) \(\rightarrow\) minor papilla sphinterotomy
Complications

1) pseudocyst (cyst-like structure encapsulated with fibrous material, not epithelium) collection of pancreatic juices outside of the normal boundaries of the ductal system

Surgery: ERCP with long stenting of pancreatic duct

2) fluid collection, abscess, necrosis – Surgical: debridement/percutaneous drainage

3) lungs\textarrow{ fluid accm in pleural space} pleural effusion, atelectasis, pneumonia, acute respiratory distress syndrome (ARDS)

4) acute renal failure (ATN) \textarrow{direct extension of inflammation to kidney}

5) CVS: pericardial effusion, pericarditis, shock

6) Splenic vein thrombosis \textarrow{Splenectomy}
Pancreatitis at a Glance
**Gallstone disease** – collection of stones in the biliary tract

**Types:** cholesterol, calcium carbonate, bile pigments, mixed

**Risks:** 5Fs – Fat, Female, Fertile, Forty, fair

**Clinical presentation**

(80% asymptomatic) may present as various forms:

1) **Biliary colic** – colicky pain, RHC region, aggravated by oily food; a/w vomiting.
2) **Cholecystitis** – inflammation of gall bladder wall with infection
3) **Cholangitis** – inflammation of CBD secondary to obstruction by gallstone
4) **Obstructive jaundice** – obstruction of CBD by stone leading to accumulation of bile, clinically jaundiced
5) **Pancreatitis** – obstruction of CBD or pancreatic duct leading to inflammation of pancreas

**Symptoms**

1) Abdominal pain – colicky, RHC region, fatty food intolerance, radiating to shoulder / scapula
2) Nausea and vomiting
3) Fever a/w chills + rigor
4) Jaundiced with +/- signs of acute pancreatitis

**Physical Exam**

Murphy Sign +
- Pt unable to complete inspiration when gallbladder region is pressed
**Cholecystitis** – inflammation of the gallbladder

Signs: fever + RHC pain, aggravated by food intake, a/w nausea/vomiting
Murphy sign +
US HBS → thickening of gallbladder wall, edematous, pericholecystic fluid, +/- GB stones
Ix: WCC raised, LFT enzymes elevated (ALP)
Tx: Conservative ➜ Antibiotics + analgesics

Surgical ➜ cholecystectomy
**Nephrolithiasis** – renal calculi

**Types** – Oxalate, Phosphate(Ca+ammonium+MgPO4), Urate, cysteine

**Clinical:** loin to groin colicky pain, UTI sx, obstructive uropathy sx, passing out sandy urine/stones

**Ix:** UFEME, RP, CaPO4, Uric Acid

Xray KUB → radio opaque stones (L1-L3 region)

US KUB → to look for hydronephrosis/hydroureter, obstructive uropathy

CTU → confirms presence and identifies position of stone

**Mx:** adequate hydration, analgesic, lithotripsy

**Surgical intervention indication:**

stone >5mm, obstructive uropathy, staghorn calculi

1) **Stenting**

2) **Nephrostomy**

3) **Lithotripsy**
Intestinal Obstruction (small / large bowel)
- blockage of the intestinal lumen with disruption of normal flow of intestinal contents and dilation proximal to the blockage

Etiology

<table>
<thead>
<tr>
<th>Table 5. Causes of Small Bowel Obstruction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extrinsic Lesions</td>
</tr>
<tr>
<td>-------------------</td>
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<tr>
<td>Adhesions (60%) - in patients with prior abdominal surgery</td>
</tr>
<tr>
<td>Hernia (20%) Volvulus Annular pancreas Neoplasms</td>
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Classification
Acute/Subacute/Chronic

Mechanical – complete/partial physical blockage
Simple – one obstruction point
Closed-loop blockage at >2 points
Paralytic Ileus – impairment of muscles, usual in post op patients
Strangulating – obstructing mechanism occludes mesenteric blood supply

Clinical
c/o abdominal distension, nausea/vomiting, colicky abdominal pain, NBO, no flatus

Obstruction
1) non-strangulating
a) Proximal – early vomiting (bilious), colicky abdominal pain, minimal distension, dehydration ++
b) Middle - moderate vomiting after onset pain, abdominal distension +, intermitent colicky pain, obstipation
c) Distal – feculant vomit, abdominal distension +++, peristaltic rushes+, obstipation, variable pain

2) Strangulating (EMERGENCY!)
- early shock, fever, leukocytosis, tachycardia
- cramping pain – continous abdominal pain
- vomiting gross or occult blood
- abdominal tenderness/rigidity
- melena if infarcted (edema and intraluminal pressure cause decrease in perfusion, impaired blood supply \(\rightarrow\) NECROSIS)

Physical
PA : soft, distended, visible peristalsis
Bowel Sound = hyperactive/tinkling
PR empty rectum
Investigations

Radiological

1) CXR – erect / Left lateral decubitus -look for free air under diaphragm
2) AXR – air-fluid levels and dilated loops of bowel >3cm, stepladder pattern, herringbone, string of pearls

<table>
<thead>
<tr>
<th></th>
<th>Air in rectum / sigmoid</th>
<th>Air in small bowel</th>
<th>Air in large bowel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>+</td>
<td>2-3 loops max</td>
<td>Rectum/sigmoid</td>
</tr>
<tr>
<td>Local Ileus</td>
<td>+</td>
<td>2-3 distended loops</td>
<td>Rectum/sigmoid</td>
</tr>
<tr>
<td>Generalized Ileus</td>
<td>+</td>
<td>Multiple distended loops</td>
<td>Distended</td>
</tr>
<tr>
<td>SBO</td>
<td>-</td>
<td>Multiple dilated loops</td>
<td>-</td>
</tr>
<tr>
<td>LBO</td>
<td>-</td>
<td>-</td>
<td>Dilated</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>High</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency of spasms</td>
<td>3–5 minutes</td>
<td>6–10 minutes</td>
</tr>
<tr>
<td>Intensity of pain</td>
<td>+ + +</td>
<td>+</td>
</tr>
<tr>
<td>Vomiting</td>
<td>Early, frequent</td>
<td>Later</td>
</tr>
<tr>
<td>Content:</td>
<td>Violent</td>
<td>Less severe</td>
</tr>
<tr>
<td>Dehydration and degree of illness</td>
<td>Marked</td>
<td>Less prominent</td>
</tr>
<tr>
<td>Distension</td>
<td>Minimal</td>
<td>Marked</td>
</tr>
</tbody>
</table>
Surgery

Several surgical options exist for bowel diversion.

- **Ileostomy** diverts the ileum to a stoma. Semisolid waste flows out of the stoma and collects in an ostomy pouch, which must be emptied several times a day. An ileostomy bypasses the colon, rectum, and anus and has the fewest complications.

- **Colostomy** is similar to an ileostomy, but the colon—not the ileum—is diverted to a stoma. As with an ileostomy, stool collects in an ostomy pouch.

- **Ileoanal reservoir surgery** is an option when the large intestine is removed but the anus remains intact and disease-free. The surgeon creates a colonlike pouch, called an ileoanal reservoir, from the last several inches of the ileum. The ileoanal reservoir is also called a pelvic pouch or J-pouch. Stool collects in the ileoanal reservoir and then exits the body through the anus during a bowel movement. People who have undergone ileoanal reservoir surgery initially have about six to 10 bowel movements a day. Two or more surgeries are usually required, including a temporary ileostomy, and an adjustment period lasting several months is needed for the newly formed ileoanal reservoir to stretch and adjust to its new function. After the adjustment period, bowel movements decrease to as few as 4 to 6 a day.

- **Continent ileostomy** is an option for people who are not good candidates for ileoanal reservoir surgery because of damage to the rectum or anus but do not want to wear an ostomy pouch. As with ileoanal reservoir surgery, the large intestine is removed and a colon-like pouch, called a Kock pouch, is made from the end of the ileum. The surgeon connects the Kock pouch to a stoma. A Kock pouch must be drained each day by inserting a tube through the stoma. An ostomy pouch is not needed and the stoma is covered by a patch when it is not in use.

*Shaded areas are removed or bypassed during surgery*
Goitre – enlargement of thyroid gland from any cause

Causes
1. physiological – increased demand for thyroid hormone (puberty/pregnancy)
2. Iodine deficiency – decreased T4, increased TSH stimulation → diffuse goiter
3. Primary hyperthyroidism (Graves disease) – due to circulating Ig LATS
4. Adenomatous (nodular) goiter – benign hyperplasia
5. Thyroiditis (autoimmune ie Hashimoto’s, de Quervain’s, Riedel’s struma)
6. Thyroid malignancies

<table>
<thead>
<tr>
<th></th>
<th>Hyperthyroidism</th>
<th>Hypothyroidism</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Primary</strong></td>
<td>Grave’s Disease</td>
<td>Autoimmune (Hashimoto’s thyroiditis)</td>
</tr>
<tr>
<td></td>
<td>Plummer’s disease (toxic nodule)</td>
<td>Idiopathic senile atrophy</td>
</tr>
<tr>
<td></td>
<td>- Adenoma, cysts, carcinoma</td>
<td></td>
</tr>
<tr>
<td><strong>Secondary</strong></td>
<td>Pituitary Adenoma</td>
<td>Pituitary failure</td>
</tr>
<tr>
<td><strong>Signs</strong></td>
<td>Goiter, Pretibial myxedema</td>
<td>Periorbital puffiness, macroglossia</td>
</tr>
<tr>
<td></td>
<td>Eye signs: lag, exophtalmus, oculomotor palsy, infrequent blinking</td>
<td>Loss of eyebrow, hair loss + hoarse voice</td>
</tr>
<tr>
<td><strong>CNS</strong></td>
<td>Anxiety, excitement + Tremor hyperreflexia</td>
<td>Slow mentation, tiredness Dementia, deafness, hyporeflexia, muscle pains</td>
</tr>
<tr>
<td><strong>CVS</strong></td>
<td>Atrial fibrillation, tachycardia, palpitations</td>
<td>Peripheral edema, bradycardia, hypotension</td>
</tr>
<tr>
<td><strong>GI</strong></td>
<td>Increased appetite diarrhoea</td>
<td>Constipation</td>
</tr>
<tr>
<td><strong>Gyn</strong></td>
<td>Oligomenorrhea</td>
<td></td>
</tr>
<tr>
<td><strong>Metabolism</strong></td>
<td>+ LOW, ++ Sweating, Heat intolerance moist palm</td>
<td>+ weight gain, - Sweat, cold intolerance Dry skin</td>
</tr>
</tbody>
</table>

**INVESTIGATIONS AND ESSENTIAL MANAGEMENT**

- Clinically toxic goitre: ¹²³I scan
- Subtotal thyroidectomy indicated for: cosmesis, pressure symptoms.
- Solitary nodule: FNAC
- Follicular cells (adenoma or carcinoma) + Papillary carcinoma
- Repeat FNAC to confirm diagnosis.
- Surgery only for cosmesis of pressure symptoms.
- Proceed to completion total thyroidectomy if follicular carcinoma.

**Other causes**
- Physiological: reassurance.
- I₂ deficiency (endemic): supplemental iodine in the diet.
- Thyroiditis.
- Autoimmune (Hashimoto’s): anti-inflammatory, thyroid replacement therapy if becomes hypothyroid.
- Subacute (de Quervain’s): simple analgesia, sometimes steroids.
- Riedel’s (struma): resection only for compression symptoms.
Hyperthyroidism
1) Grave’s disease = diffuse goiter + ophthalmopathy + dermatopathy

Pathophysiology: auto Ig that stimulates TSH receptors hence elevated T4

Risk: strong fam hx of thyroidism / autoimmune disorders

Ix: TFT = TSH decreased, T4 increased, thyroid antibody +

Tx: Propylthiouracil, Methimazole, Propanolol (palpitations)

Thyroid ablation with Radioactive Iodine

Surgical Tx
1) Lobectomy
2) Subtotal thyroidectomy
3) Total thyroidectomy

Possible post op complications include:

- Hemorrhage (bleeding) beneath the neck wound — wound bulges and the neck swells, possibly compressing structures inside the neck and interfering with breathing.
- Thyroid storm — there may be a surge of thyroid hormones into the blood.
- Injury to the recurrent laryngeal nerve — vocal cord paralysis (hoarseness of voice)
- Injury to a portion of the superior laryngeal nerve — If this occurs, patients who sing may not be able to hit high notes, and the voice may lose some projection.
- Wound infection
- Hypoparathyroidism — hypocalcemia (convulsions, arrhythmias, tetany, numbness/paresthesia)

Chvotek’s sign – facial spasm

- Trousseau sign - carpopedal spasm
Pneumothorax

Types:
1) spontaneous
   - Primary (idiopathic)
   - Secondary (underlying lung pathology, Traumatic)

2) Tension

Etio: chest traumatic rib fracture, penetrating wound, underlying lung pathology

c/o: sudden onset chest pain + SOB, tachypnea, tachycardia, O2 desaturation
PE: hyperresonance of chest

Ix:
ABG + routine bloods
CXR stat

Surgical Tx
1) Aspiration
2) Chest Tube
3) VATs (video assisted thorascopic surgery)
Chest Tube Insertion

1. Position of patient
   - Bed 30-45 degrees
   - Arm behind head

2. Identify safe triangle
   - **Anterior:** Lateral Border (M. Pect. Major)
   - **Posterior:** Ant Axillary Line (M. Lat Dorsi)
   - **Inferior:** Nipple Line (4-5th Rib)

3. Clean and drape area, Give local anesthesia

4. Make an incision 3-4cm

5. Widen the incision with Kelly Clamp
   - Use clamp to bluntly dissect muscles and pleura (gush of air may be felt)

6. Insert finger and feel for lung / empty space

7. Insert tube using Kelly Clamp
   - Once tube inside thoracic cavity, remove Kelly clamp, advance tube manually

8. Connect chest tube to under water seal

9. Secure with sutures and tape

10. Post procedure, don't forget to order a CXR to confirm correct insertion

*Gerard Loh*
Groin and Genitalia

**Hernia** = protrusion of viscus into an area which it is not normally contained

- **Complete** – hernia sac and contents protrude through defect
- **Incomplete** – incomplete protrusion through defect
- **Strangulated** – vascular supply compromised
- **Incarcerated** – irreducible

**Types**

**Groin (pelvic) hernias**

- **Indirect inguinal hernia**
  - Through inguinal canal extending into scrotal sac (in males)
  - Lateral to inferior epigastric vessels
  - Most common
  - Failure of obliteration of processus vaginalis
  - Bilateral 20% of time
- **Direct inguinal hernia**
  - Acquired defect in transversalis fascia of Hesselbach triangle
  - Medial to inferior epigastric vessels
  - More common in middle-aged males

- **Femoral hernia**
  - Through the femoral canal medial to the femoral vein
  - Only 4% of groin hernias (versus 96% inguinal)
  - More often in females but still less common than inguinal hernias
  - Right side more often than left
  - Frequently incarcerated
**Ventral (abdominal wall) hernias**

- **Umbilical hernia**
  - Failure of closure of the umbilical ring in children
  - More females than males in adults
  - More common in African Americans
  - Incarceration is rare in children, more common in adults
  - After infancy, second spike in incidence is in middle-age and result of
    - Increased intra-abdominal pressure

- **Paraumbilical hernia**
  - Adults
    - Occurs adjacent to site of umbilicus
      - Superior to umbilicus called epigastric (more common)
      - Inferior to umbilicus called hypogastric
    - Occur along the linea alba
    - Usually contain fat

- **Richter hernia**
  - Involves only anti-mesenteric side of bowel entering hernia
  - Usually no obstructive symptoms
  - Can occur with any of the abdominal hernias

- **Incisional hernia**
  - Breakdown in fascia closing prior abdominal surgery
  - More common with obesity, wound infection and smokers
  - Usually occur within first few months after surgery
  - Can be quite large and are frequently incarcerated

- **Spigelian hernia**
  - Lateral edge of rectus muscle at semilunar line
    - Inferior and lateral to umbilicus
  - Rare
  - Over age 50

- **Obturator hernia**
  - Passes through obturator foramen between pectineus and obturator muscles
  - Much more common in females, usually elderly
  - More often on right side
  - Frequently obstructs

**Clinical Findings**

- Fullness at site of hernia, Cough impulse +
- Symptoms of bowel obstruction
  - Nausea and vomiting
- Symptoms of bowel ischemia
  - Toxic

**Imaging Findings**

- Bowel loops projecting into scrotum or over obturator foramen on conventional radiographs
- Bowel and/or omentum (fat) or sometimes visceral organs protruding through peritoneum
- Bowel or fat in hernia sac
- Stranding of fat suggest the possibility of incarceration
- Proximal bowel dilatation from obstruction
- Bowel wall thickening, extraluminal fluid, severe fat stranding and engorged mesenteric vessels suggest strangulation

**Differential Diagnosis**

- Soft tissue tumors
- Lymphadenopathy
Treatment

- Surgery for incarceration - Hernioplasty
- Inguinal hernias are usually repaired to prevent incarceration and obstruction
- Spigelian and obturator hernias are usually repaired before they become symptomatic

Complications

- Obstruction
- Ischemic and/or necrotic bowel
- Perforation

**Herniorrhaphy** – repair with sutures only

**Hernioplasty** – repair with mesh
Prostatomegaly

BPH (Benign Prostatic Hypertrophy) – increased size of periurethral glands of the prostate gland
Etiology: unknown

Pathophysiology:
Microscopic stromal nodules dev around periurethral glands →
Glandular hyperplasia → compression of urethra

Clinical
1) Outlet obstruction = Weak stream, hesitancy, intermittent, dribbling, straining,
   Acute Urinary retention
2) Detrusor instability = frequency, urgency, nocturia, dysuria, incontinence
3) Detrusor failure = palpable bladder, enlarged smooth prostate

Investigations
UFEME / Renal profile
PSA (do not take after prostate exam) if suspect malignancy

Uroflowmetry – measures the volume of urine released from the body, the speed with which it is released, and how long the release takes.

- Ages 4 - 7
  - The average flow rate for both males and females is 10 mL/sec.
- Ages 8 - 13
  - The average flow rate for males is 12 mL/sec.
  - The average flow rate for females is 15 mL/sec.
- Ages 14 - 45
  - The average flow rate for males is 21 mL/sec.
  - The average flow rate for females is 18 mL/sec.
- Ages 46 - 65
  - The average flow rate for males is 12 mL/sec.
  - The average flow rate for females is 18 mL/sec.
- Ages 66 - 80
  - The average flow rate for males is 9 mL/sec.
  - The average flow rate for females is 18 mL/sec.

IPSS Score

```
<table>
<thead>
<tr>
<th>Question</th>
<th>None at all</th>
<th>Less than 20% of time</th>
<th>Less than half the time</th>
<th>About half the time</th>
<th>More than half the time</th>
<th>Almost always</th>
</tr>
</thead>
<tbody>
<tr>
<td>had a sensation of not emptying your bladder completely after urinating?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>had to urinate again less than 2 hours after urinating?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>stopped and started again several times when you urinated?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>found it difficult to postpone urination?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>had a weak urinary stream?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>had to push or strain to urinate?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Over the past month, how often have you…</td>
<td>None</td>
<td>1 time</td>
<td>2 times</td>
<td>3 times</td>
<td>4 times</td>
<td>5 times or more</td>
</tr>
<tr>
<td>how many times did you most typically get up to urinate from the time you went to bed at night until you got up in the morning?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
```

mild: score 1 to 7
moderate: score 8 to 19
severe: score 20 to 35
Medical Therapy
1) Alpha blockers – doxazosin, prazosin, tamsulosin, terazosin (Hytrin), and alfuzosin
MOA: relaxes smooth muscle tissue in prostate
2) Alpha reductase inhibitors – Finasteride (Proscar) and dutasteride

Surgical
1) Transurethral resection of the prostate (TURP):
   This is the most common and most proven surgical treatment for BPH. TURP is performed by inserting a scope through the penis and removing the prostate piece by piece.

2) Transurethral incision of the prostate (TUIP):
   This procedure is similar to TURP, but is usually performed in men who have a smaller prostate. It is usually performed without the need for a hospital stay. Like TURP, a scope is inserted through the penis until the prostate is reached. Then, rather than removing the prostate, a small incision is made in the prostate tissue to enlarge the opening of the urethra and bladder outlet.

3) Simple prostatectomy:
   An open prostatectomy is usually performed using general or spinal anesthesia. An incision is made through the abdomen or perineum (the area behind the scrotum). Only the inner part of the prostate gland is removed. The outer portion is left behind. This is a lengthy procedure, and it usually requires a hospital stay of 5 to 10 days.
Scrotal swelling

Common conditions:

1) **Orchitis**: pain++, confined to testis
2) **Epididymo-orchitis**: pain+(relieved by elevating testis), swollen+, erythema of scrotum, fever + pyuria
3) **Torsion of testis**: rapid onset, bellclapper testis +, knot in the cord, testis appears higher
4) **Hydrocele** – collection of fluid in tunica vaginalis, soft, fluctuant, difficult to feel testis, cystic intrascrotal mass
5) **Varicocele**: collection of dilated and tortuous veins in the spermatic cord, bag of worms+, dragging sensation
Hematuria

Frank/gross = macroscopic pink/red/
Microscopic = visible in UFEME

Causes – Renal / Ureteral / Bladder / Urethral

Physical Exam
Examine genitals TRO trauma
Palpate bladder

Investigations
1) ? renal cause → CT or US KUB
2) ? bladder cause → US KUB, Cystoscopy
3) ? GMN – renal biopsy

Mx
Insert CBD (3 way catheter) and start irrigation
HEMATURIA

Pseudo-hematuria
- coloured urine but negative dipstick
- differential diagnosis
  - food (e.g. beets)
  - dyes
  - medication (e.g. rifampin)

Hematuria but NO RBC's on microscopy
- myoglobinuria
- hemoglobinuria (due to hemolysis)
NB: myoglobinuria and hemoglobinuria will register on dipstick as blood

True Hematuria

Nephrological
(casts and/or protein)

Urological
(no casts or protein)
- think anatomically:
  - ureter
  - bladder
  - urethra
  - miscellaneous (e.g. TB)

Hematological
- coagulopathy
- sickle hemoglobinopathies

Associated with Urinary Tract Infection

Associated with Proteinuria
- think anatomically:
  - glomerular
  - tubulointerstitial

Associated with Casts
- see Table 2 for types of casts and their causes

* Hematuria in age >40 yo, MUST rule out malignancy

Cystoscopy
1) **Abscess** – inflammation, fluctuant with punctum, fever, indurated, warm, tender+
Tx: Incision and drainage + antibiotics

2) **Sebaceous Cyst** - sac filled with cheese-like/oily material, often in scalp, ears, face, upper arm
Tx: Excision

3) **Carbuncle** – inflammation of several hair follicles
Tx: Saucerization
Bedsores, sacral sores

four stages:

- **Stage 1** sores are not open wounds. The skin may be painful, but it has no breaks or tears. The skin appears reddened and does not blanch (lose color briefly when you press your finger on it then remove your finger). In a dark-skinned person, the area may appear to be a different color than the surrounding skin, but it may not look red. Skin temperature is often warmer. And the stage 1 sore can feel either firmer or softer than the area around it.

- At stage 2, the skin breaks open, wears away, or forms an ulcer, which is usually tender and painful. The sore expands into deeper layers of the skin. It can look like a scrape (abrasion), blister, or a shallow crater in the skin. Sometimes this stage looks like a blister filled with clear fluid. At this stage, some skin may be damaged beyond repair or may die.

- During stage 3, the sore gets worse and extends into the tissue beneath the skin, forming a small crater. Fat may show in the sore, but not muscle, tendon, or bone.

- At stage 4, the pressure sore is very deep, reaching into muscle and bone and causing extensive damage. Damage to deeper tissues, tendons, and joints may occur.
## Wound Management

<table>
<thead>
<tr>
<th>Dressing</th>
<th>Debridment</th>
<th>Proliferation</th>
<th>Epithelization</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hydrocolloid</strong></td>
<td>- - - - - - - - - - - -</td>
<td>- light exuding wound</td>
<td>- - - - - - - - - - -</td>
</tr>
<tr>
<td><strong>Foam</strong></td>
<td>- - - - - - - - - - - -</td>
<td>- exuding wound</td>
<td>- - - - - - - - - - -</td>
</tr>
<tr>
<td><strong>Hydrogel</strong></td>
<td>- - - - - dry wound</td>
<td></td>
<td>- - - - - - - - - - -</td>
</tr>
<tr>
<td><strong>Hydrofiber</strong></td>
<td>- - - - - infected or exuding wound</td>
<td></td>
<td>- - - - - - - - - - -</td>
</tr>
<tr>
<td><strong>Alginate</strong></td>
<td>- infected, exuding, or bleeding wound</td>
<td></td>
<td>- - - - - - - - - - -</td>
</tr>
<tr>
<td><strong>Charcoal</strong></td>
<td>- - - malodorous wound</td>
<td></td>
<td>- - - - - - - - - - -</td>
</tr>
<tr>
<td><strong>Silver dressings</strong></td>
<td>- - heavy colonisation</td>
<td></td>
<td>- - - - - - - - - - -</td>
</tr>
<tr>
<td><strong>Interfaces</strong></td>
<td></td>
<td></td>
<td>- - - - - - - - - - -</td>
</tr>
<tr>
<td><strong>Hyaluronic acid</strong></td>
<td>- - - dry wounds</td>
<td></td>
<td>- - - - - - - - - - -</td>
</tr>
<tr>
<td><strong>Films</strong></td>
<td></td>
<td></td>
<td>- - - - - - - - - - -</td>
</tr>
</tbody>
</table>

### Indication

<table>
<thead>
<tr>
<th>Dressing</th>
<th>Indication</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hydrocolloid</strong>: Duoderm</td>
<td>Burns, ulcers, sores (mildly exuding wound)</td>
</tr>
<tr>
<td><strong>Foam</strong>: Allevyn, Mepilex</td>
<td>Exuding, Granulating, epithelizing ulcers</td>
</tr>
<tr>
<td><strong>Hydrogel</strong>: Duoderm gel, Intrasite, Urgo Hydrogel</td>
<td>Sloughy, debrided wound</td>
</tr>
<tr>
<td><strong>Hydrofibers</strong>: Aquacel</td>
<td>Infected ulcer (heavily exuding)</td>
</tr>
<tr>
<td><strong>Alginate</strong>: Urgacel</td>
<td>Hemorrhagic, infected ulcer (heavily exuding)</td>
</tr>
<tr>
<td><strong>Silver</strong>: Actisorb Ag+, Acticoat, Aquacell Ag</td>
<td>infected Foul smelling ulcer</td>
</tr>
<tr>
<td><strong>Charcoal</strong>: Carbonet Actisorb, Iodosorb</td>
<td></td>
</tr>
<tr>
<td><strong>Impregnated/coated meshes</strong>: urgotul, mepitel</td>
<td>Mildly exuding ulcer (skin wound)</td>
</tr>
<tr>
<td><strong>Medicated tulle gras - sterile</strong>: Bactigrass</td>
<td>Hard to heal ulcers</td>
</tr>
<tr>
<td><strong>Superoxidized solution</strong>: Dermasyn</td>
<td>Bedsores, infected wound</td>
</tr>
<tr>
<td>Type of dressing</td>
<td>Trademark</td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Hydrocolloids</td>
<td>Comfeel Plus, Duoderm E, Algoplaque HP, Askina Biofilm Suprasorb H, Hydrocoll standard</td>
</tr>
<tr>
<td></td>
<td>Comfeel Plus Transparent, Comfeel Plus Brûlures, Comfeel Ovale, Duoderm Extramince, Duoderm Extramince Ovale, Algoplaque Film, Hydrocoll thin</td>
</tr>
<tr>
<td></td>
<td>Alleyyn Adhésif, Blatain adhésif, Cellosoorb adhésif, Combiderm, Mépilux Border, Permafoam Comfort, Suprasorb P Adhésif Tielle</td>
</tr>
<tr>
<td></td>
<td>Alleyyn Lite, Cellosoorb Lite, Mépilux Border em</td>
</tr>
<tr>
<td></td>
<td>Alleyyn Non Adhesive Blatain non adhésif, Cellosoorb Combinderm N, Mépilux Transfer, Suprasorb P Non adhésif Tielle S,</td>
</tr>
<tr>
<td></td>
<td>Alleyyn Gentle Blatain Contact, Mépilux, Mépilux em, Blatain Ibu, Blatain Ibu Contact</td>
</tr>
<tr>
<td>Foam dressings Granulation and epidermization stages, exudative ulcers</td>
<td></td>
</tr>
<tr>
<td>Alginates</td>
<td>Algostérol, Melgisorb Seaorb Soft pansement, Sorbalgon Plus, Urgosorb</td>
</tr>
<tr>
<td>Hydrogels</td>
<td>Duoderm Hydrogel, Hydrocoll gel or plaques, Hypargel, IntraSite Gel or Conformable, Normigel, Purison Gel, Urgo Hydrogel,</td>
</tr>
<tr>
<td>Hydrofibers</td>
<td>Aquacel</td>
</tr>
<tr>
<td>Impregnated or coated meshes (&lt; interface dressings or low-adherence dressings)</td>
<td>Adaptic (paraffin)&lt;br&gt;Urgotul (lipido-colloid)&lt;br&gt;Phystolulle (petroleum + hydrocolloid)&lt;br&gt;Mépilux (silicone)</td>
</tr>
<tr>
<td>Hyaluronic acid-based dressing</td>
<td>Hyalgin (AH film), Hyalofill Hyalogran (AH + alginate) JaloSkin (AH film) lalaset cream or Impregnated gauze, Effidia</td>
</tr>
<tr>
<td>Charcoal dressings</td>
<td>Carbonet Actisorb Ag+ (containing Ag)&lt;br&gt;Carboflex (containing hydrofiber)</td>
</tr>
<tr>
<td>Silver dressings</td>
<td>Acticoat&lt;br&gt;Actisorb Ag+&lt;br&gt;Urgotul S Ag</td>
</tr>
<tr>
<td></td>
<td>Blatain Ag non adhésive, adhésive (foam + Ag)&lt;br&gt;Cellsoorb Ag nonadhesive (foam + Ag)</td>
</tr>
<tr>
<td></td>
<td>Aquacel Ag (hydrofiber + Ag)&lt;br&gt;Lalaset Plus (hyaluronic acid + Ag)</td>
</tr>
<tr>
<td>Protease-modulating dressings</td>
<td>Promogran (collagen-based dressing)&lt;br&gt;CELLOstart (foam dressing)</td>
</tr>
<tr>
<td>Paraffin or petroleum gauzes</td>
<td>Grassolin neutral, Jelonet, Vaselittulle, Tulle gras Solvay</td>
</tr>
</tbody>
</table>
Anal / perianal disorders

c/o: swelling, pain, tender, fever/rigors
Abscess = fluctuant/indurated, punctum, inflammation+

1) Anal abscess

2) Gluteal Abscess: extending > 2cm from anus

3) Perianal Abscess: abscess within 2cm around anus

4) Pilonidal abscess: blind ending track containing hairs in the skin of natal cleft, caused by migration of hair into a sinus by movement of buttocks

Fissure: longitudinal tear in the mucosa of the anal canal

Fistula in ano: Abnormal communication between the perianal skin and the anal canal, established and persisting following drainage of a perianal abscess.
**Surgical Mx**

1) Incision and drainage of abscesses
2) EUA + insertion of seton (fistulas)
Hemorrhoids – submucosal swelling in the anal canal consisting of dilated venous plexus.

C/O: PR bleeding with +/- prolapse, esp on straining

Grade
I- no prolapse, prominent blood vessels
II- Prolapse upon bearing down, spontaneously reduced
III- Prolapse upon bearing down, manually reducible
IV- Prolapsed, manually irreducible

Examination:
Inspection of external haemorrhoids
PR: palpable haemorrhoid? Any contact bleeding? Thrombosed?
At position ( O’ clock)

Ix:
Proctoscopy
sigmoidoscopy / colonoscopy

Proctoscopy:

Conservative Tx = diet modification (high fibre), stool softener to prevent straining
Medical: T.Dafilon : 1g TDS 4/7 , BD 3/7, then OD 5/52

Surgical Tx
1) Sclerotherapy – histoacryl / phenol
2) haemorrhoid banding
Burns

Classification of burns

- Superficial
- Partial thickness - (Mid and or deep- dermal)
- Full thickness

<table>
<thead>
<tr>
<th>Depth</th>
<th>Cause</th>
<th>Surface/colour</th>
<th>Pain sensation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Superficial epidermis and the upper part of the dermal papillae</td>
<td>Sun, flash, minor scald</td>
<td>Dry, minor blisters, erythema, brisk capillary return</td>
<td>Painful</td>
</tr>
<tr>
<td>Partial thickness-superficial (superficial dermal)</td>
<td>Scald</td>
<td>Moist, reddened with broken blisters, brisk capillary return</td>
<td>Painful</td>
</tr>
<tr>
<td>Partial thickness-deep (deep dermal)</td>
<td>Scald, minor flame contact</td>
<td>Moist white slough, red mottled, sluggish capillary return</td>
<td>Painless</td>
</tr>
<tr>
<td>Full thickness</td>
<td>Flame, severe scald or flame contact</td>
<td>Dry, charred whitish, Absent capillary return</td>
<td>Painless</td>
</tr>
</tbody>
</table>
Estimation of Surface Area

- Use a Burn diagram (LUND-BROWDER) to accurately calculate the area burnt; do not count skin with isolated erythema.
- As a rough measure, the child's palm represents 1% Body Surface Area (BSA).
- BSA involvement determines need for fluid resuscitation and admission, as opposed to dressings and potential outpatient management.

A BURN CHART

NAME __________ WARD __________ NUMBER __________ DATE __________

AGE __________

LUND AND BROWDER CHARTS

Ignore simple erythema.

REGION

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>HAED</td>
<td>NECK</td>
</tr>
<tr>
<td>ANT TRUNK</td>
<td>POST TRUNK</td>
</tr>
<tr>
<td>RIGHT ARM</td>
<td>LEFT ARM</td>
</tr>
<tr>
<td>BUTTOCKS</td>
<td>GENITALIA</td>
</tr>
<tr>
<td>RIGHT LEG</td>
<td>LEFT LEG</td>
</tr>
</tbody>
</table>

TOTAL BURN

RELATIVE PERCENTAGE OF BODY SURFACE AREA AFECTED BY AGE

<table>
<thead>
<tr>
<th>AREA</th>
<th>AGE 0</th>
<th>1</th>
<th>5</th>
<th>10</th>
<th>15</th>
<th>ADULT</th>
</tr>
</thead>
<tbody>
<tr>
<td>A = 1/2 OF HEAD</td>
<td>9 1/2</td>
<td>8 1/2</td>
<td>6 1/2</td>
<td>5 1/2</td>
<td>4 1/2</td>
<td>3 1/2</td>
</tr>
<tr>
<td>B = 1/2 OF THIGH</td>
<td>2 3/4</td>
<td>3 1/4</td>
<td>4</td>
<td>4 1/2</td>
<td>4 1/2</td>
<td>4 3/4</td>
</tr>
<tr>
<td>C = 1/2 OF ONE LOWER LEG</td>
<td>2 1/2</td>
<td>2 1/2</td>
<td>2 3/4</td>
<td>3</td>
<td>3 1/4</td>
<td>3 1/2</td>
</tr>
</tbody>
</table>

PALMAR METHOD
(Patient's palm)

**Category** | **Suggested dressing** | **Other options** | **Indications**
---|---|---|---
Creams, lotions and hydrogels | Solugel™ | N/A | A liquid hydrogel used for superficial burns, particularly on the face and perineum, to maintain a moist wound environment. They need thorough washing off and reapplication 4 times per day.
| Sorbolene with 10% glycercine | | | Provides moisture to skin surrounding the burn and to the newly healed burn.
Low-adherent dressings | Mepitral™ then Melolin™ then crepe | Jelonet™, Rectigrade™, Xeroform™, Cuticerin™ | Used for superficial burns and can be left intact for several days, depending on wound exudate. The silicone-based dressings such as Mepitral™ appear to be less adherent, aiding comfort of dressing changes and re-epithelisation.
Silver products | Acticoat™ and Acticoat™ (nanocrystalline silver antimicrobial sheet) | Aquadressings SSD (Silver sulphur dioxide) cream- Silverzine™ | Acticoat™ is low-adherent It needs to be activated by wetting with sterile water before application on the wound bed. Acticoat™ can stay intact for 3 days and Acticoat™ for up to 7 days. Intrasite conformable™ is used over the Acticoat™ to stop the Acticoat™ drying out. SSD creams should not be applied to face because of potential corneal toxicity.
Adhesive papers/plastics | Hyperfix™ | Tegaderm™, Mefix™ | Useful for securing burns dressings. They should not be applied to the burn surface as they may damage new epithelium and some are not sterile. They are also painful to remove.
Acute Management:

1) Management of Major burns >10% BSA

Airway and Breathing - For signs of airway burn or lung injury, arrange intubation as soon as possible and before airway swelling.

Fluids
- If > 10% of body surface involved, commence Burns fluid resuscitation and calculate fluid requirements from the time of injury.
- Insert urinary catheter if burn > 15% SA or if significant perineal burn.
- Insert NGT if > 15% deep partial thickness or full thickness burns; start feeding within 6-18 hrs

2) Management of minor burns (isolated, <10% BSA)

- Analgesia; children may require opiates before assessment and initial dressings.
- Immobilisation with sling and splinting is suggested for upper limb burns.
- Check Tetanus status.
- Closed dressings are recommended for partial thickness burns. The wound exudate determines the number of dressing changes.
- Evidence regarding the management of blisters is limited:
  - May have protective function, and reduce pain if left intact for a few days.
  - If small, not near a joint and not obstructing the dressing, should be left intact.
  - In children, small blisters may require debridement as they cover a greater relative surface area.
  - Large blisters should be deroofed to allow for accurate assessment of the wound base
  - If overlying a joint, de-roof as may limit function.
  - De-roof if blister fluid becomes opaque (suggests infection).

Superficial burns with erythema only:

- Can be treated by exposure. In infants who show a tendency to blister or scratch, a protective, low-adherent dressing (eg. Mepitel™ + Melolin™) with crepe bandage may be helpful.

Partial thickness burns

- Cleanse the burn and surrounding surface with saline and pat dry. If treatment is delayed or wound is dirty, use aqueous chlorhexidine 0.1% then saline.
- For small, superficial partial thickness burns, a low adherent dressing (eg. Mepitel™ + Melolin™) then crepe bandage or adhesive paper.
- For more extensive or deeper partial thickness burns, a low-adherent silver dressing (eg. Acticoat™ or Acticoat 7™) should be applied.

When to refer BURN UNIT

* All Burns with a surface area greater than 10%, except very superficial burns.
* All full thickness burns except those that are extremely small. (All burns to face, ears, eyes, hands, feet, genitalia, perineum or a major joint. Even if less than 5%).

1. Electrical burns (including lightening injury)
2. Chemical Burns
3. Burns associated with significant fractures or other major injury, in which the burn injury poses a significant risk of morbidity or mortality
4. Inhalation burns of any nature (ICU admission)
5. Burns in children under the age of 12 months (emergency transfer may not be required but assessment should be made)
6. Small area burns - in patients with social problems, including children at risk
7. Any other patient that is deemed appropriate on consultation

Any child 15 - 20% TBSA should have the following:

- Fluid Resuscitation
- IDC on 1hrly measures
- NG tube with feeding started within 6 hours
- Strict Fluid Balance
- Flame burns/ burns that are oozing are to be dressed with Acticoat
- Scald burns can be dressed with Mepitel or Acticoat
- Any Circumferential burns to have 1 hourly Colour, Warmth, Movement and Sensation and the limb elevated
**Fluid Resuscitation**

<table>
<thead>
<tr>
<th>BURNS SURFACE AREA ......................... %</th>
<th>TIME IV COMMENCED ....................... 24 HR CLOCK</th>
</tr>
</thead>
<tbody>
<tr>
<td>TIME OF BURN ......................... 24 HR CLOCK</td>
<td>DATE ...........................................</td>
</tr>
<tr>
<td>WEIGHT IN KG ........................................</td>
<td>.....................................................</td>
</tr>
</tbody>
</table>

**A. BURN RESUSCITATION**

<table>
<thead>
<tr>
<th>TYPE OF INFUSION</th>
<th>1st 24 HOURS (volume)</th>
<th>1st 8 HOURS (volume)</th>
<th>2nd 8 HOURS (volume)</th>
<th>3rd 8 HOURS (volume)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. 4% Normal Serum Albumin Solution (NSAS)</td>
<td>mL</td>
<td>mL</td>
<td>mL</td>
<td>mL</td>
</tr>
<tr>
<td>2. Remainder as Hartmann’s Solution</td>
<td>mL</td>
<td>mL</td>
<td>mL</td>
<td>mL</td>
</tr>
</tbody>
</table>

50% of each type solution is used concurrently.

**B. MAINTENANCE FLUID**

See oral fluids information below

1/2N saline in 5% dextrose (estimated volume on body wt in kg)

<table>
<thead>
<tr>
<th></th>
<th>1/3 of 24 hr vol.</th>
<th>1/3 of 24 hr vol.</th>
<th>1/3 of 24 hr vol.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>mL</td>
<td>mL</td>
<td>mL</td>
</tr>
</tbody>
</table>

**TOTAL A & B**

BURN RESUSCITATION + MAINTENANCE FLUID

**URINARY OUTPUT EXPECTED** 0.75mL/kg/hr - _________ mL

**ORAL FLUIDS:** Most children with burn injury tolerate oral fluids. Initially all children may be offered small amounts of milk and if tolerated the quantity is increased at hourly intervals. Usually after a few hours the patient is receiving most maintenance fluid by mouth except for those patients with very severe burns.

**NOTES:**
* In less severe burns 2mL X 1% in the first 24 hours may be sufficient
** Normal Serum Albumin Solution (NSAS) in interspersed and not given as one bolus
*** If no Hartmann’s available use normal saline

**2nd 24 HOURS:** After the initial 24 hours of fluid replacement, the type of fluid replacement will depend on urinary output, serum electrolytes and haemoglobin. The volume of resuscitation fluid is approximately 1/2 that given in the first 24 hours.
Acute Limb Ischaemia

Deep Vein Thrombosis
MALIGNANCY

Gastric Ca

Risk factors: smoker, alcohol, hx H. pylori, adenomatous polyps, blood type A, prev partial gastrectomy

Histology: 92% Adenocarcinoma

Spread → Liver, Lungs, Brain

Presentation:
postprandial abdominal fullness, LOW, burping, nausea, vomiting, dyspepsia, dysphagia, vague epigastric pain, hepatomegaly, epigastric mass, hematemesis, melena

Ix

OGDS with biopsy HPE
CT for distant mets staging

Staging TNM

Definitions:

Primary tumor (T):
Tis = carcinoma in situ: intraepithelial tumor without invasion of lamina propria
T1 = tumor invades lamina propria or submucosa
T2 = tumor invades muscularis propria or subserosa
T3* = tumor penetrates serosa (visceral peritoneum) without invasion of adjacent structures
T4**,*** = tumor invades adjacent structures

*A tumor may penetrate the muscularis propria with extension into the gastrocolic or gastrohepatic ligaments or into the greater or lesser omentum without perforation of the visceral peritoneum.

**Structures adjacent to the stomach include the spleen, transverse colon, liver, diaphragm, pancreas, abdominal wall, adrenal gland, kidney, small intestine, and retroperitoneum.

***Intramural extension to the duodenum or esophagus is classified by the depth of greatest invasion in any of these sites, including the stomach.

Regional lymph nodes (N):
Include the perigastric nodes along the lesser and greater curvatures, and the nodes along the left gastric, common hepatic, splenic, and celiac arteries.
N0 = no regional lymph node metastasis
N1 = metastasis to 1–6 regional lymph nodes
N2 = metastasis in 7–15 regional lymph nodes
N3 = metastasis in more than 15 regional lymph nodes

Distant metastasis (M):
M0 = no distant metastasis
M1 = distant metastasis
**Surgical Tx**

Adenocarcinoma

- proximal lesions- total gastrectomy and esophagojejunoanostomy (Roux-en-Y)
- distal lesions- distal radical gastrectomy (wide margins, en bloc removal of omentum and lymph node drainage)
- palliation - gastric resection to decrease bleeding and to relieve obstruction thus enabling the patient to eat
- lymphoma - chemotherapy ± surgery ± radiation

---

**TNM System for Staging Gastric Cancer**

<table>
<thead>
<tr>
<th>Stages</th>
<th>T</th>
<th>N</th>
<th>M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 0</td>
<td>Tis</td>
<td>N0</td>
<td>M0</td>
</tr>
<tr>
<td>Stage IA</td>
<td>T1</td>
<td>N0</td>
<td>M0</td>
</tr>
<tr>
<td>Stage IB</td>
<td>T1</td>
<td>N1</td>
<td>M0</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>N0</td>
<td>M0</td>
</tr>
<tr>
<td>Stage II</td>
<td>T1</td>
<td>N2</td>
<td>M0</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>N1</td>
<td>M0</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>N0</td>
<td>M0</td>
</tr>
<tr>
<td>Stage IIIA</td>
<td>T2</td>
<td>N2</td>
<td>M0</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>N1</td>
<td>M0</td>
</tr>
<tr>
<td>Stage IIIB</td>
<td>T4</td>
<td>N0</td>
<td>M0</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>N2</td>
<td>M0</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>N1</td>
<td>M0</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>N2</td>
<td>M0</td>
</tr>
<tr>
<td>Stage IV</td>
<td>T4</td>
<td>N1</td>
<td>M0</td>
</tr>
<tr>
<td></td>
<td>T1</td>
<td>N3</td>
<td>M0</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>N3</td>
<td>M0</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>N3</td>
<td>M0</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>N2</td>
<td>M0</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>N3</td>
<td>M0</td>
</tr>
<tr>
<td>Any T</td>
<td>Any N</td>
<td>M1</td>
<td></td>
</tr>
</tbody>
</table>
A. Low subtotal gastrectomy  B. Billroth II anastomosis

A. High subtotal gastrectomy  B. with Roux-en-Y gastrojejunostomy

A. Total gastrectomy  B. Roux-en-Y esophagojejunostomy
Colorectal Ca Surgery

**Abdominal Perineal Excision of the Rectum (APER)**

Performed when cancer located close to rectum

**Hartman’s Procedure**

The lower part of the colon is removed from the rectum, the bowel is divided and the top end is brought out on to the abdomen as a colostomy. The top of the rectum is oversewn and left inside

**Right Hemicolectomy**

The remaining bowel is reconnected to the small bowel

**Left Hemicolectomy**

Part of the transverse colon (large bowel) may be removed

The two remaining ends can be rejoined, or a colostomy or ileostomy may be fashioned above the join
### APPENDIX

#### Common Surgical Problems

<table>
<thead>
<tr>
<th>Problem</th>
<th>Investigations</th>
<th>Management</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Acute Appendicitis</strong></td>
<td>- abdominal pain (RIF) worsening</td>
<td>- Spiking Temperature</td>
</tr>
<tr>
<td></td>
<td>- Vomiting</td>
<td>- FBC: WCC raised</td>
</tr>
<tr>
<td></td>
<td>- Fever a/w rigor/chills</td>
<td>- UFEME: TRO UTI</td>
</tr>
<tr>
<td>o/e: PA tender RIF</td>
<td>- AXR: TRO fecal loaded or bowel dilation</td>
<td>* no analgesics/antibiotics first unless appendicitis ruled out</td>
</tr>
<tr>
<td>+/- guarding / Rebound / Rovsing</td>
<td>US Abdomen (if in doubt)-ovarian cyst</td>
<td></td>
</tr>
<tr>
<td><strong>Perforated Appendicitis</strong></td>
<td>- septic looking, severe pain for 2/7</td>
<td>- Ddx PUD, UTI, ectopic pregnancy, ruptured cyst, cholecystitis, PGU, PDU, diverticulitis</td>
</tr>
</tbody>
</table>
|  | - fever , vomiting |  | *
|  | +++ guarding/rebound/Rovsing peritonitis | *if suspect perforated start antibx | IV Cefobid/Flagyl |
|  | peritonitis | keep NBM | |
| **Appendicular mass (late)** | - abdominal pain a/w RIF mass | | |
|  |  | emergency open appendicectomy | |
| **Peritonism** | Primary peritonitis – mild generalized acute abdomen + ascites + systemic sx (tx with antibiotics) |  | Generalized acute abdomen – Exploratory Laparotomy |
| **Acute Gastritis** | - epigastric pain, sharp/colicky | - PR: melena? | IV ranitidine 50mg stat tds (before scope) |
|  | - aggravated by food? Movement? | - tender epigastric region | Syr MMT 10ml tds |
|  | - hx taking outside food? | - FBC/RP/LFT | OGDS |
|  | - diarrhea/vomiting? | - Amylase/urine diastase (TRO pancreatitis) | IV pantoprazole 40mg OD |
|  | - delayed meals? | - AXR: air under diaphragm? | IV Omeprazole 20-40mg OD |
|  | - reflux sx (acid brash) |  | IV Rabeprazole |
|  | - NSAIDs use/ traditional med? | * Complications: perforated gastric ulcer | |
|  |  |  | |
| **Acute pancreatitis** | +abdominal pain radiating to back + severe vomiting | IMRIE score (0-2 mild, >3 severe) | ERCP |
|  | Grey turner sign - flank | Age>55 years. | severe \( \Rightarrow \) ICU |
|  | Cullen sign – umbilicus | • WBC>15×10^9/l. | keep NBM with fluid replacement |
|  | + jaundice | • Glucose<10 mmol/l. | insert CVL |
|  | DKA | • Albumin<32g/l. | US HBS TRO gallstones/hepatitis |
|  |  | • Urea>16 mmol/l. | |
|  |  | • PaO₂<8 kPa (60 mmHg). | |
|  |  | • LDH>600 i.u./l. | |
|  |  | • AST>200i.u./l. | |
|  |  | Amylase/urine diastase | |
| **Gallstone diseases** |  |  | Antibiotics / Analgesics |
| 1) **Biliary colic** – colicky pain, RHC region, aggravated by oily food / a/w vomiting | LFT – enzymes raised?bilirubin | Gallstone pancreatitis : urgent ERCP |
| 2) **Cholecystitis** - inflammation of gall bladder wall with infection | AXR- any stones | Gallstones: lap cholecystectomy |
| 3) **Cholangitis** – inflammation of CBD secondary to obstruction by gallstone | US HBS – CBD dilated? Stones? | diet modification |
| 4) **Obstructive jaundice** – obstruction of CBD by stone leading to accumulation of bile, clinically jaundiced | Murphy sign + (unable to complete inspiration when GB point is pressed) | | |
| 5) **Pancreatitis** – obstruction of CBD or pancreatic duct leading to inflammation of pancreas | | | |
| **Bed sores** | Grade I – intact skin  
- Common in bed bound pt  
- stroke, obesity, disabled  
II – shallow ulcer (dermis)  
III –full thickness tissue (subcut fat)  
IV – Bone and muscle exposed | Debridement may be required  
Swab C&S  
Daily dressing – refer to wound mx table  
Greenish \(\rightarrow\) pseudomonas sp – Acetic acid  
2 hourly body turning |
| --- | --- | --- |
| **Abscess** | FBC  
FBS/FSL  
Pus swab C&S | Antibx (IV unasyn)  
Aspiration / Incision and drainage  
Pus swab C&S |
| **Carbuncle** | Saucerization |
| **Sebaceous Cysts** | Saucerization |
| **Hernia** | **Inguinal**  
Direct: protrusion on abd wall visible peristalsis? reducible?  
Indirect: scrotal protrusion  
- palp sperm cord, unable to go above  
Incarcerated: I/O sx | **1) Orchitis**  
pain++, confined to testis,  
- caused by bacterial infxn  
ddx: Mumps (w parotitis)  
+ Red swollen scrotum + blue testis  
- no urinary sx  
**2) Epididymo-orchitis:**  
pain+(relieved by elevating testis),  
swollen+, erythema of scrotum, fever + pyuria  
**3) Torsion of testis:**  
- rapid onset, severe pain  
bellclapper deformity, knot in the cord, one testis appears higher  
+ nausea/vomiting  
US Scrotum/testes with Doppler  
torsion = no flow  
Surgical: EUA/ exploration  
emergency detorsion  
<12H good prognosis  
12-24H testicular atrophy  
> 24H poor prognosis, orchiectomy | **4) Hydrocele:** intrascrotal cyst  
soft, fluctuant, difficult to feel testis  
Testis is not separable from hydrocele  
Spermatic cord is palpable above the swelling  
US scrotum/tests  
Testes is not separable from hydrocele  
Surgical: EUA/ exploration  
electric cautery  
* referral to urology |
| **PR bleed** | **4) Hydrocele:** intrascrotal cyst  
soft, fluctuant, difficult to feel testis  
Testis is not separable from hydrocele  
Spermatic cord is palpable above the swelling  
US scrotum/tests  
Testes is not separable from hydrocele  
Surgical: EUA/ exploration  
electric cautery  
* referral to urology |
| **5) Varicocele:** collection of dilated and tortuous veins in the spermatic cord, bag of worms+, dragging sensation  
pulsates with cough/valsava man  
Transillumination +  
Surgical ligation of testicular vein  
percutaneous vein occlusion | **1) Orchitis**  
pain++, confined to testis,  
- caused by bacterial infxn  
ddx: Mumps (w parotitis)  
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* referral to urology |
<table>
<thead>
<tr>
<th>Hematemesis</th>
<th>FBC/CoAg/GSH</th>
<th>Hb low to transfuse</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fresh or altered blood?</td>
<td>If hypotensive, fluid rescus</td>
<td>Keep NBM</td>
</tr>
<tr>
<td>Duration? On medication?</td>
<td>CXR/AXR</td>
<td>Suspect gastric ulcer- NG tube</td>
</tr>
<tr>
<td>severe vomiting/retching?</td>
<td>ECG</td>
<td>If suspect varices, not for NG Tube</td>
</tr>
<tr>
<td>any LOA/LOW</td>
<td></td>
<td>Persistent bleed- Emergency OGDS</td>
</tr>
<tr>
<td>ddx</td>
<td>Esophageal varices</td>
<td></td>
</tr>
<tr>
<td>gastric ulcer, Mallory weis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PTB/ tumour</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intestinal Obstruction</td>
<td>AXR: dilated bowel</td>
<td>Keep NBM with IVD</td>
</tr>
<tr>
<td>-colicky abd pain</td>
<td>CXR: air under diaphragm?</td>
<td>Insert RT with 4hourly aspiration</td>
</tr>
<tr>
<td>- vomiting (fecal) + NBO/flatus</td>
<td></td>
<td>KIV for exploratory lap</td>
</tr>
<tr>
<td>- abdominal distension(colon)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- visible peristalsis, BS hyperactive</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- ddx incarcerated hernia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ddx</td>
<td>colorectal tumour, I/O, thyroidism, Crohns/ulcerative colitis</td>
<td></td>
</tr>
<tr>
<td>Pyelonephritis</td>
<td>FBC/RP</td>
<td>Anti bx</td>
</tr>
<tr>
<td>Loin to groin pain?</td>
<td>UFEME/ Urine C&amp;S</td>
<td>adequate hydration</td>
</tr>
<tr>
<td>Fever a/w chills or rigor</td>
<td>Xray KUB</td>
<td>US KUB TRO stone</td>
</tr>
<tr>
<td>Painless urine</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Renal punch +</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constipation</td>
<td>TFT</td>
<td>Colonoscopy</td>
</tr>
<tr>
<td>Altered bowel habit</td>
<td>AXR: fecal loaded</td>
<td>Stool softener</td>
</tr>
<tr>
<td>Abdominal pain, tenesmus?</td>
<td>PR: fecal loaded? Impacted stool?</td>
<td>High fibre diet</td>
</tr>
<tr>
<td>Abdominal distension?</td>
<td>Ddx: colorectal tumour, I/O, thyroidism, Crohns/ulcerative colitis</td>
<td></td>
</tr>
<tr>
<td>Vomiting? LOA/LOW PR bleed?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Renal/ bladder Calculi</td>
<td>AXR: hyperdense calculi</td>
<td>If AUR, insert CBD</td>
</tr>
<tr>
<td>- Loin to groin pain, colicky</td>
<td>UFEME / RP</td>
<td>if RP obstructive uropathy, KIV refer uro</td>
</tr>
<tr>
<td>- AUR?</td>
<td></td>
<td>for stenting/nephrostomy</td>
</tr>
<tr>
<td>- passing stone/sandy urine</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AUR</td>
<td>PR: assess prostate gland enlarged/firm/nodular?</td>
<td>Insert CBD</td>
</tr>
<tr>
<td>Onset sudden/gradual prostatism?</td>
<td>Frequency/urgency/straining/terminal dribbling/ stop-start/dysuria?</td>
<td>Clamp and Trial off CBD later</td>
</tr>
<tr>
<td>Frequency/urgency/straining/terminal dribbling/ stop-start/dysuria?</td>
<td>IPSS score</td>
<td>If unable to PU, D with CBD with 2 wklychange, TCA SOPD 1/12 to try off</td>
</tr>
<tr>
<td>Subcut empysema?</td>
<td>US prostate if indicated</td>
<td>US KUB/prostate</td>
</tr>
<tr>
<td>Renal/ bladder Calculi</td>
<td>PSA</td>
<td></td>
</tr>
<tr>
<td>Pneumothorax</td>
<td>CXR any rib #, mediastinal shift?</td>
<td>Chest tube insertion</td>
</tr>
<tr>
<td>Trauma? MVA? Rib #?</td>
<td>ABG</td>
<td>ABG</td>
</tr>
<tr>
<td>Sudden onset chest pain/SOB</td>
<td>FBC/ RP/LFT/coag</td>
<td>Adequate oxygenation</td>
</tr>
<tr>
<td>Subcut empysema?</td>
<td></td>
<td>Incentive spirometry</td>
</tr>
<tr>
<td>Cerebral concussion</td>
<td>CT Brain tro fractures</td>
<td>Analgesics</td>
</tr>
<tr>
<td>MVA? Helmet buckled?</td>
<td>Routine bloods</td>
<td>Observe 48Hrs</td>
</tr>
<tr>
<td>Head trauma?</td>
<td>GCS</td>
<td>Refer neurosurgical if GCS drop</td>
</tr>
<tr>
<td>LOC/ENT bleeding?</td>
<td>Orientation</td>
<td>Allow orally if gag reflex present</td>
</tr>
<tr>
<td>Orientation</td>
<td>Neurological exam</td>
<td>head chart</td>
</tr>
<tr>
<td>Condition</td>
<td>Examination/Procedure</td>
<td>Management</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>---------------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Neurological deficit</td>
<td>CT brain / cervical spine routine bloods</td>
<td>Refer neurosurgical monitor VS&lt;br&gt;Keep NBM with hydration&lt;br&gt; withhold any anti plt&lt;br&gt; Head chart&lt;br&gt; Analgesia</td>
</tr>
<tr>
<td><strong>ICB / SDH/ADH</strong></td>
<td>MVA/Trauma? Any skull #&lt;br&gt; any hematoma / Lacerations&lt;br&gt; Any neurological deficit&lt;br&gt; GCS</td>
<td>CT TAP for staging&lt;br&gt; Surgical:&lt;br&gt; Mastectomy with axillary clearance</td>
</tr>
<tr>
<td><strong>Breast Ca</strong></td>
<td>Mammogram/ US breast&lt;br&gt; FNAC cytology - cyst&lt;br&gt; Tru Cut biopsy for HPE – lump&lt;br&gt; CT TAP for staging</td>
<td>Surgical:&lt;br&gt; Mastectomy with axillary clearance</td>
</tr>
<tr>
<td><strong>Gastric Ca</strong></td>
<td>OGDS with biopsy&lt;br&gt; CT TAP for staging</td>
<td>Surgical:&lt;br&gt; gastrectomy</td>
</tr>
<tr>
<td><strong>Liver Ca</strong></td>
<td>CT abdomen , CT liver 3phase&lt;br&gt; LFT/Coag/FBC/RP</td>
<td>KIV refer hepatobiliary team</td>
</tr>
<tr>
<td><strong>Colorectal Ca</strong></td>
<td>AXR&lt;br&gt; Routine bloods&lt;br&gt; Ca markers&lt;br&gt; CT TAP&lt;br&gt; colonoscopy with biopsy</td>
<td>Keep NBM till review&lt;br&gt;Adequate hydration&lt;br&gt; NG tube&lt;br&gt; KIV for surgery (refer notes)</td>
</tr>
<tr>
<td><strong>Burn</strong></td>
<td>Lung and browder chart&lt;br&gt; Rule of 9&lt;br&gt; FBC/e-/RBS/GSH/RP</td>
<td>&gt;10%  fluid resus&lt;br&gt;If &gt; 15% refer burn unit&lt;br&gt; Analgesia&lt;br&gt; Dress with bactigrass (refer burn notes)</td>
</tr>
<tr>
<td><strong>Acute Limb Ischaemia</strong></td>
<td>ABSI, ECG&lt;br&gt; Palpate vessels&lt;br&gt; CT angiography&lt;br&gt; ECHO</td>
<td>Conservative:Heparinization as per protocol 48 hours&lt;br&gt; then taper with Warfarin limb physio&lt;br&gt; Surgical: refer vascular surgeon (intervention within 6hours)</td>
</tr>
<tr>
<td><strong>DVT</strong></td>
<td>Doppler lower limb</td>
<td>Warfarinization therapy&lt;br&gt; Surgical: cava filter</td>
</tr>
<tr>
<td><strong>Abdominal Aorta Aneurysm</strong></td>
<td>FBC/RP/GSH&lt;br&gt; AXR: aortic calcification?&lt;br&gt; USG / CT Abdomen&lt;br&gt; ECHO, ECG, EST</td>
<td>KIV refer vascular surgery&lt;br&gt; &gt;5.5cm shld be repaired</td>
</tr>
<tr>
<td>Diagnosis</td>
<td>Usual Pain Location</td>
<td>Diagnostic Studies</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>-----------------------------</td>
<td>--------------------</td>
</tr>
<tr>
<td><strong>Upper Quadrants/ Midepigastric</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hepatitis, subphrenic abscess, hepatic abscess</td>
<td>RUQ</td>
<td>U/S, CT</td>
</tr>
<tr>
<td>Cholecystitis, cholelithiasis, choledocholithiasis, and cholangitis</td>
<td>RUQ</td>
<td>U/S</td>
</tr>
<tr>
<td>Fitz-Hugh-Curtis syndrome</td>
<td>RUQ and signs of PID</td>
<td>Perihepatitis: elevated liver enzymes, associated with Gonorrhea</td>
</tr>
<tr>
<td>Pancreatitis</td>
<td>Midepigastric region</td>
<td>Elevated amylase, lipase, WBC</td>
</tr>
<tr>
<td>Cardiac disease</td>
<td>May present as epigastric pain</td>
<td>ECG and enzymes to rule out cardiac disease</td>
</tr>
<tr>
<td>Duodenal ulcer or gastric ulcer</td>
<td>Midepigastric/LUQ pain</td>
<td>UGI or endoscopy</td>
</tr>
<tr>
<td>Superior mesenteric artery syndrome</td>
<td>Midepigastric pain, especially after eating</td>
<td>Upper GI may show duodenal outlet obstruction</td>
</tr>
<tr>
<td>Splenic hematoma or enlargement</td>
<td>LUQ pain</td>
<td>U/S or CT</td>
</tr>
<tr>
<td><strong>Lower Quadrants</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aortic aneurysm</td>
<td>Periumbilical especially into back flanks, May be colicky</td>
<td>U/S or CT</td>
</tr>
<tr>
<td>Appendicitis</td>
<td>Early periumbilical Late RLQ</td>
<td>CT or U/S may show abscess, enlarged appendix</td>
</tr>
<tr>
<td>Cecal volvulus</td>
<td>RLQ pain with sudden onset</td>
<td>Seen on flat plate radiograph as RUQ distended bowel</td>
</tr>
<tr>
<td>Condition</td>
<td>Location</td>
<td>Diagnosis</td>
</tr>
<tr>
<td>------------------------------------------------</td>
<td>------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>Crohn's disease or ulcerative colitis</td>
<td>RLQ but may be LLQ</td>
<td>Sedimentation rate, ANCA, endoscopy</td>
</tr>
<tr>
<td>Mesenteric adenitis</td>
<td>RLQ</td>
<td>Diagnosis of exclusion</td>
</tr>
<tr>
<td>Pneumonia</td>
<td></td>
<td>May mimic appendicitis</td>
</tr>
<tr>
<td>Diverticulitis</td>
<td>Generally LLQ, very rarely RLQ</td>
<td>Clinical diagnosis (LLQ pain, diarrhea, vomiting, fever), CT scan most sensitive test</td>
</tr>
<tr>
<td>Gynecologic disease</td>
<td>Pain in pelvis, either adnexal area</td>
<td>Pregnancy test, cervical cultures, US</td>
</tr>
<tr>
<td>Ovarian torsion, Mittelschmerz, ruptured ovarian cyst</td>
<td>Sudden onset colicky lower abdominal pain</td>
<td>Pregnancy test, cervical cultures, U/S</td>
</tr>
<tr>
<td>PID</td>
<td>Gradual onset, fever, constant aching pain, vaginal discharge</td>
<td>Pregnancy test, cervical cultures, U/S</td>
</tr>
<tr>
<td>Urolithiasis or nephrolithiasis</td>
<td>Either flank</td>
<td>Noncontrast CT most sensitive modality.</td>
</tr>
<tr>
<td>Cystitis</td>
<td>Suprapubic pain</td>
<td>UA</td>
</tr>
<tr>
<td>Generalized</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spontaneous bacterial peritonitis</td>
<td>Generalized with peritoneal signs</td>
<td>Paracentesis</td>
</tr>
<tr>
<td>Large bowel ischemia</td>
<td>Acute onset lower abdominal pain followed within 24 hours by bloody diarrhea or blood per rectum</td>
<td>Clinical diagnosis, colonoscopy</td>
</tr>
<tr>
<td>Mesenteric thrombosis</td>
<td>Sudden onset of severe generalized abdominal pain without peritoneal signs and out of proportion to physical findings May have antecedent history of bowel angina (postprandial abdominal pain).</td>
<td>May have elevated serum phosphate, serum lactate, amylase, acidosis CT scan may show bowel edema Angiography diagnostic</td>
</tr>
<tr>
<td>Intussusception</td>
<td>Cramping abdominal pain with asymptomatic periods Mental status changes common with periods of lethargy Bloody &quot;currant jelly&quot; stools are</td>
<td>Air enema (has replaced barium for this indication) is often curative (see text)</td>
</tr>
<tr>
<td>Metabolic disease: DKA, Addison's disease</td>
<td>Diffuse pain, associated nausea, vomiting, may have guarding</td>
<td></td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>--------------------------------------------------</td>
<td>---</td>
</tr>
<tr>
<td>Acute intermittent porphyria</td>
<td>Diffuse and especially into back 24-hour urine for ALA, PGB (porphobilinogen), porphyrins Screening urine for PGB is also available</td>
<td>Colicky abdominal pain that is intermittent may be associated with dark urine Associated psychiatric/ neurologic symptoms: sensory changes, paresthesias, psychosis Exacerbated by medications (estrogens, alcohol, sulfonamides), menstruation, weight loss May have photosensitivity</td>
</tr>
<tr>
<td>Hemolysis</td>
<td>Back and CVA pain Reticulocyte count, serum free hemoglobin, LDH</td>
<td>G6PD deficiency, transfusion reactions, paroxysmal nocturnal hemoglobinuria</td>
</tr>
<tr>
<td>Meckel's diverticulum</td>
<td>Below or left of umbilicus</td>
<td>May be recurrent with rectal bleeding or intestinal obstruction</td>
</tr>
</tbody>
</table>

Drugs to consider as a cause of abdominal pain

- Alcohol
- Antibiotics (e.g. erythromycin)
- Aspirin
- Corticosteroids
- Cytotoxic agents
- Tricyclic antidepressants (e.g. imipramine)
- Iron preparations
- Nicotine
- NSAIDs/COX2 inhibitors
- Sodium valproate
- Phenytoin

Dangers of misdiagnosis

- Ectopic pregnancy → rapid hypovolaemic shock
- Ruptured abdominal aortic aneurysm (AAA) → rapid hypovolaemic shock
- Gangrenous appendix → peritonitis/pelvic abscess
- Perforated ulcer → peritonitis
- Obstructed bowel → gangrene
Quick Reference
By Dr Goh Kiam Seong

Things you need to know in surgical dept

1. Fluid and Electrolytes
   (i) Content in each pint of solution

<table>
<thead>
<tr>
<th>SoL</th>
<th>Content</th>
<th>Na</th>
<th>K</th>
<th>Ca</th>
<th>Cl</th>
<th>HCO₃⁻</th>
</tr>
</thead>
<tbody>
<tr>
<td>NS</td>
<td>NaCl 9g (0.9%)</td>
<td>150</td>
<td>-</td>
<td>-</td>
<td>150</td>
<td>-</td>
</tr>
<tr>
<td>HS</td>
<td>NaCl 4.5g (0.45%)</td>
<td>77</td>
<td>-</td>
<td>-</td>
<td>77</td>
<td>-</td>
</tr>
<tr>
<td>0.5%D</td>
<td>Dextrose 50g/L</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>D10%</td>
<td>Dextrose 100g/L</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>HM</td>
<td>NaCl + KCl + CaCl₂ + Na lactate</td>
<td>131</td>
<td>5</td>
<td>2</td>
<td>111</td>
<td>29</td>
</tr>
<tr>
<td>3%Sal</td>
<td>NaCl 30g (3%)</td>
<td>513</td>
<td>-</td>
<td>-</td>
<td>513</td>
<td>-</td>
</tr>
</tbody>
</table>

(ii) Dehydration

<table>
<thead>
<tr>
<th></th>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adult</td>
<td>5%</td>
<td>7.5%</td>
<td>10%</td>
</tr>
<tr>
<td>Paeds*</td>
<td>&lt;3%</td>
<td>3.9%</td>
<td>&gt;9%</td>
</tr>
</tbody>
</table>

*according to Acute Diarrhoea Protocol 2011

(iii) Fluid requirement

Total = Maintenance + Deficit + On-going losses

Maintenance = 40cc/kg/day
  For Paeds (use Holliday Segar Formula)
  4cc/kg/h for 1st 10 kg
  2cc/kg/h for next 10 kg
  1cc/kg/h for subsequent kg

Deficit = 10 × % × Body wt
*replace over 12 hrs

On going losses = losses from RT Aspiration, Drainage, third space loss, plasma loss etc
*usually replace per shift with HM/NS

In all head injury patient – give only NS
In burn patient – Parkland correction by HM
In paeds patient – usually use ½NSD5%

(iv) Assess degree of dehydration based on
- Mental status
- Eye – sunken eye/crying with tears
- Breathing
- Mucosa/tongue
- Skin turgor
- Pulse volume
- PR/BP
- CRT
- Periphery warm/cold
- Urine output *good UO = 0.5-1cc/kg/h

(v) Na requirement

Total requirement = Maintenance + Deficit

Maintenance = 2-3mmol/kg/d
Deficit (in mmol) = (140-x) × Wt × 0.6
*to convert to g, divide with 23.3

(vi) K requirement

Total requirement = Maintenance + Deficit

Maintenance = 0.5-1mmol/kg/d
Deficit (in mmol) = (4-x) × Wt × 0.4
*to convert to g, divide with 13.3

Rules of K correction:
Rate should not > 1.5g per hour
Concentration should not > 3g in 1L (1.5g in 500ml)

If hypoK – use Mist KCl 15ml TDS
If severe hypo – load 1g KCl in 100cc NS over 1 hr
Or 2g KCl in 200cc NS over 2 hr
*make sure take ECG/put on cardiac monitoring during loading AND repeat RP post loading 2 hrs

If hyperK – use oral Kalimate 15g TDS
If severe hyper – “insulin chase”
  ✓ IV Ca Gluconate 10% 10cc over 2-5 min then
  ✓ IV Dextrose 50% 50cc then
  ✓ IV Actrapid 10unit
ECG changes

<table>
<thead>
<tr>
<th>Hypo K</th>
<th>Hyper K</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flat T wave</td>
<td>Small P</td>
</tr>
<tr>
<td>Narrow QRS</td>
<td>Tall tented T wave</td>
</tr>
<tr>
<td>ST depression</td>
<td>Widen QRS complex</td>
</tr>
<tr>
<td>U wave</td>
<td>Ventricular tachy/fibrillation</td>
</tr>
</tbody>
</table>

(vii) Hyperglycaemia

<table>
<thead>
<tr>
<th>DKA</th>
<th>HH5/HONK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absolute insulin deficiency</td>
<td>Relative insulin deficiency</td>
</tr>
<tr>
<td>Dx:</td>
<td>Dx:</td>
</tr>
<tr>
<td>- pH &lt; 7.3</td>
<td>- Serum osmolarity &gt;320</td>
</tr>
<tr>
<td>- Dxt &gt; 14</td>
<td>- Dxt &gt;33</td>
</tr>
<tr>
<td>- Blood Ketone &gt; 2 (get a ketone stick)</td>
<td>*Osm = 2(Na+K) + Glu + Urea</td>
</tr>
</tbody>
</table>

Principle of management:
1. Fluid resuscitation – 2 large bore IV cannula (green 18G or grey 16G) in 2 antecubital fossa – 1 for maintenance, 1 for bolus
2. Insulin therapy (not to start first if K less than 3.3), target Dxt in DKA 8-11, HHS 14-16 then ½ dose of insulin, if hypo – do not stop insulin, instead use D10% drip
3. Correction of electrolytes – BUSE & VBG 4hrly, make sure good urine output and no ECG evidence of hyperK when planning to load K
4. Treat underlying causes (sepsis, MI etc)

*Indication of HCO₃ – if HCO₃ <10, give 100meq (10 amp)

*If resolved and patient tolerating orally – to change to basal bolus regime 0.5-0.8u/kg/d and titrate with overlapping 1-2hrs with IV sliding scale

(viii) Preparing DM patient for elective and emergency surgery

<table>
<thead>
<tr>
<th>Elective</th>
<th>Emergency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minor</td>
<td>Major</td>
</tr>
<tr>
<td>OHA – give normal regime</td>
<td>OHA – omit long acting (glibenclamide)</td>
</tr>
<tr>
<td>Insulin – omit on day of surgery</td>
<td>DXT QID</td>
</tr>
<tr>
<td>DXT QID</td>
<td>* if RBS &gt;15, to start insulin sliding scale</td>
</tr>
</tbody>
</table>
2. Acid Base balance & Oxygen therapy
   (i) ABG interpretation
       
       **Norms**
       pH 7.35-7.45
       pO₂ 80-100 mmHg
       pCO₂ 35-45 mmHg
       HCO₃ 22-26

       *To convert mmHg to kPa divide 7.5

   (ii) If pH>7.45

<table>
<thead>
<tr>
<th>pCO₂ &lt; 35</th>
<th>HCO₃ &gt;26</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respiratory Alkalosis</td>
<td>Metabolic Alkalosis</td>
</tr>
<tr>
<td>Hyperventilation</td>
<td>profuse vomiting</td>
</tr>
<tr>
<td>-stroke</td>
<td>hypoK</td>
</tr>
<tr>
<td>-SAH</td>
<td>burn</td>
</tr>
<tr>
<td>-meningitis</td>
<td></td>
</tr>
<tr>
<td>-anxiety</td>
<td></td>
</tr>
<tr>
<td>-hyperthermia</td>
<td></td>
</tr>
<tr>
<td>-PE</td>
<td></td>
</tr>
<tr>
<td>-salicylates poisoning</td>
<td></td>
</tr>
</tbody>
</table>

   (iii) If pH<7.35

<table>
<thead>
<tr>
<th>pCO₂ &gt; 45</th>
<th>HCO₃ &lt;22</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respiratory Acidosis</td>
<td>Metabolic Acidosis</td>
</tr>
<tr>
<td>NAGMA</td>
<td>HAGMA</td>
</tr>
<tr>
<td>Respiratory failure</td>
<td>Increase in organic acid production</td>
</tr>
<tr>
<td>-RTA</td>
<td>-lactoacidosis-shock,</td>
</tr>
<tr>
<td>-Diarrhoea</td>
<td>sepsis, hypoxia</td>
</tr>
<tr>
<td>-Addison ds</td>
<td>-uric acid</td>
</tr>
<tr>
<td>-Pancreatic fistula</td>
<td>-ketone-DM, alcohol</td>
</tr>
</tbody>
</table>
| -NH₄ ingestion | -drug – metformin,
| | metanol |

*anion gap = [Na + K] - [Cl + HCO₃]*

(iv) Oxygen dissociation curve

Left side of curve - ↑pH →↑↓DPG (2,3 diphosphoglycerate)
Right side of curve - ↓pH →↑↑DPG (2,3 diphosphoglycerate)

p50 – point where saturation of Hb reaches 50% (at pO₂=26.6)

ICU point (PaO₂, SaO₂) = (60mmHg, 91%) = lowest acceptable
PaO₂ in ICU patient because further drop beyond this point
lead to drastic drop in SaO₂

Mixed venous point at SaO₂ = 75%

(v) Indication for intubation

✓ To deliver positive pressure ventilation
✓ Airway protection from aspiration
✓ During surgical procedures involving neck and head in non-supine position
✓ Neuromuscular paresis
✓ Procedures increases intracranial pressure
✓ Profound disturbance n consciousness
✓ Severe pulmonary and multi-systemic injury
3. Pain management

(i) Effect of pain
- Hypoventilation
- Secretion retention
- Mental unrest

(ii) WHO pain medication ladder

<table>
<thead>
<tr>
<th>Pain score 0-3</th>
<th>4-5</th>
<th>7-10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild</td>
<td>T PCM 1g QID</td>
<td>S/C Morphine 5-10mg 4hrly</td>
</tr>
<tr>
<td></td>
<td>+ Cap Tramadol</td>
<td>± T PCM/Cap Tramadol</td>
</tr>
<tr>
<td>Moderate</td>
<td>T PCM 1g QID</td>
<td>S/C Morphine 5-10mg 4hrly</td>
</tr>
<tr>
<td>Severe</td>
<td>S/C Morphine 5-10mg 4hrly</td>
<td>± T PCM/Cap Tramadol</td>
</tr>
</tbody>
</table>

**Uncontrolled** – to refer to APS for PCA or epidural etc

Other options:
- T Arcoxia (Etoricoxib) 90/120mg OD
- T Ponstan (Mefenamic acid) 500mg TDS
- IV/IM Voltaren (Diclofenac Na) 75mg TDS

*for head injury – T PCM and T Arcoxia
*for rib injury – s/c morphine

4. Operative care

(i) Preoperative care

- Clinical assessment: Investigation and preparation
  - Get informed consent
  - Hx taking – previous surgery, choice of anaesthesia, complication of previous operation
  - Underlying comorbid, smoking, alcoholic, heart/respiratory/kidney diseases
  - Current medication – to withhold aspirin/ warfarin
  - Physical examination – short neck (difficult intubate), obese, CVS-Respi status
  - Vital signs, sugar control, body weight/height
  - FBC/Coag/RP/LFT/RSS/CXR/ECG
  - Correction of coagulation disorder, electrolyte imbalance, sugar level, blood pressure
  - Prophylactic antibiotics
  - Anaesthetic team pre-op assessment

(ii) Post-operative care (complications)

<table>
<thead>
<tr>
<th>POD – fever &gt;38.5°C</th>
<th>Prevention</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Wind Atelectasis</td>
<td>Incentive spirometry, chest physiotherapy, ambulate</td>
</tr>
<tr>
<td>3 Water UTI/Pneumonia</td>
<td>Early off bed, prop up patient, sit patient on chair, hand washing on handling, RT insert, oral/trachy to lolling</td>
</tr>
<tr>
<td>5 Walk DVT</td>
<td>Encourage ambulation, S/C Cleaxane 0.4mg OD, TED stocking</td>
</tr>
<tr>
<td>7 Wound Wound infection, abscess</td>
<td>Preop shower and skin prep, continue antibiotics postop, dressing of wound</td>
</tr>
<tr>
<td>10 Wonder Drug</td>
<td></td>
</tr>
</tbody>
</table>

- Preop bowel prep (Fleet/Foltran) to prevent intraoperative contamination by faecal masses
- OPSI prevention – penicillin (age <21), vaccination post-splenectomy (Haeumophilus influenza b, meningococcal*, pneumococcal) *pt have to self-purchase
- Once evidence of bowel movement (bowel sounds, flatus/BO) – encourage orally ASAP to prevent "Refeeding syndrome"
  - Identify risk: - malignancy, anorexia, alcoholism, GI surgery, starvation
  - Close monitoring during period of refeeding with involvement of nutritionist
- Parenteral phosphate administration 18mmol/d in addition to oral supplement
5. Primary and Secondary Survey
   (i) Primary survey – ABC resuscitation

   **Airway**
   - If patient gag/talk/cough → airway patent
   - Cervical collar → for all head injury
   - Sx of airway obstruction: stridor, hoarseness of voice
   - Look for FB in the throat
   - Perform suction and check gag reflex
   - If gag ↓, nasopharyngeal (not for basal skull fracture/oropharyngeal tube or intubation

   **Breathing**
   - Look for chest expansion – symmetry?
   - Pneumo/haemorthorax?
   - Flail chest – paradoxical breathing
   - Recheck ET, CXR
   - Tension pneumothorax
   - Thoracocentesis – if pneumothorax → chest tube
   - Insertion
   - Oxygen therapy

   **Circulation**
   - Listen to heart – look for muffled heart sound
   - Correct hypotension
   - Intraabdominal injury
   - Abnormal bruits
   - Cardiac BP/PR monitoring
   - Beck’s triad (muffled HS, ↑ JVP, hypotension)

   **Disability**
   - GCS assessment
     - 13-15 mild head injury
     - 8-12 moderate head injury
     - <8 severe head injury
   - Neurological assessment – cranial nerve, power, tone, reflexes, sensation
   - Long bone fractures – tenderness, crepitus
   - Pupil reflexes
   - Consciousness – Alert, Verbalise, Pain, Unresponsive
   - Cervical spine injury
   - CT Brain/Cervical spine – ICB, pneumoocranium, spine disarticulation, fractures

   **Exposure**
   - Other injuries
   - Abrasion/laceration wounds
   - Check perineum – blood in urethral meatus
   - Logroll – step deformities, anal tone, DPR examination, spine deformities
   - Chest spring/pelvic spring

<table>
<thead>
<tr>
<th>Life threatening in Trauma</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>Tension pneumothorax</td>
</tr>
<tr>
<td>Flail chest</td>
</tr>
<tr>
<td>Open pneumothorax</td>
</tr>
<tr>
<td>Cardiac tamponade</td>
</tr>
</tbody>
</table>

Short history – AMPLE

“Allergy ~ Medication ~ PMHx ~ Last meal ~ Event surrounding injury”

After primary survey
- Monitor - cardiac, SPO2, BP, Urine output
- Lab - GXM, ABG, toxicology screening, urine analysis, UPT, other base line lx
- Adequate resus – based on blood gas and u/o
- Radiographic lx – CXR, PXR, FAST

**GCS Score**

<table>
<thead>
<tr>
<th>Eye</th>
<th>Verbal</th>
<th>Motor</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Orientated</td>
<td>Obey</td>
</tr>
<tr>
<td>5</td>
<td>Spontaneous</td>
<td>Localise pain</td>
</tr>
<tr>
<td>4</td>
<td>To call</td>
<td>Inappropriate but comprehensible</td>
</tr>
<tr>
<td>3</td>
<td>To pain</td>
<td>Flexion</td>
</tr>
<tr>
<td>2</td>
<td>Close</td>
<td>Extension</td>
</tr>
<tr>
<td>1</td>
<td>Mute</td>
<td>No movement</td>
</tr>
</tbody>
</table>

**FAST scan (Focal Abdominal Sonography for Trauma)**

6 areas of focal scan:-
- Morrison pouch (between liver and rt kidney)
- Space between spleen and Lt kidney
- Left paracolic space
- Right paracolic space
- Pouch of Douglas/Rectovesical pouch
- Pencardial cavity
Safety triangle for chest tube insertion

Lateral border of m pectoralis major
Anterior border of m latissimus dorsi (anterior axillary line)
4-6th rib

(ii) Secondary survey (*)
= head and toe complete examination after primary survey

Sign of basal skull fracture
✓ Periorbital haematoma (raccoon eyes)
✓ Mastoid haematoma (battle sign)
✓ Haematympanum
✓ CSF rhinorrhoea
✓ CSF otorrhoea

6. Management of drowsy and unconscious patient
(i) Causes
1. Bilateral cortical diseases/processes
   a. Trauma – head injury
   b. Hypoxia – HIE, sinus thrombosis, CVA
   c. Infection – cerebral abscess, meningitis, encephalitis
   d. Haemorrhage – SAH, SDH
   e. Metabolic – DKA, HHS, hypo or hyper Na/K, hypoglycaemia
   f. Organ failure – liver or renal
   g. Postictal
   h. Endocrine – thyroid storm, myxoedema, Addison crisis
   i. Drugs – opiates, alcohol, opioid, alcohol, cocaine, benzodiazepine, antidepressant
2. Brainstem disorder — Supratentorial/Infratentorial lesions → SDH, EDH, ICB

(ii) Diagnosis and management

Priority should be given to ABC resuscitation and perform examination simultaneously, then:
- 1. Obtain quick history from witness
   i. Onset – abrupt/gradual
      ii. Acute (sec/min) – CVA, cardiac arrest, SDH, head injury
      iii. Subacute (min-hrs) – sepsis, infections, drug, hypo
      iv. Protracted
   b. Recent complaints – headache, depress, weakness, vertigo
   c. Recent injury
   d. Previous medical illness

2. Examination
   a. Vitals – T, PR, BP, RR
   b. Skin petechial rashes, ecchymosis (meningoencephalitis)
   c. Neurological assessment
      i. Posture
         ✓ Lack of movement of one side
         ✓ Intermittent twitching
         ✓ Multifocal myoclonus
         ✓ Decortication
         ✓ Decerebration
      ii. Level of consciousness
      iii. Neck rigidity
      iv. Pupil sizes – Horner Syndrome (ptosis, myosis, anhidrosis and enophthalmus), atropine overdose, opioid poisoning, ICB etc
   v. Fundoscopy
   vi. Brainstem reflex – pupill reflexes
   vii. Corneal reflex
   viii. Doll’s eye reflex (eye move to opposite side of movement so it always goes to centre) – if negative → brainstem injured
   d. Raccoon eyes → basal skull #
   e. Otorrhoea/rhinorrhoea
   f. Nails, dxt marks
   g. Breathing
      i. Cheyne-Stroke – rapid, shallow with periodic apnoeic episodes → heart failure, strokes, traumatic brain injuries, tumours, CO poisoning, morphine, toxic metabolic encephalopathy
      ii. Kussmaul – deep laboured breathing (usually met acidosis) e.g. DKA, renal failure
      iii. Biot breathing – cluster pattern → pontine malfunction
      iv. Gasping – severe hypoxia
7. Approach to patient in shock

(i) Difference between septic, spinal and hypovolaemic shock

<table>
<thead>
<tr>
<th></th>
<th>Septic</th>
<th>Spinal</th>
<th>Hypovolaemic</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Early</td>
<td>Late</td>
<td></td>
</tr>
<tr>
<td>Skin</td>
<td>Warm Pink</td>
<td>Cool Pale</td>
<td>Warm Pink</td>
</tr>
<tr>
<td>JVP</td>
<td>↑</td>
<td>↓</td>
<td></td>
</tr>
<tr>
<td>Cardiac output</td>
<td>↑</td>
<td>↓</td>
<td></td>
</tr>
<tr>
<td>Systemic vascular resistance</td>
<td>↓</td>
<td>↑</td>
<td></td>
</tr>
<tr>
<td>Mixed venous O₂ content</td>
<td>↑</td>
<td>↓</td>
<td></td>
</tr>
<tr>
<td>Inotropes</td>
<td>Dopamine</td>
<td>Dopamine</td>
<td>Noradrenaline</td>
</tr>
<tr>
<td>Mx</td>
<td>IV Abx</td>
<td>Methypred*unresponsive to fluid resus</td>
<td>Fluid resus/blood transfusion</td>
</tr>
</tbody>
</table>

Hypovolaemic shock ("Tennis" staging)

<table>
<thead>
<tr>
<th></th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
<td>&lt;15</td>
<td>15-30</td>
<td>30-40</td>
<td>&gt;40</td>
</tr>
<tr>
<td>ml</td>
<td>750</td>
<td>750ml-1.5l litre</td>
<td>1.5-2 litres</td>
<td>&gt;2 litres</td>
</tr>
</tbody>
</table>

(ii) Concept of:
a. Third space loss
   - Fluid accumulation in interstitial tissue/lumen of paralytic bowels eg post GIT surgery, pancreatitis (acute parapancratic fluid collection)
   - Tends to mobilise back to intravascular space in POD3
   - Beware of fluid overload sign

Algorithm

ABC of life support
↓
Oxygen and I.V access
↓
Stabilize cervical spine
↓
Blood glucose
↓
Control seizures
↓
Consider I.V glucose, thiamine, naloxone, flumazenil

Brief examination and obtain history
↓
Investigate
↓
Reassess the situation and plan further
b. Plasma loss
   - Occur after 1st 12hrs post-burn injury
   - Slowly decrease at the 2nd 12hrs
   - Plasma loss causes oedema of tissue involved

c. Acute blood loss

d. Spinal shock
   - Loss of sensation accompanied by motor paralysis with initial loss and gradual recovery of reflexes following spinal cord injury
   - Phase 1 (0-1day) – areflexia/hyporeflexia, loss of descending facilitation
   - Phase 2 (1-2day) – initial reflex retain, denervation, supersensitivity
   - Phase 3 (1-4 wks) – hyperreflexia, axon-supported synapse growth
   - Phase 4 (1-12 mths) – hyperreflexia, spasticity, soma-supported synapse growth

- GIT/GUT/Respi procedure without spillage
- Wound open for drainage

- Spillage from GIT/Biliary/GUT

- Dirty infected
  - Traumatic wound from dirty source
  - Wound embedded with foreign body
  - Indicated for wound debridement to remove necrotic tissues

(ii) Wound closure
   a. Primary wound closure
      - Wound closed immediately after op
   b. Secondary wound closure
      - Wound left open and let it healed over time
   c. Delayed primary closure or secondary suturing
      - Due to infected/contaminated wound, unable to close at the time after op done
      - Done after wound is clean

(iii) Stages of wound healing
   a. Early (D1) – haemostasis and inflammatory stage
   b. Intermediate (D2-D3) – proliferative with migration of mesenchymal tissues, angiogenesis and epithelisation
   c. Late (D4-5) – wound contraction and scarring (D21)

8. Management of wound
   (i) Types of wounds by degree of contamination
      a. Clean
         - Non traumatic without inflammation e.g. vascular, endocrine, eye procedure, without involving respiratory, GIT/GUT
      b. Clean-contaminated
         - High potential for infection
9. Burn resuscitation
   (i) Pathophysiology of burn

   Zone of coagulation: irreversible tissue loss (necrosis)
   Zone of stasis: reduced tissue perfusion, potentially salvageable tissue (loss of tissue in this zone can lead to wound deepening and widening)
   Zone of hyperaemia: increased tissue perfusion, most likely recover tissue unless untreated severe sepsis and prolonged hypotension

   **Systemic response** developed once the burn reaches 30% of TBSA, as a result of cytokines and other inflammatory mediators
   ✓ CVS
   (i) increased capillary permeability leads to loss of intravascular protein and fluid into interstitial compartment
   (ii) peripheral and organ vasoconstriction caused by TNF-α ⇒ myocardial contractility ⇒ systemic hypotension and organ hypoperfusion
   ✓ Respi – bronchoconstriction ⇒ ALI
   ✓ Metabolic – BMR ↑3×, catabolism
   ✓ Immune – down-regulating

(iii) Burn classification
   - According to depth (degree)
     I superficial – epidermis: only erythema, no blister, heal in 3-4 days
     II A superficial partial thickness – involved papillary dermis: red warm, oedematous, blistered, sensory intact, heal less than 2 weeks
     II B deep partial thickness – involved reticular dermis: damage dermal appendages, sweat gland, nerves, hair follicles, heal at least 3 weeks
     III full thickness – burn involved all layers of skin and some subcutaneous tissue initially painless in sensate dry surface that appear white crack with exposed underlying fat
     IV full thickness with involvement of fascia, muscles, and bones
   - According to the surface area:
     Small area – rules of palm (1% patient’s palm SA)
     Large area – rules of nine
Peritoneal sign
- Tenderness on palpation
- Percussion tenderness
- Voluntary guarding
- Involuntary guarding
- Rigidity
- Rebound tenderness

Inspection — surgical scar, distention
Palpation — tenderness, hernia, motion tenderness, CVAP (costovertebral angle pain)
Auscultation — bowel sounds and bruises
Percussion — liver and spleen size

Peritonism — motionless, often with knee flex

(ii) Indication of surgical referral
- Rupture of organ
- Peritonitis
- Colic
- Obstruction of bowel etc.

(iii) Management
- ABC resuscitation
- Treat shock
- Antibiotic
- IV fluid resuscitation
- Analgesics
- Keep NBM
- Blood (x) FBC, RP, LFT, CRP, Amylase, ABG, UFEME, Blood C+S
- US/CT to look for free fluid
- AXR/ECG
- Consent

(iv) Pain relief

Non opioid — PCM, ibuprofen, diclofenac, aspirin (musculoskeletal pain, renal, biliary colic)
Contraindication: peptic ulcer, floating disorder

Opioid — Morphine, dimorphine, pethidine, tramadol
Contraindication: not used in traumatic head injury or hepatic failure

(iii) Fluid resuscitation
IV fluid in excess of maintenance is given to all patient with burn >20% body surface area using Parkland formula for reducing the occurrence of burn-induced shock

Choice of solution — Ringer lactate/HM (crystalloid)

<table>
<thead>
<tr>
<th>AREA</th>
<th>Age 0</th>
<th>1</th>
<th>5</th>
<th>10</th>
<th>15</th>
<th>Adult</th>
</tr>
</thead>
<tbody>
<tr>
<td>A = 1/4 of HEAD</td>
<td>9%</td>
<td>8%</td>
<td>6%</td>
<td>6%</td>
<td>4%</td>
<td>3%</td>
</tr>
<tr>
<td>B = 1/3 of one THIGH</td>
<td>3%</td>
<td>3%</td>
<td>4%</td>
<td>4%</td>
<td>4%</td>
<td>3%</td>
</tr>
<tr>
<td>C = 1/3 of one LOWER LEG</td>
<td>2%</td>
<td>1%</td>
<td>2%</td>
<td>3%</td>
<td>3%</td>
<td>3%</td>
</tr>
</tbody>
</table>

Parkland Formula = \( 4 \times BW \times BSA \% \)

*First half to be given in first 8hrs after injury
*Second half to be given in next 16hrs after injury
*Colloid should not be used in 1st 24hrs post burn because it may lead to severe pulmonary complication (ARDS) due to excessive capillary leakage

11. Acute abdomen
   (i) Definition
   Acute severe abdominal pain that causes patient to seek for medical attention
10. Blood and blood product
(i) ABO and Rhesus group
   a. Universal donor for FBC – O negative
   b. Universal donor for FFP – AB

1 unit PC expected to increase 2-4% Haematocrite

\[ \text{Hb} \times 3 = \text{Hct} \]

(ii) Type of cross matching

GSH (Group-Screen-Hold)
- Patient’s blood type is determined, blood is screened for antibody
- Type and cross from the sample can be ordered if needed later

GXM (Group-cross-match)
Patient’s blood sent to blood bank and cross match for specific donor unit for possible blood transfusion

(iii) Type of blood product and indication

Packed cell – 1 unit = 350-450cc
Indicated at acute blood loss
Hb < 10 for patient with h/o CAD/COPD
Healthy symptomatic patient with Hb < 8
1 unit PC expected to increase 1-1.5g of Hb

Platelet – indicated if < 20
1 unit should increase > 20
Platelet count before surgery have to be > 50

FFP – to replace clotting factor
In case of warfarin overdose, DIVC, liver disease, TTP

Cryoprecipitate – to replace fibrinogen, vWF, and other clotting factors

HAS 4.5% or 20%
- Temporarily for patient with hypoproteinaemia (liver ds/nephrotic) with fluid overload
- Replace in abdominal tapping

1 DIVC regime = 2 platelet, 4 cryoprecipitate, 6 FFP

(iv) Rate of transfusion
1 pint packed cell usually transfused over 4 hrs with IV frusemide 30mg in between transfusion

(v) Transfusion complication

<table>
<thead>
<tr>
<th>Early (Within 24 hrs)</th>
<th>Late (&gt;24hrs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute haemolytic reaction</td>
<td>Infection (Hep B/C/HIV/protozoa/prion)</td>
</tr>
<tr>
<td>Anaphylaxis</td>
<td>Iron overload</td>
</tr>
<tr>
<td>Bacterial contamination</td>
<td>Post transfusion purpura</td>
</tr>
<tr>
<td>Febrile reaction</td>
<td></td>
</tr>
<tr>
<td>Allergic reaction</td>
<td></td>
</tr>
<tr>
<td>Fluid overload</td>
<td></td>
</tr>
<tr>
<td>Transfusion related acute lung injury</td>
<td></td>
</tr>
</tbody>
</table>