

8 Chest and abdomen

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Lungs and respiratory system examination

Attention

Remember — *Assessing trauma – primary and secondary survey (p27).*

- **When examining children**
 - Look before going near them with stethoscope or thermometer
 - RR and work of breathing most important indicators of chest infections in children
 - Listening to chest **not** reliable way to diagnose chest infections — only one part of assessment
- **Crepitus** — crackling sensation under skin caused by air leaking into tissues from airways or lungs. May be felt around chest drain

Large area of crepitus, with/without drain site — **emergency**. See *Needle decompression of tension pneumothorax (p49)*.

- **Crackles** (creps) sound like rubbing hair between fingers
 - Ask person to cough. If caused by mucus in upper airways — will clear
- Practise procedures — know what normal chest looks, sounds, feels like
- If anything abnormal or worrying — **medical consult**

What you need

- Warm hands with short fingernails
- Warm stethoscope — warm between your hands
- Good ears. If you have hearing problem — use amplified stethoscope
- Pulse oximeter
- Other equipment as needed, eg peak flow meter, spirometer

What you do

- Respiratory system starts at tip of nose — need to include head, ears, sinuses, nose, throat including nodes in examination
- **Ask about**
 - Nose — discharge, nostrils clear or blocked
 - Cough — when it started, when it happens, any triggers
 - Sputum — how much, colour, eg egg yellow, green, bloody
 - Noisy breathing
 - Breathing out (wheeze)
 - Breathing in (stridor) — important, could be obstruction
 - Shortness of breath — at rest, after activity, exercise
 - Chest pain or discomfort
 - How they sleep — lying, sitting, how many pillows

- Snoring that wakes others, stops breathing while asleep — could be OSA (*CARPA STM p352*)
- Swollen legs (oedema)
- Pain in calves — with shortness of breath could be DVT, PE
- Smoking, exposure to cigarette or domestic smoke, chemicals, dust
- Temp, pulse, BP, RR (for whole minute in children), O₂ sats
 - Skin, hands, feet — warm, cool, sweaty, clammy
- Check mouth for foreign body or upper airway obstruction
- **Expose chest and look**
 - Shape of chest, eg pigeon, barrel, concave
 - Breathing — look for
 - Distressed, agitated, short of breath, panting, unable to lie down
 - Rhythmical or uneven
 - Chest moving the same on both sides (symmetry)
 - Excessive use of accessory muscles (eg intercostal muscles), indrawing, jugular vein distension
 - Talking in full sentences, single words, not at all. Number of words spoken a good indicator of shortness of breath
 - Wounds, lumps, depressions on front/back of chest or neck
- **If small child or baby**
 - Alert, drowsy, lethargic
 - Look at respiratory effort
 - How fast they are breathing, stopping breathing (apnoea)
 - Do nostrils widen (flare) a lot as they breathe in
 - Do ribs and breast bone (sternum) suck inwards when they take a breath (indrawing), does abdomen move
 - Able to feed or drink from breast or cup
 - Dehydrated

Feel chest (palpate)

- Check position of windpipe (trachea). Put ring and index fingers on heads of clavicles, middle finger on windpipe. Is it in centre or moved to one side — F 8.1
- Using palms of hands, feel gently for any sore areas, swellings or dents (retractions) of chest wall and between ribs (intercostal spaces) — F 8.2
 - Feel for crepitus, especially around puncture wounds, drain sites



8.1



8.2

- Using pads of fingers feel over whole front and back of chest for lumps, scars, skin temperature, tone — F 8.3
- Should be no pain. If pain — think about broken ribs, muscle strain from coughing, collapsed lung



8.3

Measure chest expansion (symmetry)

Compare movement of both sides of chest wall (symmetry). If problem expanding (inflating) one or both lungs — may be fluid in pleural space, pneumonia, pneumothorax etc.

- Put hands on person's back with tips of fingers below scapula, thumbs touching over spine — F 8.4
 - Ask person to take a deep breath. Your thumbs and fingers should separate evenly, equally, at same time
- Note any difference in movement
- Look at collar bones (clavicles) from above, do they rise and fall equally



8.4

Percuss chest

- Use hands and hearing to find edges of lungs inside chest. 2 main sounds — **resonant** and **dull**, see Table 8.1. Check if filled with air, fluid, solid matter

Left front chest sounds dull over heart — from sternum to mid-clavicular line, at third or fourth rib space. Normal resonance again at sixth rib space.

Table 8.1: Chest percussion sounds

Name	Sound	What it means
Resonant	Hollow sound	Normal lung tissue
Very (hyper) resonant	Very loud, drum-like	Too much air in lung, eg emphysema, pneumothorax
Dull	Thud-like	Fluid or pus in lung, eg consolidation, pleural effusion

Practise on yourself

- Put non-dominant hand on top front of your chest with middle finger lying straight and flat
 - With tip of middle finger of dominant hand, tap briskly on non-dominant middle finger just below top joint — F 8.5.
 - Tapping movement must come from wrist
 - Will hear **resonant** sound
- Repeat on top of head. You will hear **dull** sound



8.5

Percuss patient

- Put hand firmly on chest, with straightened middle finger between ribs (in rib space)
- Follow percussion sequence for front — F 8.6 and back — F 8.7
- When percussing normal lungs, you hear resonant sound over most of lung



8.6



8.7

Listen to breath sounds (auscultation)

- First listen quietly without stethoscope
 - Wheeze or whistle, wet or dry cough
 - Speaking in sentences, short phrases, or single words
- Sounds made by air passing through larger and smaller airways tell you about condition of lungs and chest (pleural) cavity
 - If normal lungs — soft sound as person breaths in (inspire), nothing as they breath out (expire)
 - If fluid (pleural effusion) or air (pneumothorax) around lung — sounds usually decreased
 - If fluid in lung (eg infection, heart failure) — sounds increased, sounds present when person breathes out (bronchial breathing)
 - If blockage in large airways — loud higher pitched sound when person breathes in (stridor)
 - If blockage in smaller airways (eg asthma, bronchiolitis) — may hear higher pitched sound when person breathes out (wheeze)

If small child — always rely on **what you can see**

- Level of distress, breathing rate, effort, chest movements more reliable. See *Clinical examination of children* (p122).

- Put warm stethoscope diaphragm firmly onto skin. **Do not** listen through clothing — covers sounds, confuses findings
- Ask person to take regular, deep breaths through open mouth
- Follow same sequence as for percussion — F 8.6, F 8.7. Listen at each spot for one complete breath — in and out
 - Listen to back, compare one side of chest to other, then to front
 - See Table 8.2 for normal breath sounds (p174)

Table 8.2: Normal breath sounds

Where	Sound
Windpipe (tracheal — over trachea)	Harsh, high pitched
Large air tube (bronchial — over bronchus)	Loud, high pitched
Air sacs (vesicular — over alveolus)	Soft, low pitched

- If unusual breath sounds — note type, loudness, length, timing (breathing in or out)
 - Ask person to keep saying 'ninety-nine' (99), listen for changes
- Check under arm for pleural rub (creaky-leather sound), means membranes around lungs (pleura) inflamed and rubbing together
- Type of abnormal sound depends on where air flow is blocked, what is causing blockage. See Table 8.3 (*below*)

Table 8.3: Abnormal breath sounds

Where	Sound	Example of causes
Larynx	Stridor — high pitched crowing, worse when breathing in	Croup, foreign body stuck in throat, blocked airway
Bronchus	Wheeze — high pitched, hissing, musical	Asthma, bronchitis, bronchiolitis
Alveolus	Crackles — coarse or fine	Coarse — pus, infection Fine — fluid, fibrosis

- If breath sounds
 - Not there (air not reaching air sacs) — lung may have collapsed, eg pneumothorax, bad infection, severe pulmonary oedema, asthma
 - Less than normal (less air reaching air sacs) — lungs may contain fluid (pulmonary oedema)
 - Unusual — check medical history for repeated chest infections and/or chronic chest disease, **medical consult**

Using peak flow meter

- Measures how well person breathes air out of lungs, how well their medicine is working
- Reduced peak flow can be due to lung disease or to person not understanding what they need to do
 - Can tell you there is something wrong with lungs but not what it is
- If you know usual result when they are well — can help you decide if asthma or COPD worse than normal. Check file notes

Attention

- Teach person to blow from deep in lungs, not just from mouth

What you need

- Peak flow meter
- Disposable mouthpieces
- Graph to record result
- Person's medicine

What you do

- Ask person to sit up straight
- Put clean mouthpiece on meter
- Hold meter level (horizontal) with indicator facing upwards. Make sure marker is on '0' (zero) or 'start'
- Ask person to
 - Take big breath in, get lungs as full as they can
 - Seal lips around mouthpiece, blow out as hard and as fast as they can
- Note result, put marker back to zero/start, do this twice more
- Record best (highest) result on graph
- Ask person to take normal dose of reliever medicine
- Wait 15 minutes, then do procedure again. Record result on graph
- Compare result with normal or ideal to decide if treatment working

Spirometry

- Measures lung function — how much air person can blow out, how fast lungs can be emptied
- If 7 years or over — best test for diagnosing asthma or COPD. Use with history and examination
- Need training to carry out procedure, experience to interpret

Attention

- Must do procedure with **greatest effort possible**, no pausing
- If person coughs, takes extra breath, blocks mouth piece with tongue — will not be accurate. Must be done again
- Effort may be reduced by chest pain, abdominal problems, fear of incontinence. Manage these risks to reassure patient
- Takes longer for people with airflow obstruction to fully breathe out
- Avoid spirometry in anyone who had eye, chest, abdominal surgery, or pneumothorax in last 6 weeks
- **First** — demonstrate procedure to person
- For video clip demonstrating use in primary care setting see Spirometry at <http://www.nationalasthma.org.au/health-professionals/spirometry-resources/spirometry-technique-video>
- For more information on spirometry see Spirometry Handbook at http://www.nationalasthma.org.au/uploads/content/211-spirometer_handbook_naca.pdf

What you need

- Accurately calibrated spirometer
- Pre-calibrated single-use mouthpieces may be preferred
- Use nose clips if available

What you do

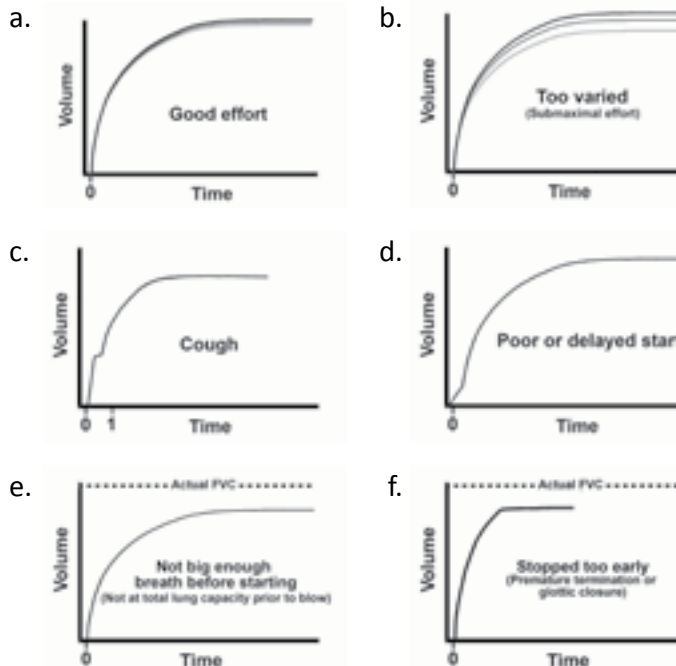
- Person sits up straight with feet firmly on floor. Tell them to try not to lean forward during test
- Ask person to
 - Breathe in as deeply as they can
 - Seal lips around mouthpiece
 - Blow air out as fast and as hard as they can, keep blowing till lungs feel completely empty
- When measuring breathing out (forced expiratory manoeuvre)
 - Adults and children over 10 years should blow out for 6 seconds or more
 - Children 10 years and under should blow out for 3 seconds or more
- You will need at least 3 good tests
 - If person too tired to do 3 good tests in a row — rest in between
- When 3 good tests, give 2 puffs of salbutamol (200mcg) via spacer. Wait 15min, repeat spirometry and get another 3 good tests
- Throw away single-use mouthpiece when finished

Breathing function measurements

- **FVC (forced vital capacity)**
 - Maximum volume of air which can be forcefully breathed out (exhaled)
 - Abnormal if less than 80% of predicted value based on age, height, gender
 - FVC6 is forced expiratory volume in first 6 seconds. Can be used instead of FVC, especially if severe lung disease and takes a long time to exhale
- **FEV1 (forced expired volume in one second)**
 - Volume expired in first second of a forced expiratory manoeuvre
 - Abnormal if less than 80% of predicted value based on age, height, gender
- **FEV1/FVC ratio**
 - Calculated by dividing FEV1 by FVC, usually expressed as percentage
 - Reduced ratio (less than 70%) suggests airflow obstruction consistent with asthma, COPD, bronchiectasis
- **Improvement in FEV1 following bronchodilator (eg salbutamol)**
 - If airflow obstruction — increase in FEV1 of 12% or more *AND* at least 200ml after bronchodilator suggests
 - If lung function returns to normal — asthma
 - If obstruction remains — asthma with COPD/bronchiectasis

'Good' spirometry test

- To be classified as a 'good' test, spirometry needs to meet criteria for **acceptability** and **reproducibility**
- **Acceptability**
 - Based on individual forced expiratory manoeuvre
 - Best assessed by looking at both flow-volume and volume-time curves, and patient
 - Blow of acceptable quality — F 8.8a
 - Starts quickly — steep rise in flow-volume loop
 - At least 3 seconds if 7–10 years or 6 seconds if over 10 years
 - No cough (at least in first second)
 - Smooth continuous expiration with only 1 breath
- **Reproducibility**
 - Based on how similar 3 acceptable forced expiratory manoeuvres are compared to one another — before and after bronchodilator
 - **2 best** FVC results should be within 0.15L of one another
 - **2 best** FEV1 results should be within 0.15L of one another
 - Highest FEV1 and FVC values should be used

Examples of spirograms**8.8**

Chest physiotherapy

Chest physiotherapy procedures improve **airway clearance** by

- **Improving ventilation, getting air behind sputum** (secretions)
 - Deep breathing exercises, especially deep, slow breaths with breath hold
 - Sitting upright rather than 'slumped'
 - Positive expiratory pressure (PEP) devices such as Bubble PEP
 - Physical activity or movement that increases deep breathing
- **Unsticking sputum from small airways**
 - Chest percussion, vibration
 - Bubble PEP
- **Moving sputum towards larger airways**
 - Postural drainage positions, gravity assistance
 - Chest percussion and vibration
 - Huffing and other breathing exercises
- **Clearing sputum**
 - Coughing and swallowing for infants and young children
 - Coughing and spitting out for older children and adults

Physical activity may help airway clearance, prevent chest problems. Short bursts of activity (eg running on the spot) through to playing sports.

Attention

- **Do not** do chest physiotherapy if person very unwell
 - In early stages of chest infection/pneumonia, eg fever, high RR, chest pain, coughing up blood
 - Having an asthma attack
- Start physiotherapy when fever gone, cough loose, RR under 40/min for infants, 25/min for adults

Infants and young children with chronic lung disease or chest infection

Attention

Do not use head-down positions. Keep infants and young children flat or upright.

What you do

- Sit or lie child on your lap or comfortable flat surface

- Use chest clapping (percussion) — slightly cupped hand should make hollow (drum-like) sound, not slapping
 - With child leaning forward on lap or over shoulder, percuss back of chest wall near shoulder, both sides — F 8.9
 - With child lying back against adult's chest, percuss front of chest wall near shoulder, both sides — F 8.10
 - With child lying on each side, percuss near armpit — F 8.11
 - With child lying on tummy, percuss near spine just under shoulder blade, both sides — F 8.12
- **AND/OR** Vibration — gently squeeze and shake chest wall as child breathes out. Use same positions as percussion. Good if child coughs



8.9



8.10



8.11



8.12

- Try physical activities to improve airflow
 - Tickling, giggling, laughing
 - If child old enough to control torso and head — swinging and playing 'aeroplanes'. Hold child by trunk and 'fly' them up and down, side to side
 - Jumping, short bursts of 20 star jumps for older children

Doing bubble PEP

- Bubble PEP aims to help
 - Move mucus from smaller airways to larger airways so it can be coughed up
 - Increase gas volume in air sacs (alveoli) that are underinflated due to mucus blocking airways

Attention

- Change water every time
- Wash tubing and bottle in warm soapy water, dry thoroughly after use. Use a clean **dry** bottle and tube each day
- Children may get dizzy if they take big breaths in and blow all way out with every breath. Just slightly bigger breaths than normal are best

What you need

- 2 tall plastic bottles, eg 2L plastic milk or fruit juice bottle with handle. 1 for child, 1 for you to demonstrate with
- 2 pieces tubing about 1cm wide and 50cm long. Suction tubing or garden drip line will do
- Tape to hold tubing in place, if needed
- 2 bowls to sit bottles in, to catch any overflow
- Food colouring, detergent

What you do

- Put 10–15cm of water in bottle. Check amount with physio
- Thread tubing down through handle to base of bottle — F 8.13, or tape tubing in place
- Put bottle in bowl, leave top of bottle open
- Blow through tube to make bubbles — F 8.14. Add some food colouring and detergent to make it fun
- If too hard for child — tip out 2–3cm of water

Note: If child quite young — start with water only in case they suck by mistake.



8.13

8.14

- **Series of breaths is best, not just single breaths**
 - Aim to build up to at least 8–12 bubble breaths in a row, or 1–2 minutes of bubble-PEP breaths at a time
 - After each set of breaths, let child have a break for a minute or so, then repeat bubble breaths
 - Do bubbling for about 10 minutes, depending on child's age and respiratory condition
- **Now try variations**
 - Hum a tune. Each line = 1 full breath
 - Blow your longest breath out at end of a set of breaths
 - Gently press paper to coloured bubbles to make prints. Use different colour another day
 - Encourage imaginative fun, eg make volcanoes or bubble flowers
 - Play 'hide and seek' in the bubbles. Use a straw to blow away bubbles and find hidden object, eg small toy, key, ping pong ball
 - Slowly and carefully blow the 'world's biggest bubbles'

Older children and adults with chronic lung disease

Attention — postural drainage

- Avoid head-down positions in people with enlarged abdomen, high BP, cardiac problems, liver disease, history or symptoms of reflux
- Need to know which lung is affected, which part contains sputum that needs drainage. Need full chest examination (p170), x-rays
- Always start treatment with most damaged lung uppermost
- If too hard for person — shorten time spent in drainage position, but ask them to try and stay in position a bit longer each time they have a go
- Do at least once a day



8.15

What you need

- Surface that can be tilted, eg special bed, couch, stretcher, or copy ideas in pictures. Make sure person is safe
- Disposable cup or container to spit into, box of tissues



8.16

What you do

Postural drainage

- Ask person to lie in position that drains affected part/s of lung for 15–20 minutes, do breathing exercises at least 6 times in each position
 - Position in F 8.15 will drain bottom front of lungs
 - Positions in F 8.16 and F 8.17 will drain bottom sides of lungs
 - Positions in F 8.18 and F 8.19 will drain bottom back of lungs



8.17



8.18



8.19

Breathing exercises

- Ask person to
 - Relax and breathe normally until comfortable lying in position
 - Take 5 big breaths, hold last breath for slow count of 3. If too difficult — may need to take ordinary breaths in between
 - Do 1 or 2 'huffs'. For a 'huff' ask person to take a breath slightly bigger than normal then force air out quickly through open mouth
 - Relax and breathe normally
 - Repeat until sputum has moved up airways far enough to be coughed out
 - Use 1 breath for 1 cough to clear sputum. Repeat to clear all sputum in upper airways

Oxygen flow rates

Table 8.4: Oxygen flow rates

Oxygen delivery system	Oxygen flow rate (L/min)			Example of medical conditions
	Infant	Child	Adult	
Nasal cannula/prongs	1–2	1–2	2–4	Respiratory conditions, eg COPD, bronchiolitis, mild pneumonia
Simple mask Oxygen mask <i>Hudson</i> mask	6	6	6–8	Pneumonia, chest pain, moderate asthma
Non-rebreather mask	10	10	12–15	Critically ill but adequate breathing
High flow mask Venturi mask	N/A	N/A	4–12	Exacerbations of COPD
Bag and mask	8	10	15	Critically ill, respiratory arrest

How much oxygen to give (adult and child)

- Important to check person's response to oxygen treatment often, and increase or decrease if needed. **Medical consult** if not sure
- If not breathing, or very poor respiratory effort — use bag and mask at 15L/min
- If critically unwell — use non-rebreather mask
 - Aim to get O₂ sats of 94–98%
- If condition such as chest pain or respiratory condition, eg pneumonia, asthma — first use simple oxygen mask, or *Hudson* mask at 6–8L/min
 - Aim to get O₂ sats of 94–98%
 - If improving — use less oxygen via nasal prong
- If history of COPD — use nasal prongs or *Venturi* mask and less oxygen
 - Aim to get O₂ sats of 92%

Oxygen delivery devices

Nasal prongs/cannula — F 8.20

- Uses
 - Oxygen needed for long periods. Lets person eat, drink, talk
 - Babies/young children with pneumonia who won't tolerate face mask
- Flow rate
 - 2L/min = 28% inspired oxygen concentration
 - 4L/min = 36% inspired oxygen concentration



8.20

Simple mask — F 8.21 (eg *Hudson* or *Venticare MC*)

- Uses
 - Adults/older children with pneumonia or other moderate respiratory illness
- Flow rate
 - 5–6L/min = 40% inspired oxygen concentration
 - 7–8L/min = 60% inspired oxygen concentration
 - Give more than 4L/min (child) or 6L/min (adult) to remove expired air from mask and prevent re-breathing of CO₂
 - Giving more than 10L/min will not increase percentage of oxygen given



8.21

Mask with reservoir bag — F 8.22

Bag and mask or non-rebreather mask.

- Uses
 - Trauma, shock, illness needing high level of oxygen
- Flow rate
 - 14L/min = 85–90% inspired oxygen concentration
- Make sure reservoir bag full before putting on person, mask properly sealed around mouth and nose



8.22

Venturi or high flow mask — F 8.23

- Uses
 - Acute exacerbation of COPD
- Flow rate
 - Gives 24%, 28%, 31%, 35%, 40%, or 60% inspired oxygen concentration
 - Oxygen must be set at recommended flow rate for required concentration (listed on venturi valve)



8.23

Table 8.5: Guide to venturi valve colours

Venturi valve colour	Flow rate (L/min)	Oxygen delivered (%)
Blue	2	24
White	4	28
Orange	6	31
Yellow	8	35
Red	10	40
Green	15	60

Abdominal examination



Attention

- Make person as comfortable as possible, respect privacy
 - Warm room, empty bladder
 - Gentle approach — start as far from painful area as you can
- Palpate/percuss for a reason, to answer question, eg Is there guarding in right iliac fossa, mass in left upper quadrant, enlarged bladder
 - **Do not** poke or prod abdomen — palpate and percuss gently
 - **Do not** palpate/percuss longer than needed to answer question/s
- Watch person's face during examination to see if they have pain, keep them relaxed
- Mentally divide abdomen into 4 areas (quadrants), know what organs lie in each — F 8.24
 - Start examination well away from painful area, be sure to examine all quadrants, leave painful area/s to last
- Do examination in following order
 - **Look** — abnormalities, asymmetry
 - **Auscultate** — listen for bowel sounds
 - **Percussion** — check for tenderness, size of organs, masses, air and/or fluid in abdomen (ascites)
 - **Palpation** — feel for masses, enlarged organs, tenderness, guarding, rigidity
- If you find anything abnormal or worrying — **medical consult**

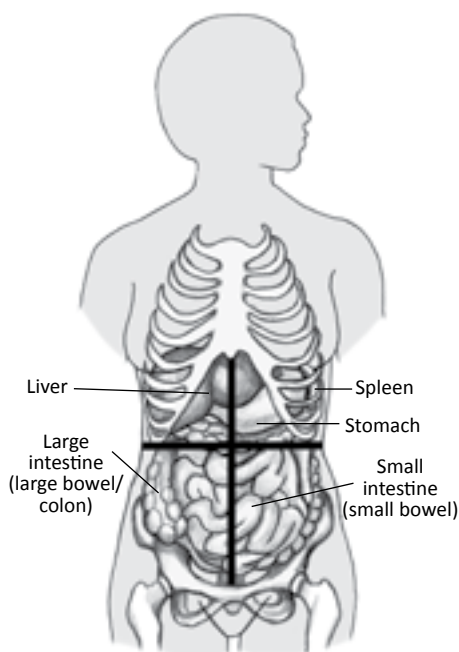
What you need

- Warm hands with short nails
- Stethoscope
- Waterproof/permanent marker
- Disposable tape measure
- Pain relief

What you do

Look

- Lie person on back, arms by sides, pillow under head
- If person in distress/pain — give pain relief now (*CARPA STM p399*)
- Signs of injury



8.24

- Does abdomen move with respiration
- Does person look very thin (malnourished)
- Jaundice
- Prominent capillaries (spider naevi) or veins visible
- Abdomen swollen/distended
- Where is fat/fluid lying — see *Assessing ascites (p188)*
- Lumps, bulges, rashes, scars
- Umbilicus — in midline, bulging out
- Pregnancy signs, eg brown discolouring from umbilicus to pubis, stretch marks (striae)
- Bowel moving under skin (peristalsis)
- Pulsing of aorta or femoral arteries

Listen — with stethoscope (auscultation)

Don't spend a lot of time listening to abdomen. Interpretation of abdominal sounds very individual, doesn't add much to clinical picture. Not a good discriminator, few or lots may be normal, can be serious abdominal pathology with normal sounds.

- Listen for 30–60 seconds in area of umbilicus
 - If no bowel sounds heard — record as reduced
 - If bowel sounds present — are they plentiful
 - If plentiful, loud and tinkling — may be obstruction
 - Lots of gurgling may come before diarrhoea, or may be normal
- Use active listening to answer question — is there obstruction
 - Mechanical, eg adhesion or twisted, eg volvulus
 - Lack of intestinal peristalsis (ileus) — from injury, inflammation, low potassium, drugs

Percuss

- Use same technique as chest percussion (*p172*)
- Percuss very lightly at first, start as far from tender/painful areas as possible, cover all quadrants
- Listen for
 - Hollow, drum-like sound (tympany) — normal over air filled organs, eg stomach, bowel
 - Dull sound (dullness) — normal over enlarged liver or spleen, full bladder, uterus (these organs have no overlying bowel)
- Use tape to measure
 - Distance liver or spleen extend below ribcage in mid-clavicular line
 - Height of bladder or uterus above pubic bone

To percuss liver

- Start in mid-clavicular line over lower right lung (just below nipple) then work down. Sound will be hollow over lung
- Use pen to mark where sound becomes dull as you pass over top edge of liver
- Start in right lower quadrant, percuss upwards until hollow sound of bowel changes to dullness at bottom edge of liver
 - Confirm bottom edge by light palpation, usually within 2cm of rib cage. Mark this point
- Measure between 2 marks

To percuss spleen

Can only percuss if enlarged. Need to distinguish from enlarged kidney or stomach tumour.

- **Do not** percuss spleen if left upper quadrant pain/tenderness — might cause damaged/diseased spleen to rupture
- In mid-clavicular line, percuss upward from level of umbilicus
 - Enlarged spleen sounds dull on percussion
 - If covered by bowel — usually sounds hollow
- Confirm by light palpation. Mark this point
- In mid-clavicular line, measure from ribcage to mark

To percuss bladder

- Do after person has emptied bladder
- Start at pubic bone, percuss up towards umbilicus
- Enlarged bladder sounds dull
- Enlarged uterus and large ovarian masses also sound dull — may be mistaken for bladder

Palpate

- Always start palpation far away from where patient complains of pain, examine painful area last

Two types of palpation — far more information gained from light palpation than deep palpation.

- **Light palpation** — use flat hand and feel with index finger (leading) edge. Press lightly in smooth, gentle movements. Will show up pain, tenderness, tense muscles, some masses, organs lying close to skin, eg liver, spleen, uterus, bladder
- **Deep palpation** — use more pressure and press deeper (up to 5–7cm if person obese). You can use both hands, one on top of the other. This will show up deep pain, masses, shape/size of deeper structures, eg kidneys, aorta

To palpate liver

- Use light palpation to check area you marked during percussion
- Start from right lower quadrant, working upwards 2–3cm at a time
- At each site, ask person to take a deep breath
 - If liver or gall bladder enlarged — will feel bottom edge being pushed down by diaphragm
- Normal liver often palpable 1–2cm below ribcage in mid-clavicular line
- Gall bladder tender if infected (cholecystitis)

To palpate spleen

In adults you only feel spleen if enlarged. Otherwise protected by lower left rib cage. Occasionally feel edge of normal spleen in children.

Can be difficult to palpate and easily missed even when very enlarged.

- Spleen can be enlarged in
 - Trauma, eg subcapsular haemorrhage
 - Leukaemia
 - Myelofibrosis
 - Certain infections, eg malaria, glandular fever (EBV)
 - Cirrhosis (portal hypertension) occasionally complicated by enlarged spleen

If left upper quadrant tenderness — be very gentle palpating for spleen as injured/enlarged spleen can rupture easily.

- Lie person on right side, facing you
- Sit down with right hand lying horizontally on abdomen at umbilicus
- Feel with leading edge of index finger. Press gently towards left lower rib cage as person breathes in
 - Repeat 4–5 times, each time bringing hand a little closer to rib cage
- Measure in mid-clavicular line from ribcage

To palpate kidneys

- Kidneys and adrenal glands are deep, usually difficult to palpate
- Enlarged kidneys usually polycystic
- Renal and adrenal tumours occasionally palpable, especially in children
- Lower pole of right kidney may be felt if person very thin
- **Right kidney**
 - Stand on person's right side, facing their head
 - At level of umbilicus, put left hand under person's back half way to midline, put right hand on right abdomen one hand's breadth from midline
 - Ask person to take a deep breath and hold for a moment

- With flats of fingers, press up with left hand and down with right to 'capture' and bounce (ballot) kidney between them — F 8.25
- As person breathes out, partially release pressure of right hand. May feel kidney slide back into original position



8.25

• Left kidney

- Move to person's left side facing head, repeat procedure with hands in opposite positions

To palpate bladder

Pregnant uterus or large ovarian cyst/tumour can be mistaken for bladder.

- Have person try to empty bladder
- Stand on person's right side. Starting above umbilicus use fingers of left hand to lightly palpate into lower abdomen
- Will only feel bladder if distended

Assessing ascites

Attention

- **Ascites** is excessive fluid between abdominal organs and abdominal wall. Always abnormal
- If abdomen swollen — may be ascites

What you need

- Helper
- Waterproof/permanent marker
- Tape measure

What you do

Percussion wave test

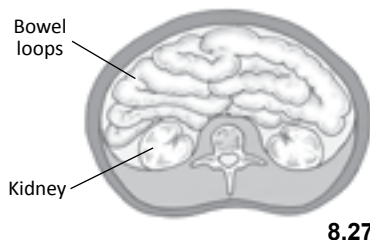
- Person lies on back
- Ask helper to press down firmly in midline with side of hand — F 8.26
- Face person's head and put your hands either side of abdomen
- Tap side of abdomen with right hand. Check for 'ripple' or 'wave' of fluid across abdomen that you can see and feel with left hand — F 8.26



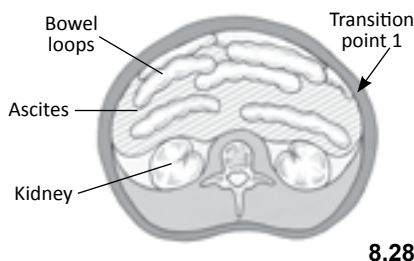
8.26

Shifting dullness test

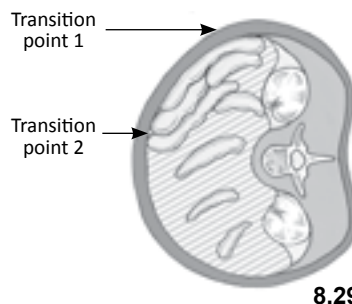
- Person lies on back, stand to side of person
 - Percuss from umbilicus to side away from you
 - Normal air filled bowel — F 8.27 will sound hollow (tympany)
 - If fluid (ascites) — hollow sound will change to dullness. Mark this point (transition point 1) — F 8.28
- Roll person onto side facing you, wait a minute for ascites to move down with gravity
 - Percuss from upper side of abdomen towards umbilicus
 - Mark point where hollow sound changes to dullness (transition point 2) — F 8.29
- If ascites — marks/transition points will be at least 3cm apart — F 8.29



8.27



8.28



8.29

Rectal examination



Attention

- **Do not** do if splits in skin (fissures) around anus, or other painful conditions
- Tampons in female patients can feel like a tumour, so check first
- Very important to explain procedure to person and obtain consent
 - Can be associated with extreme embarrassment, fear of pain or diagnosis of cancer
 - May be more at ease if accompanied by friend or relative

What you need

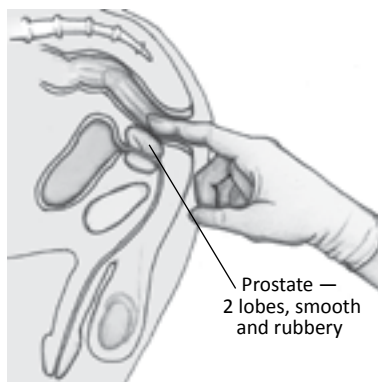
- Paper sheets or blueys
- Well-fitting sterile gloves
- Lubricant

What you do

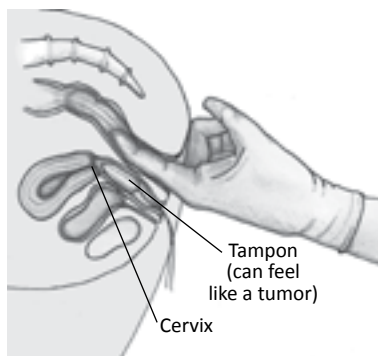
- Ask person to empty bladder
- Put clean paper sheet or bluey on bed
- Have person lie on left side with knees drawn up
- Put on gloves, put lubricant on your finger
- Separate buttocks, note any haemorrhoids, faeces (guna), abrasions etc
- Put finger over anus. Ask person to breath deeply, try to relax
- Gently insert finger into anal canal, then rectum. Direct finger towards small of the back. Finger will reach in 7–8cm
- Sweep finger to front of person (anteriorly) to feel for prostate in males — F 8.30, cervix in females — F 8.31
- Feel all the way around rectum, then back the other way until you have been around full circle

Check for

- Haemorrhoids, splits (fissures), abrasions or openings (fistulas) around anus, in anal canal
- Painful or non-painful lumps



8.30



8.31

- Tone (strength) of muscle around anus (sphincter). Ask them to bear down
- For impacted faeces (guna)
- Condition of rectal wall
 - Hard, raised, ulcerated areas may mean tumours
 - Soft, spongy, velvety areas may mean polyps (villous adenoma)
- **The prostate**
 - About 3cm long, 2 lobes with central dip/groove (sulcus). Should feel firm, smooth and rubbery
 - Will feel larger if man has full bladder
 - Rough or craggy hard mass may mean malignant tumour (cancer)
 - Enlarged smooth mass may mean benign enlargement (hypertrophy)
 - Tender, lumpy, boggy mass may mean inflammation/infection (prostatitis)

Now

- Slowly withdraw finger, check tip of glove
- Wipe area with tissues

Continuous ambulatory peritoneal dialysis

CAPD allows people with end-stage kidney disease to care for own dialysis needs in community. Provides renal replacement therapy by using peritoneal membrane, body's own naturally occurring semi-permeable membrane.

- Fluid introduced into membrane through permanent catheter
- Excess water and body wastes (solutes) removed when fluid drained out
- Exchange of fluid ensures clearance of body wastes and water. Occurs through manual or automated methods using various regimes
- Each exchange consists of a drain, fill and dwell phase

Attention

- Shared care with peritoneal dialysis/renal unit
 - Management plan should include how and when to contact them
- Biggest risk is peritonitis. Can be life threatening, lead to dialysis failure

Contamination

Contamination of patient line

Attention

5 main ways to contaminate CAPD system

- Most common cause — breakdown in aseptic technique during connection by touching one of
 - End of transfer set/extension line when disinfection cap (eg *MiniCap*) off
 - Inside of disinfection cap
 - Patient connection part of peritoneal dialysis solution set
- Using out of date stock
- Using equipment that does not have protective cover/cap
- Breakages in part of delivery system
 - Transfer set/extension line, eg line or disinfection cap fallen off
 - Peritoneal catheter
 - Patient connection part of peritoneal dialysis solution set
- Breakdown of aseptic technique when injecting additives into peritoneal dialysis bags

What you do

If you suspect contamination of CAPD system

- Peritoneal catheter must be clamped — clamp stays on until extension line changed or repaired
- Person must take oral antibiotics from emergency kit

- If person has **not** clamped peritoneal dialysis catheter and taken antibiotics from their emergency kit
 - Clamp catheter with
 - White peritoneal catheter clamp
 - *OR* Plastic scissor clamp with gauze between jaws and catheter
 - Give antibiotics immediately
 - **Dicloxacillin** oral 1g single dose
 - If allergic to **dicloxacillin** — give **cephalexin** oral 1g single dose
 - If allergic to **dicloxacillin** and **cephalexin** — give **clindamycin** oral 900mg single dose
 - **Do not** use IV antibiotics
- Work out how contamination happened, then decide what to do next
- Contact renal dialysis unit or on-call renal registrar/nephrologist if
 - Contaminated fluid could have entered peritoneal cavity. Must be drained out and fresh exchange performed
 - Transfer set/extension line needs to be changed. Must be changed if
 - Transfer set/extension line split
 - Transfer set/extension line end (dark blue piece) exposed, ie disinfection cap off
 - Exposed transfer set/extension line end (dark blue piece) touched
 - Transfer set/extension line fallen off peritoneal dialysis catheter at titanium connector

If more than 2 contaminations in 6 month period — arrange review with peritoneal dialysis/renal unit.

Hole or split in peritoneal dialysis catheter

Attention

- Will be wet clothing, fluid leaking from tubing
- Caused by
 - Accidentally cutting catheter
 - **Do not** use scissors or sharp objects near catheter
 - Catheter caught in zipper
 - Catheter weakened by cleaning with alcohol swabs or wipes
 - Kink at titanium adaptor if taped incorrectly

What you do

- Clamp catheter on patient side of hole/split with
 - White peritoneal dialysis catheter clamp
 - *OR* Plastic scissor clamp with gauze between jaws and catheter

- Contact peritoneal dialysis/renal unit for further advice

Disconnection of line at titanium adaptor

Attention

- Person should check that line firmly screwed onto titanium adaptor every day. After daily shower is a good time
- If line disconnects — peritoneal dialysis fluid will pour out

What you do

- Clamp catheter close to abdomen with
 - White peritoneal dialysis catheter clamp
 - *OR* Plastic scissor clamp with gauze between jaws and catheter
- Cover exposed end with
 - **Povidone-iodine** soaked gauze
 - *OR* Disinfection cap
 - *OR* Sterile gauze
- Give antibiotics (*p193*)
- Contact peritoneal dialysis/renal unit for further advice

Exit site infection

Attention

- Will be discharge/pus draining from exit site
- May be pain, redness, large amount of crusting
- Tunnel tract may also be infected. Redness, pain, swelling over part of catheter under skin. Rarely occurs alone
- May feel unwell, have poor appetite

What you do

- Contact peritoneal dialysis/renal unit for advice
- Clean exit site with **normal saline**
- Milk along catheter tunnel tract, apply firm downward pressure over external cuff
- Swab purulent discharge that runs out — send for MC&S
- Continue daily exit site care
- If infection serious — daily sterile dressings

Peritonitis

Attention

- If you suspect peritonitis — contact peritoneal dialysis/renal unit immediately
- **Treatment must be started immediately.** Can be life threatening and will not get better without treatment

- Caused by
 - Contamination or damage to transfer/extension set
 - Exit site infection (*p194*)
 - Hole or split in peritoneal dialysis catheter (*p193*)
 - Accidental disconnection of line at titanium adaptor (*p194*)
 - Infection of female genital tract
 - Constipation or diarrhoea

Ask

- Abdominal pain, nausea, vomiting
- Diarrhoea, constipation
- Fever, uncontrollable shivering
- Poor drainage
- Feeling very unwell

Check

- Temp, pulse RR, BP, for cloudy fluid
- Check catheter and extension line for damage, missing disinfection cap
- Sample cloudy bag
 - Hang drain bag for at least 15 minutes
 - Wipe bung of each culture bottle with alcohol swab. Use new swab for each bottle. Wipe sampling port with new alcohol swab. Take
 - 1 x aerobic blood culture bottle (room temperature)
 - 1 x anaerobic blood culture bottle (room temperature)
 - 1 x EDTA tube (fridge not freezer)
 - 50mls in RED TOP (gamma sterilised) specimen container (fridge not freezer)
 - Mark pathology form '**URGENT** Notify nephrologist/renal registrar', send copy to peritoneal dialysis/renal unit. Request
 - White blood cell and differential count
 - Gram stain
 - MC&S

Do

- **Alert on-call nephrologist/renal registrar**
- **If catheter damaged** — do repair or line change
 - Contact peritoneal dialysis/renal unit for help
- Carry out standard bag exchange
 - If dehydrated — use low strength glucose, 0.55% (white ring pull)
 - Reduced volume may help abdominal discomfort
- **Contact renal unit for medicines order**
 - Usual medicines
 - **Cephazolin** IP 1g
 - **Ceftazidime** IP 1g
 - **Heparin** IP 1000units/L (2L bag needs 2000units)
 - Add together to new bag of fluid after drain and 'flush before fill'. Fluid must stay in body for 6 hours
- Give pain relief (*CARPA STM p399*)
- Give **nystatin** oral 500 000units 4 times a day (qid)

Other problems

Fibrin in effluent

Attention

- Fibrin may be seen when peritoneal membrane irritated
 - Usually seen with peritonitis (*p195*)
 - May look like stringy threads in drain fluid *OR* egg white or jellyfish as drain fluid cools
 - If left untreated — can block catheter

What you do

- If effluent otherwise clear and **no drainage problems** — review in 24 hours
- If effluent clear and **drainage poor**
 - Use **heparin** 1000units/L in all bags until no fibrin for 24 hours, drainage improved
 - If not sure — contact peritoneal dialysis/renal unit

Difficulty draining in or out

Attention

- Caused by
 - Closed twist clamp on transfer set
 - Closed clamp on drain line

- Frangible not broken completely
- Kinks in drain/fill lines
- Fibrin
- Not enough gravity for flow
- Catheter tip floating up out of pelvis
- Catheter trapped in loop of bowel
- Fold of peritoneum (omentum) wrapped around catheter
- Constipation

What you do

- Check tubing. Start from exit site and work outwards looking for kinks, closed clamps, unbroken frangible, fibrin in drain fluid
- Check that infusion bag high enough and drainage bag low enough for gravity to help with filling and drainage. Ask person to stand, move around, bend forward and backwards
- Ask person about recent bowel habits
- If problem persists — contact peritoneal dialysis/renal unit for advice

Fluid leak at exit site

Attention

- Suspect if dressing and clothes become wet
- **Do not** ignore

What you need

- **Normal saline**
- U/A dipstick

What you do

- Clean exit site with **normal saline**
- Press firmly along line of catheter towards exit site
- Put glucose part of a U/A dipstick onto expressed fluid
- If dipstick positive for glucose — drain fluid from peritoneal cavity
- Contact peritoneal dialysis/renal unit

Extruded dacron cuff

First of 2 cuffs on peritoneal dialysis catheter has come out. Part or all is seen.

Attention

- Caused by
 - Pulling or tugging on catheter
 - Exit site infection
 - Poor insertion technique
 - Large weight loss

What you do

- Secure catheter in natural fall line — never let it hang loose
- Clean twice daily. Never trim cuff back
- Treat exit site infection if needed (*p194*)
- Contact peritoneal dialysis/renal unit

Blood in effluent

Attention

- 1 teaspoon of blood in 2L of effluent can look like pure blood, don't panic
- Usually caused by
 - Menstruation (peritoneal membrane is open at fallopian tubes)
 - Trauma (straining, heavy lifting)

What you do

- Add **heparin** 1000units/L to all bags until fluid is clear
 - Can take up to 48 hours
 - Regular dialysis helps remove blood

Nausea and vomiting

Attention

- Can be early indication of peritonitis
- May be food poisoning or gastroenteritis. Check other family members
- Can lead to dehydration

What you do

- Do bag exchange
 - If person dehydrated — use 0.55% glucose-strength bag
- Treat nausea and vomiting. Encourage person to have small frequent sips of water and ice, rest

- **Peritoneal dialysis/renal unit consult**, while person in clinic
- Review in 24 hours or as needed
- If person still unwell and fluid clear — sample drain fluid

Dehydration

Not enough fluid in the body.

Attention

- Caused by
 - Not drinking enough
 - Using wrong glucose-strength bags — too strong
 - Vomiting or diarrhoea
 - Peritonitis
 - Other febrile illness or infection
- Will have
 - Low BP, headache, cramps, sunken eyes, dry cracked coated tongue, dizziness on standing
 - Weight below ideal body weight

What you do

- Check level of dehydration, may need IV rehydration
- Increase oral fluids
- Treat cause of dehydration
- Use lower than usual glucose-strength bag — 0.55%. If not available — use only 1.5%
- Only do 3 exchanges over next 24 hours
- Contact peritoneal dialysis/renal unit

Fluid overload

Attention

- Caused by
 - Drinking too much
 - Not draining fully
 - Too much salt
 - Using wrong glucose-strength bags — too weak
- May have
 - Weight above ideal body weight
 - High BP
 - Fluid build-up (oedema) in legs, face especially around eyes

- Headache
- Difficulty breathing, especially when lying flat

What you do

- If severe — can do rapid 4.25% glucose exchanges. Contact peritoneal dialysis/renal unit or on-call renal registrar/nephrologist for advice
- Make sure person is draining fully. Check draining method (technique)
- Do 5 exchanges in next 24 hours
- Treat constipation — slows drainage
- Tell person to
 - Drink less than 500ml/day
 - Stop adding salt to food
- Check urine output
- Discuss diet and fluid intake

Stress and depression

Chronic illness, anaemia, doing dialysis 365 days a year, waiting on transplant list all likely to reduce quality of life, cause stress and depression.

Attention

- May have mood swings, lack of interest in anything, feel unable to cope, sleep longer than usual but feel less rested

What you do

- Have person talk to someone — friend, partner, nurse, doctor, ATSIHP, AHW
- Contact renal unit. Some have psychosocial support workers, patient groups
- Review regularly