most frequent causes to consider are tuberculosis, occult abscess (usually intra-abdominal), osteomyelitis, infective endocarditis, lymphoma or leukaemia, systemic-onset juvenile rheumatoid arthritis, giant cell arteritis and drug fever (drug fever is responsible for 10% of fevers leading to hospital admission[3]). In studies of fever of unknown origin, infection is found to be the cause in 30%, neoplasia in 30%, connective tissue disease in 15% and miscellaneous causes in 15%; in 10% the aetiology remains unknown (Table 16.1). Remember, the longer the duration of the fever, the less likely there is an infectious aetiology. The majority of patients do not have a rare disease but rather a relatively common disease presenting in an unusual way.[4]

TABLE 16.1 Common causes of pyrexia of unknown origin

1 Neoplasms • Hodgkin's and non-Hodgkin's lymphoma, leukaemia, malignant histiocytosis • Other tumours: hepatic, renal, lung, disseminated carcinoma, atrial myxoma
2 Infections • Bacterial: e.g. tuberculosis, brucellosis and other bacteraemias, abscess formation (especially pelvic or abdominal), endocarditis, pericarditis, osteomyelitis, cholangitis, pyelonephritis, pelvic inflammatory disease, prostatitis, syphilis, Lyme disease, borreliasis, cat scratch disease, dental abscess • Viral: e.g. infectious mononucleosis, cytomegalovirus infection, hepatitis B or C, human immunodeficiency virus (HIV) infection, Ross River virus • Parasitic, rickettsial and others: e.g. malaria, Q fever,

toxoplasmosis • Fungal: e.g. histoplasmosis, cryptococcosis, blastomycosis
3 Connective tissue diseases • Juvenile rheumatoid arthritis, systemic lupus erythematosus • Vasculitis, e.g. giant cell arteritis, polyarteritis nodosa
4 Drug fever
5 Miscellaneous Inflammatory bowel disease, alcoholic liver disease, granulomatous disease (e.g. sarcoid), multiple pulmonary emboli, thyroiditis, adrenal insufficiency, phaeochromocytoma, familial Mediterranean fever and other hereditary periodic fever syndromes, factitious fever
6 Uncertain

History

The history may give a number of clues in these puzzling cases. In some patients a careful history may give the diagnosis where expensive tests have failed. See *Questions box 16.1*.

Questions box 16.1

General questions to ask the patient with a fever

! denotes symptoms for the possible diagnosis of an urgent or dangerous problem.

1. How long have you had high temperatures?
2. Have you taken your own temperature? How high has it been?
3. Have you had shivers and shakes (rigors)?

4. Has anyone you know had a similar illness?

5. What medications are you taking?

6. Have you had any recent illnesses?

7. Have you had any recent operations or medical procedures?

8. Have you travelled recently? Where to?

9. Did you take anti-malarial prophylaxis and have the recommended vaccinations for your trip?

10. Have you any pets? Have they been sick lately?

The time course of the fever and any associated symptoms must be uncovered. Symptoms from the various body systems should be sought methodically.

Examples include:

1. The gastrointestinal system—diarrhoea, abdominal pain, recent abdominal surgery (inflammatory bowel disease, diverticular disease, cholangitis).

2. The cardiovascular system—heart murmurs, dental procedures (infective endocarditis), chest pain (pericarditis).

3. Rheumatology—joint symptoms, rashes.

4. Neurology—headache (meningitis, cerebral abscess).

5. Genitourinary system—history of renal disease or infection, dysuria.

6. Respiratory system—old tuberculosis (TB) or recent TB contact, chest symptoms.

Details of any recent overseas travel are important. Find out also about hobbies and exposure to pets. Occupational exposure may be important. Take a drug history. Find out if the patient is involved in behaviour posing a risk of HIV infection. Patients who are already in hospital may have infected cannulas or old cannula sites.

Fever due to bacteraemia (the presence of organisms in the bloodstream) is associated with a higher risk of mortality. It is present in up to 20% of hospital patients with fever.[5] Certain clinical findings modestly increase the likelihood of the presence of bacteraemia (*Good signs guide*

16.1).

GOOD SIGNS GUIDE 16.1 Clinical findings and bacteraemia

Risk factors	Likelihood ratio if	
	Present	Absent
Age > 50	1.4	0.3
Temperature >38.5	1.2	NS
Rigors	1.8	NS
Tachycardia	1.2	NS
Respiratory rate >20	NS	NS
Hypotension	2.0	NS
Chronic kidney disease	4.6	0.8
Hospitalisation for trauma	3.0	NS
Terminal disease	2.7	NS
Indwelling urinary catheter	2.4	NS
Central venous catheter	2.0	NS
'Toxic appearance'	NS	NS

From McGee S, Evidence-based physical diagnosis, 2nd edn. St Louis: Saunders, 2007.

Examination

General

Look at the temperature chart to see whether there is a pattern of fever that is identifiable. Inspect the patient and decide how seriously ill he or she appears. Look for evidence of weight loss (indicating a chronic illness). Note any skin rash (Table 16.2). The details of the examination required will depend on the patient's history.

TABLE 16.2 Differential diagnosis of prolonged fever and rash

1 Viral: e.g. infectious mononucleosis, rubella, dengue fever

1 Viral: e.g. infectious mononucleosis, rubella, dengue fever
2 Bacterial: e.g. syphilis, Lyme disease
3 Non-infective: e.g. drugs, systemic lupus erythematosus, erythema multiforme (which may also be related to an underlying infection)

Hands

Look for the stigmata of infective endocarditis or vasculitic changes. Note whether there is clubbing. The presence of arthropathy or Raynaud's phenomenon may point to a connective tissue disease.

Arms

Inspect for drug injection sites suggesting intravenous drug abuse (see Figure 4.41). Feel for the epitrochlear and axillary nodes (e.g. lymphoma, other malignancy, sarcoidosis, focal infections).

Head and neck

Feel the *temporal arteries* (over the temples). In temporal arteritis these may be tender and thickened.

Examine the *eyes* for iritis or conjunctivitis (connective tissue disease—e.g. Reiter's syndrome) or jaundice (e.g. ascending cholangitis, blackwater fever in malaria). Look in the fundi for choroidal tubercles in miliary tuberculosis, Roth's spots in infective endocarditis, and retinal haemorrhages or the infiltrates of leukaemia or lymphoma.

Inspect the *face* for a butterfly rash (systemic lupus erythematosus, see Figure 9.61, page 284) or seborrhoeic dermatitis, which is common in patients with HIV infection.

Examine the *mouth* for ulcers, gum disease or candidiasis, and the teeth and tonsils for infection (e.g. abscess). Look in the *ears* for otitis media. Feel the *parotid glands* for evidence of infection.

Palpate the cervical lymph nodes. Examine for thyroid enlargement and tenderness (subacute thyroiditis).

Chest

Examine the chest. Palpate for bony tenderness. Carefully examine the respiratory system (e.g. for signs of pneumonia, tuberculosis, empyema, carcinoma) and the heart for murmurs (e.g. infective endocarditis, atrial myxoma) or rubs (e.g. pericarditis).

The abdomen

Examine the abdomen. Inspect for rashes, including rose-coloured spots (in typhoid fever—2- to 4-mm flat red spots, which blanch on pressure and occur on the upper abdomen and lower chest). Examine for evidence of hepatomegaly and ascites (e.g. spontaneous bacterial peritonitis, hepatic carcinoma, metastatic deposits), splenomegaly (e.g. haemopoietic malignancy, infective endocarditis, malaria), renal enlargement (e.g. renal cell carcinoma) or localised tenderness (e.g. collection of pus). Palpate for testicular enlargement (e.g. seminoma, tuberculosis). Feel for inguinal lymphadenopathy.

Perform a rectal examination, feeling for a mass or tenderness in the rectum or pelvis (e.g. abscess, carcinoma, prostatitis). Sigmoidoscopy should also be performed for evidence of inflammatory bowel disease or carcinoma. Perform a vaginal examination to detect collections of pelvic pus or evidence of pelvic inflammatory disease. Look at the penis and scrotum for a discharge or rash.

Central nervous system

Examine the central nervous system for signs of meningism (e.g. chronic tuberculous meningitis, cryptococcal meningitis) or focal neurological signs (e.g. brain abscess, mononeuritis multiplex in polyarteritis nodosa).

HIV infection and the acquired immunodeficiency syndrome (AIDS)

This syndrome, first described in 1981, is caused by the human immunodeficiency virus (HIV).[6,7] This is a T-cell lymphotrophic virus, which results in T4 cell destruction and therefore susceptibility to opportunistic infections and the development of tumours, notably Kaposi's sarcoma[a] and non-Hodgkin's lymphoma.

HIV infection should be suspected particularly if the patient falls into a high-risk group (e.g. male homosexual, intravenous drug abuser, sexual tourist, sexual partner of HIV-infected person, haemophiliac, blood

transfusion or blood product recipient, prostitute, or sexual contact with one of these). Examine the patient as follows.

Examination

General inspection

Take the temperature. The patient may appear ill and wasted due to chronic ill-health or chronic opportunistic infection. *Mycobacterium avium* complex (MAC) presents with fever and weight loss.

Look at the skin for rashes:

- The maculopapular rash of acute HIV infection (5- to 10-mm maculopapular lesions on the face and trunk and rarely on the palms and soles).

- Herpes zoster (shingles, which may involve more than one dermatome in this disease and is more commonly seen in early rather than in advanced HIV infection).

- Oral herpes simplex (cold sores) or genital herpes (20%).

- Oral and flexural candidiasis (once the CD4 level is below 200/mm^3).

- Molluscum contagiosum (10%), impetigo, seborrhoea (occurs in up to 80% of patients at some time) or other non-specific exanthems.

- Kaposi's sarcoma: red-purple vascular non-tender tumours. These present typically on the skin but can occur anywhere.

- Skin lesions resembling Kaposi's sarcoma may also be seen. These are called bacillary angiomatosis and are caused by *Bartonella henselae* and *Bartonella quintana* (Figures 16.1 and 16.2).

Figure 16.1 Angry red nodule of bacillary angiomatosis

Figure 16.2 Late nodules of Kaposi's sarcoma

Adverse drug reactions are more common in patients with HIV infection and may be the cause of a rash. Look for hyperpigmentation. Patients taking the drug clofamizine for MAC infection usually become deeply pigmented. Areas of peripheral fat atrophy—lipodystrophy— on limbs, cheeks and buttocks may be seen in 20%–30% of patients treated with the protease inhibitor drugs. Some of these patients have fat redistribution with central obesity.

Hands and arms

Look for nail changes including onycholysis. Feel for the epitrochlear nodes; a node 0.5 cm or larger may be characteristic.[8] Note any injection marks.

Face

Inspect the mouth for:

- candidal plaques

• angular stomatitis

• aphthous ulcers

• tongue ulceration (e.g. herpes simplex, cytomegalovirus or candidal infections) or gingivitis.[9]

Periodontal disease is very common. Kaposi's sarcoma (Figures 16.3 and 16.4) may also occur on the hard or soft palate (in which case associated lesions are almost always present elsewhere in the gastrointestinal tract). Oral squamous cell carcinoma and non-Hodgkin's lymphoma are more common in AIDS.

Figure 16.3 Kaposi's sarcoma

From McDonald FS, ed., Mayo Clinic images in internal medicine, with permission. ©Mayo Clinic Scientific Press and CRC Press.

Figure 16.4 Oral candidiasis

Parotidomegaly is sometimes seen as a result of HIV-associated Sjögren's syndrome. These patients may have dry eyes and mouth for this reason.

Hairy leucoplakia is a unique raised or flat, white, painless, and often hairy-looking lesion typically present on the lateral surface of the tongue; it is caused by Epstein-Barr virus infection in HIV-infected persons and is almost diagnostic of HIV infection.

Palpate over the sinuses for tenderness (sinusitis). Examine the cervical and axillary nodes. There may be generalised lymphadenopathy, and all lymph node groups should be examined.

Chest

Note any tachypnoea or dry cough. Chronic cough, either dry or productive of purulent sputum, is common. On auscultation crackles may be present at the bases due to bronchiolitis obliterans. There are often, however, no chest signs despite the presence of pulmonary infiltrates on chest X-ray due to *Pneumocystis jiroveci* (formerly *carinii*) or other opportunistic infections.

Abdomen

Examine for hepatosplenomegaly (e.g. infection, lymphoma). Perform a rectal examination (e.g. perianal ulceration from herpes simplex) and a sigmoidoscopy looking for Kaposi's sarcoma or proctitis (e.g. cytomegalovirus, herpes simplex, amoebic dysentery or pseudomembranous colitis from antibiotic use). Examine the genitals for herpes simplex, warts, discharge or chancre.

Nervous system

Look for signs of meningism (e.g. cryptococcal meningitis). There may be focal signs due to a space-occupying intracranial lesion (e.g. toxoplasmosis, non-Hodgkin's lymphoma).

A syndrome similar to Guillain-Barré and a pure sensory neuropathy can occur. HIV infection itself, opportunistic infection or the drugs used in treatment can be responsible for peripheral sensorimotor neuropathy, polymyositis, radiculopathy, mononeuritis multiplex or a myelopathy.

Look in the fundi for cottonwool spots (common in AIDS patients), scars (e.g. toxoplasmosis—Figure 16.5) or retinitis (e.g. cytomegalovirus-induced retinitis with perivascular haemorrhages and fluffy exudates, which can cause blindness of rapid onset—Figure 16.6).[10] There may be signs of dementia (AIDS encephalopathy).

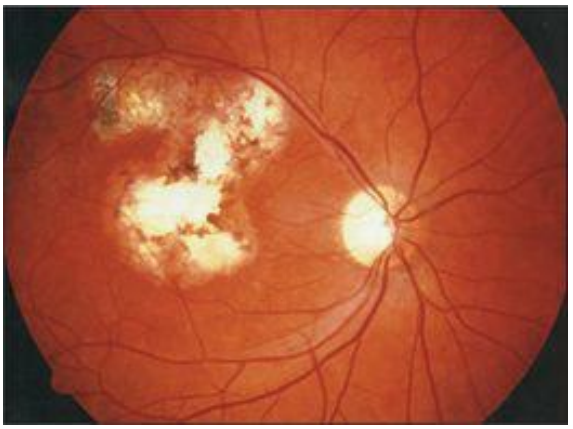

Figure 16.5 Retinal toxoplasmosis—old chorioretinal scar

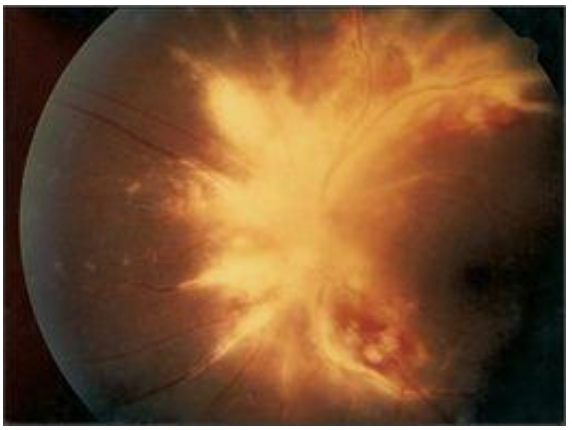

Figure 16.6 Cytomegalovirus retinitis

References

1. Knockaert DC, Vanneste LJ, Vanneste SB, Bobbaers HJ. Fever of unknown origin in the 1980s. An update of the diagnostic spectrum. *Arch Intern Med*. 1992;152:51-55.

2. Whitby M. The febrile patient. *Aust Fam Phys*. 1993;22:1753-1755. 1758–1761

3. Arbo M, et al. Fever of nosocomial origin: etiology, risk factors and outcomes. *Am J Med*. 1993;95:505-515.

4. Mourad O, Palda V, Detsky AS. A comprehensive evidence based approach to fever of

unknown origin. *Arch Intern Med*. 2003;163:545.

5. Bates DW, Cook EF, Goldman L, et al. Predicting bacteremia in hospitalized patients: A prospectively validated model. *Ann Intern Med*. 1990;113:495-500.

6. American College of Physicians and Infectious Diseases Society of America. Human immunodeficiency virus (HIV) infection. *Ann Intern Med*. 1994;120:310-319.

7. Nandwani R. Human immunodeficiency virus medicine for the MRCP short cases. *Br J Hosp Med*. 1994;51:353-356.

8. Malin A, Ternouth I, Sarbah S. Epitrochlear nodes as marker of HIV disease in sub-Saharan Africa. *BMJ*. 1994;309:1550-1551.

9. Weinert ML, Grimes RM, Lynch DP. Oral manifestations of HIV infection. *Ann Intern Med*. 1996;125:485-496. Details the 16 leading oral complications, based on an extensive literature review

10. De Smet MD, Nessenbatt RB. Ocular manifestations of AIDS. *JAMA*. 1991;266:3019-3022. Provides a very good review of eye changes

Suggested reading

Edmond RTD, Rowlard HAK. *A color atlas of infectious diseases*, 4th edn. Mosby; 2003.

[a] Moritz Kohn Kaposi (1837–1902), professor of dermatology, Vienna, described the sarcoma in 1892.

Appendix I

Writing and presenting the history and physical examination

> Experience is never limited, and it is never complete.
> *Henry James*

It is important that the medical record be kept short and simple, yet complete. The following approach is one recommended by the authors. The detail of the history and examination and its record varies of course,

depending on whether this is a first visit and on the complexity of the presenting problem. It is not necessary to ask every patient every question.

History

Personal information

Record the name, sex, date of birth and address. Write down the date and time of the examination.

Presenting (principal) symptoms (PS)

A short sentence identifies the *major* symptoms and their duration; it is often useful to quote the patient's own words.

History of present illness (HPI)

Don't record every detail; rather, prepare short prose paragraphs telling the story of the illness in chronological order. Describe the characteristics of each symptom. Note why the patient presents at this time. Also, describe any past medical problems which are related to the current symptoms. Include the relevant positive and negative findings on the system review here. If there are many seemingly unrelated problems, summarise these in an introductory paragraph and present the history of each problem in separate paragraphs.

List **current medications** and doses and the indications for their use, if they are known, and any side-effects or known or measured therapeutic effects. For example, if the patient. takes anti-hypertensive drugs ask whether blood pressure control has been satisfactory as far as the patient knows. Finally, record your impression of the reliability of the information and, if the patient was unable to give the history, describe who was the source.

Past history (PH)

List in chronological order past medical or surgical problems (sometimes called *inactive* problems), past medication use, if relevant, and any history of allergy (particularly drug allergy) or of drug intolerance. Find out exactly what the problem with the drug was. The patient may know the results of certain previous important investigations (e.g. 'the scan showed I had clots in my lung'). A history of blood transfusions should be noted.

Social history (SH)

This may include recording the patient's occupation, schooling, hobbies, marital status, family structure, personal support system, living conditions and recent travel. The number and sex of sexual partners may be relevant. Analgesic use, smoking, alcohol and any recreational drug use should also be described. Ask about ability to perform the activities of daily living (ADL). If a patient has a chronic illness, ask about the effect of this on his or her life.

Family history (FH)

Describe causes of mortality in the first-degree relatives and, if indicated, draw a family tree.

Systems review (SR)

All directly relevant information should be incorporated in the HPI or PH.

Physical examination (PE)

Under each of the major systems, list the relevant positives and negatives using brief statements. See Appendix II.

Provisional diagnosis

Ask yourself these questions when considering the differential diagnosis of a patient's major symptoms.

1. What is the likely diagnosis based on the patient's age, sex and background?

2. Are there other conditions that resemble the likely diagnosis but can present in the same way?

3. Is there a serious disorder, even if rare, that must not be missed?

4. Could the patient have a specific condition that often masquerades as (or mimics) other conditions (e.g. depression, drugs, diabetes mellitus, thyroid dysfunction, anaemia, malignancy, spinal cord disease, urinary infection, renal failure, alcoholism, syphilis, tuberculosis, HIV, infective endocarditis or connective tissue disease)?

5. Is the patient trying to really tell me that there is an emotional or psychological problem?

Problem list and plans

Using a sentence or two, summarise the most important findings and then give a provisional diagnosis (PD) and differential diagnosis (DD).

Remember Occam's razor: choose the simplest hypothesis to explain observations. Also remember Sutton's law: the famous bank robber said he robbed banks because 'that's where the money is'—i.e. consider a common diagnosis before resorting to a rare one to explain the symptoms and signs.

It is often useful to ask yourself if the patient's problem is a diagnostic or management one (or both). For example, a patient with the new onset of dyspnoea presents a diagnostic problem—What is the cause of the breathlessness?; and a management problem—How should the condition be treated? The patient who presents with a worsening of previously diagnosed angina presents a management problem—How should the symptoms be treated?

List all the active problems that require management. Outline the diagnostic tests and therapy planned for each problem.

Sign your name and then put your name and position underneath.

Continuation notes

Date (and time) each progress note in the record. The SOAP format can be useful (***s****ubjective*, ***o****bjective*, ***a****ssessment* and ***p****lans*).

Subjective data refer to what the patient tells you; list relevant current problems and note any new problems. Have the patient's previous symptoms improved on the current treatment?

Objective data are physical or laboratory findings; relevant data for each active problem are summarised.

Assessment refers to the interpretation of any relevant findings for each problem.

Plans describe any interventions that will be started for each problem.

Many patient records are now kept in a computer file. Parts of this can be used to provide referral information for the patient to take to a specialist or if he or she is travelling. It is important that such files be kept up to date and especially that lists of medications that are no longer used are deleted from the current list before it is given to the patient.

Presentation

In their formal examinations and less formally on the wards, students and resident medical officers will often be expected to present the history and physical examination of a patient to an examiner or senior colleague. This is excellent training for clinical practice, as the need to discuss patients with colleagues or specialists arises frequently in both hospital and non-hospital practice.

A successful case presentation is both *succinct* and *relevant*. The examiner is most interested in what the patient's problems are now. One should aim to convey basic biographical information and an assessment of the patient's presenting problem in the first few sentences. It is often helpful to present the case as a diagnostic or management problem, or both.

The information will have been obtained from the patient by taking the history as set out above. The examination of the patient should be performed with particular attention to the areas most likely to be abnormal. This information must then be assembled into a form that can easily be conveyed to others. The following is a suggested method.

1. Begin with a sentence that tells your colleague something about the patient and the clinical problem. For example, one might say 'Mr Jones is a 72-year-old retired cabinet minister who presents with two hours of chest pain which is not typically ischaemic'. This gives an idea about the patient himself and indicates that the problem is likely to be a diagnostic one.

2. One should then go on to explain in what way the pain is atypical of ischaemia and whether it has features suggestive of any other diagnosis.

3. Once the presenting symptom or problem has been described, relevant past history should be discussed. In a patient with chest pain this would include any previous cardiac history or investigations, and a summary of the patient's risk factors for ischaemic heart disease.

4. Present a list of the patient's current medications.

5. Important previous health problems should be outlined briefly. This retired cabinet minister might also have a history of intermittent claudication and of chronic obstructive pulmonary disease. These facts will affect possible treatment for ischaemic heart disease, e.g. the use of beta-blockers.

6. Present the physical examination in two parts.
   (a) Abnormal and *important* normal examination findings in the presenting system. In this patient's case this would mean giving the pulse rate and blood pressure but not details of normal heart sounds. If there was a history of claudication, the examination of the peripheral pulses should be presented even if it is normal.
   (b) Abnormal findings in the rest of the examination.

7. Offer the most likely diagnosis and the differential diagnosis.

8. Suggest a plan for investigation and treatment.

8. Suggest a plan for investigation and treatment.

9. Much more detail will have been obtained in the assessment of the patient than should be presented routinely, but further details may be asked for by your colleague. These may include information about the patient's living conditions and the availability of support from the family. This may determine how soon the patient can be sent home from hospital after treatment.

By the end of your presentation your colleague should know what you think is wrong with the patient and what you intend to do about it.

Suggested reading

Kroenke K. The case presentation: stumbling blocks and stepping stones. *Am J Med.* 1985;79:605-608.

Appendix II

A suggested method for a rapid screening physical examination

> To all students of medicine who listen, look, touch and reflect: may they hear, see, feel and comprehend.
> *John B Barlow (1986)*

Begin by positioning the appropriately undressed patient in bed at 45 degrees. Use this opportunity to make a spot diagnosis if this is possible. Look particularly for any of the diagnostic facies or body habituses. Decide also whether the patient looks ill or well. Note if there is any dyspnoea or other distress. Take the blood pressure. Repeat the measurement a few minutes later if the first reading is high.

Key to Appendix II	
CNS	central (and peripheral) nervous system
CVS	cardiovascular system
ENDO	endocrine system
GIT	gastrointestinal system
HAEM	haematological system
INF	infectious diseases
RENAL	renal system
RESP	respiratory system
RHEUM	rheumatological system

The hands and arms

Begin by picking up the patient's right hand and examine the nails for clubbing (RESP, CVS, GIT) and for the stigmata of infective endocarditis (CVS) or chronic liver disease (GIT) (Figure A1). The nail changes suggesting chronic renal disease or iron deficiency must also be spotted (RENAL, HAEM). Note any evidence of arthropathy (RHEUM). Examine the other hand.

Figure A1 The detailed examination of most of the body systems begins with the hands of the patient

Take the patient's pulse, and note the rate and regularity or irregularity (CVS). While this is being done the arms can be inspected for bruising or scratch marks (GIT, HAEM, RENAL). Determine the state of hydration (GIT, RENAL, CVS). Then examine for axillary lymphadenopathy (HAEM).

The face

Look at the eyes for jaundice (GIT, HAEM) or exophthalmos (ENDO). Look at the face for evidence of a vasculitic rash (RHEUM). Inspect the mouth for mucosal ulcers (RHEUM, GIT, HAEM, INF) and the tongue for glossitis (nutritional deficiencies) or cyanosis (RESP, CVS).

The front of the neck

Feel the carotid pulses and pay careful attention to the state of the jugular venous pressure (CVS). Feel gently for the position of the trachea (RESP). Then palpate the supraclavicular lymph nodes (HAEM, GIT).

The chest

Examine the front of the chest for scars and deformity. Note any spider naevi (GIT) or hair loss (GIT, ENDO). Palpate the chest wall and auscultate the heart (CVS). Then percuss and auscultate the chest (RESP) and examine the breasts.

The back of the chest and neck

Sit the patient up and lean him or her forward. After inspection, test chest

expansion of the upper and lower lobes of the lungs. Percuss and auscultate the back of the chest (RESP). Feel for cervical lymphadenopathy (RESP, GIT, HAEM). Then examine formally for a goitre from behind (ENDO). Test for sacral oedema (CVS, RENAL).

The abdomen

Lay the patient flat on one pillow. Inspect the abdomen from the side and then palpate for organomegaly and other abdominal masses. Percuss for shifting dullness if this is appropriate and auscultate over the abdomen. Palpate for inguinal lymphadenopathy and hernias, and in men palpate the testes (GIT, RENAL).

The legs

Look for peripheral oedema (CVS, RENAL) and leg ulcers (HAEM, RHEUM, CVS, CNS). Feel all the peripheral pulses (CVS).

Neurological examination

Find out if the patient is right- or left-handed.

Begin with examination of the higher centres and cranial nerves. Test orientation and note any speech defect. Ask about any noticed problem with the sense of smell (I). Then examine the visual acuity, visual fields, the fundi (II), the pupils and eye movements (III, IV, VI). Screen for the other cranial nerves by testing pain sensation over the face (V), the strength of upper and lower facial muscles (VII), whispered voice hearing (VIII), the palatal movement ('Ah') (IX, X), poking out the tongue (XII), and rotation of the head (XI).

Next look for wasting and fasciculation in the upper limbs. Test tone, power (shoulders, elbows, wrists and fingers), and the biceps, triceps and brachioradialis reflexes. Assess finger–nose movements. Then test pinprick sensation on the tip of the shoulder, outer and inner forearms, and on the median, ulnar and radial areas of the hands.

Go to the lower limbs. Test gait fully: ask the patient to walk away several paces, turn around rapidly and walk back. Then test heel–toe walking (cerebellum), ability to stand on the toes (S1) and heels (L4, L5), and squatting (proximal muscles). Finally look for Romberg's sign (posterior columns). Next, test hip and knee flexion and extension, and dorsiflexion and plantar flexion of the feet in bed. Then do knee, ankle and plantar reflexes,

and heel–shin tests. Test pinprick sensation on the middle third of the thighs, both sides of the tibia, the dorsum of the feet, the little toes, on the buttocks, and three levels on the trunk on both sides.

Completing the examination

Thorough physical examination always requires a rectal and pelvic examination, analysis of the patient's urine, a temperature reading, and measurement of height and weight and calculation of the BMI.

Particular details of the examination will be altered depending on what is found. An important guide to the areas where examination should be particularly directed, apart from the history, is the general inspection. A minute or two spent standing back to inspect the patient before the detailed examination begins is never wasted.

Appendix III

The pre-anaesthetic medical evaluation (PAME)

An appropriate medical evaluation of the patient who has been admitted for elective surgery is always required. It includes a history and examination which is sufficient to uncover any likely major problems with anaesthesia or the procedure itself.

The history

The first thing to find out, of course, is the presenting problem, what operation is intended, and whether the surgery is expected to be performed under general or local anaesthesia. Clearly the assessment of a patient having a small lesion removed under local anaesthesia can be briefer than the assessment of a patient undergoing extensive bowel resection under general anaesthesia. As a rule, before any patient undergoes surgery under general anaesthesia or spinal anaesthesia, careful attention must be given to identifying whether he or she is at higher risk.

Cardiovascular history

The most important questions here relate to a history of ischaemic heart disease. Patients who have had a myocardial infarct in the preceding six months should not usually undergo elective surgery; the risks of further

infarction or malignant arrhythmia and death are high during this period. A patient who has symptoms of angina which have recently become unstable is also at greater risk. A history of stable angina which has not changed for months or years is not a contraindication to most forms of surgery. The recent placement of a coronary stent may mean that cessation of anti-platelet drugs is not safe for 1 month after insertion of a bare metal stent and 1 year after the insertion of a drug-eluting stent.

Symptoms of cardiac failure should be sought. Any patient with uncontrolled cardiac failure is at considerable risk of severe cardiac failure postoperatively. This is particularly true if large amounts of intravenous fluids are given during and after surgery while the patient's anti-failure drugs (e.g. diuretics) are omitted.

Cardiac drugs should be asked about, particularly anti-anginal and anti-failure drugs. It is important to attempt to ensure that the patient receives these drugs, particularly beta-blockers, on the day of the operation. The surgeon will often require the patient to stop aspirin a week or more before surgery. This is usually a safe thing for the patient to do but may be a problem in the first month at least after a coronary angioplasty because of the risk of thrombosis of the stent in this early period. Previous coronary artery bypass grafting or angioplasty is not a contraindication to surgery.

A history of infective endocarditis or the presence of a prosthetic cardiac valve or complex congenital cardiac condition is an indication for antibiotic prophylaxis for any procedure that may result in bacteraemia – the circulation of bacteria in the blood stream. These procedures include most types of dental work, colonoscopy and surgery on the bowel or bladder, and some gynaecological operations and vaginal delivery.

Patients who take the anticoagulant drug warfarin are a special problem. When the drug is being used to protect the patient from embolic events associated with atrial fibrillation it may be reasonable, on the balance of risks, to have the drug stopped 4 days before surgery and resumed as soon as practical afterwards. If the patient takes the drug to protect a mechanical heart valve from clot, the drug should, in general, be replaced by intravenous unfractionated or subcutaneous fractionated heparin. The last dose of fractionated heparin can be given about 12 hours before surgery and the drug recommenced as soon as the surgeon feels it is safe. Many patients can administer the drug themselves at home. Patients with mechanical valves, especially in the mitral position, are at high risk of embolic events if their warfarin is stopped without replacement with some form of heparin.

The presence of a cardiac pacemaker or implanted defibrillator may be a problem if the surgeon intends to use a diathermy device.

The respiratory history

Inquire about a history of respiratory disease, particularly chronic obstructive pulmonary disease or severe asthma. Patients who have continued to smoke up to the time of their surgery have a much higher risk of postoperative chest infections than those who have not. Even stopping a few weeks before will reduce this risk. Severe respiratory disease is a relative contraindication to surgery. It may be difficult to reverse the anaesthetic and muscle relaxant drugs in such a patient, and he or she may require ventilation postoperatively. Doctors in charge of intensive care units are always happier to be warned that a patient may require ventilation postoperatively than to have it come as a surprise.

Drug therapy for respiratory disease must be asked about. Steroids may impair wound healing, and steroid doses may need to be increased during the operative period because of steroid-induced adrenal suppression.

Other

Inquire about any history of bleeding diathesis, diabetes mellitus, renal disease, hepatitis, jaundice and drug abuse. The control of blood sugar in diabetic patients can be difficult in the perioperative period, especially while normal diet is impossible. The fasting preoperative diabetic on insulin may need to be advised to have half the normal insulin dose on the morning of surgery, possibly with a very early light breakfast. This may be important to avoid ketoacidosis.

Specific inquiries about *previous operations and anaesthetics*, particularly with reference to any complications, should be made. *Allergies* to anaesthetic agents or other drugs must be asked about. Attempt to distinguish a true allergy or anaphylaxis from an adverse effect such as vomiting after a morphine injection. Some operations involve the use of contrast media, and an allergy to iodine may be a contraindication to their use. This risk is now much less with the new non-ionic contrast media. There may occasionally be a *family history of anaesthetic complications* or deaths. This raises the possibility of malignant hyperthermia, which is an inherited disorder leading to fever and muscle destruction after administration of muscle relaxants.

The examination

Examination according to the rapid screening method outlined in Appendix II represents the best approach. Record height, weight and vital signs (pulse rate, blood pressure, respiratory rate). The cardiovascular and respiratory

rate, blood pressure, respiratory rate). The cardiovascular and respiratory systems must be fully examined. Patients with a short thick neck may be difficult to ventilate and intubate. It is better for the anaesthetist to be aware of this possible problem before the patient is given a muscle relaxant and is unable to breath spontaneously. The presence of loose or fragile teeth must also be noted because of the risk of their dislodgement during attempted intubation.

If a previously undiagnosed symptom or sign of significance is uncovered, some further investigations may be required before surgery, and the operation may have to be deferred. For example, the discovery of a new and significant heart murmur, uncontrolled hypertension, respiratory failure, a bleeding diathesis, uncontrolled diabetes mellitus or renal failure should be brought to the attention of the surgeon and anaesthetist.

> Now this is not the end.
> It is not even the beginning of the end.
> But it is, perhaps, the end of the beginning.
> *Winston Churchill,*
> *Speech at the Lord Mayor's Day Luncheon,*
> *London, 10 November 1942*

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