

1 The background to surgery

You have just arrived at your hospital and have not yet unpacked, when the ambulance arrives with a note from sister to say that there is a patient with a strangulated hernia waiting for you. You have never done one, because the registrar when you did your internship wanted to do as much operating as he could himself. So you mostly assisted and were occasionally allowed to sew up the skin. All your seniors have left and have gone into private practice, so there is nobody to help you. If you refer this patient, he will die on the way.

These manuals are dedicated to you. This personal reminiscence was contributed by Dr Michael Migue of AMREF, as describing the scene for which these manuals are needed.

1.1 The unmet need for surgical care

Surgically treatable diseases are not as important as the great killers of small children in the developing world—malnutrition, pneumonia, and diarrhoea. However, surveys from the rural areas of Bangladesh, from India and from urban South America indicate that 10% of all deaths, and almost 20% of deaths in young adults are the result of conditions that would be amenable to surgery in the industrial world. If even very simple surgical services were available two-thirds or more of these deaths would not have occurred. One study showed that for every person who died of an accident in the Punjab, there were eight who were permanently disabled.

A study in East Africa estimated that, per 100 000 of the population; 225 mothers needed a Caesarean section, yet only 25 got one, 175 inguinal hernias needed repair each year, but that only 25 were repaired; 30 patients needed operations for strangulation, yet only 4 had them. Since a strangulated hernia is almost always fatal unless it is treated, this is a mortality of nearly 90%. These are just two examples, one from India, and one from Africa, of the surgery that needs doing and is not done. All this unmet need means that there are many unnecessary deaths in remote villages from strangulated hernias and obstetric disasters, as well as from vesicovaginal fistulae and from cerebral injuries at birth. They illustrate the fact that district hospitals can only care for a fraction of the burden of surgical disease in the communities around them. The result is that millions of people, whom surgery might help, it does not help. Too many people still die from obstructed gut, or are disabled by untreated osteomyelitis, or burns contractures—much as they were in the industrial world a hundred years ago.

Once services are available to prevent the killing diseases of childhood, the simple surgical services described here should surely have the next priority. They can do much to improve the quality of life of the poor. Although much of this manual has a rural orientation, 44% of the people of the developing world are expected to be living in towns by the year 2000, so the surgical care of the urban poor will be almost equally important.

Surgery has an importance in the public mind that medicine does not have. It is also the most technically demanding of the tasks of a district hospital doctor, and is thus a good measure of the quality of his medical education. If this has not been adequate, either because it never was adequate in his medical school, or because the quality of its teaching has fallen, he will be very loath to do much surgery, and may do none. This is why some district hospitals, and many district hospitals in some entire countries, do little surgery. When this happens, patients soon realize that it is no use going to such hospitals, with the result that they soon have empty beds. So if you see a hospital with

empty beds, one of the first questions to ask yourself is "What is the quality of the surgery here?" There is thus a qualitative aspect to the unmet need for surgical care as well as a quantitative one.

The constraints on the provision of surgical care are formidable. Here is one very special centre of excellence expressing them: (Nevertheless, over the previous year it had been able to increase its average daily number of patients by 14%, and its major operations by 7%.)

CONSTRAINTS HEROICALLY OVERCOME "It is an anxious time. Costs are rising. The Ministry's manpower resources are scarce, making it well nigh impossible for them to take on the extra responsibility from the Church hospitals. The rural people are very anxious that the Churches continue their health work. It makes sense for both economic and humanitarian points of view. What of our Lord's call for compassion for the sick and identification with the poor? Where is the way forward?" 1981 Annual Report St Francis' Hospital, Katete Zambia.

1.2 The surgical scene

The countries of the third world and the surgical scene within them differ widely. Ethiopia and Brazil, for example, are about as different as two countries could be. Typically, the people of the developing world are poor, hungry, and rural, although they are rapidly migrating to the towns. The population of sub-Saharan Africa, whence these manuals come, is increasing at an inexorable 3% annually. Meanwhile its per capita food production and its already meagre gross national product are falling.

One feature developing countries do have in common. It is that most of the surgery that is done has to be done in their district hospitals. These typically have between 50 and 200 beds and are staffed by two to four doctors, assisted by nurses and auxiliaries. Fortunately, the 'one doctor hospital', which was common until recently, is now unusual. Each hospital serves about 150-250,000 people living in an area which may be as large as 3000 square miles.

Over the world as a whole these hospitals range from the excellent to the indescribable. At one end they provide care which anyone would be fortunate to have, at the other the few patients brave (or foolish) enough to enter them lie largely untended.

If you work in a hospital in the middle or at the lower end of this spectrum, expect to find your wards overcrowded, with more than one patient in a bed. 'Clean' and infected cases will not be separated, so that a patient with an open fracture may lie next to one with a perforated typhoid ulcer. Your maternity ward will be particularly overcrowded, and resist all your attempts to decongest it. Cultural reasons may make it impossible to restrict the number of visitors to the wards. Defects in their construction will make keeping them clean and tidy a major task. Your equipment will be limited and poorly serviced. When it does break down, it may take years to replace. Trees may be so scarce that your staff have to go a long way to collect firewood.

If your hospital is at sea level on the equator, expect to operate at 30°C in 95% humidity, your clothes wet, and everything which can go rusty or mouldy doing so. Only insects enjoy such conditions, and you will find plenty of them.

You may have to rely on locally trained staff with only primary education who find the idea of sterility almost incomprehensible. Most of them will experience considerable hardship, and be so poorly paid that they will have to grow the food they need.

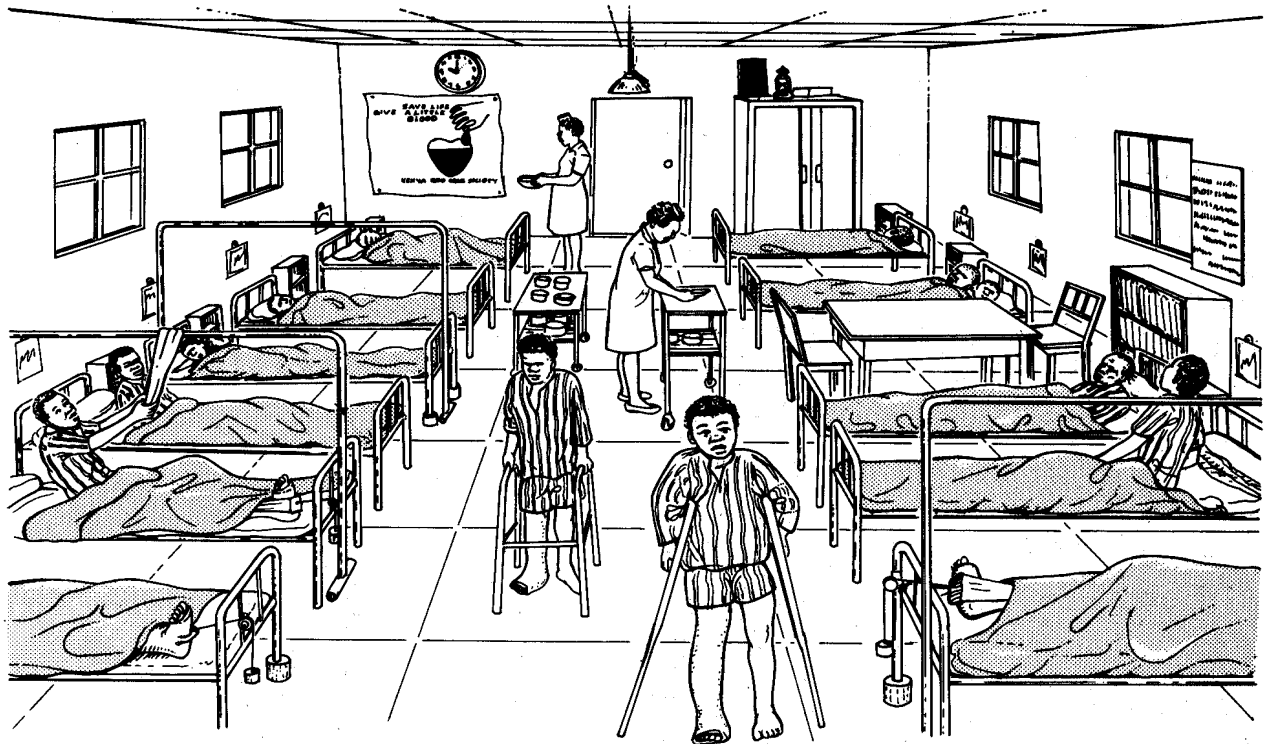


Fig 1-1: Surgical Scene in Africa: Ward 7 in Nyeri Provincial General Hospital. This is somewhat better than the average conditions for sub-Saharan Africa at the time of writing. Note the blood transfusion poster. You will see that there are several patients on traction, two with long leg casts, and that one of the beds contains two patients.

Their ability to monitor a patient postoperatively on the wards may be so poor that you may be forced to assume that, once a patient has left the theatre, he is on his own as far as recovery is concerned.

Your anaesthetic facilities will vary greatly. If you are lucky you will have two or three anaesthetic assistants, trained to do most of the methods in Primary Anaesthesia. Your laboratory facilities will be minimal. Although AIDS has recently made it much more dangerous in many areas, blood transfusion should always be possible - if you can put enough effort into organizing it. Often, relatives will give blood for a patient, but for nobody else. So be prepared to find everything - or nothing. On occasion expect to find no water, no steam, no gauze, no bandages, no catgut, no suxamethonium, no gloves (or only gloves with holes in them), no plaster, (or only plaster that does not set)... When you need the autoclave for a Caesarean section, expect that there may be no kerosene, and that the patient's relatives may have to go out to the market to buy it. When you go into the maternity ward late one night, don't be surprised if the last sphygmomanometer is missing. Try not to blame your staff too harshly, they may not be responsible-and even if they are, their families may be starving. If you do have electricity, be prepared for it to fail at 3 a.m., just when you are in the middle of a Caesarean section.

Even when you have your 'normal' supplies, you will not have solutions for parenteral nutrition, or plasma, and probably no dextran. Don't be tempted to imagine that the teaching hospital has everything: it too may be without water, spirit, or linen. One teaching hospital is said to have had no temperature charts for 10 years.

You may be cherished, supported, praised, and congratulated by your Ministry of Health, or you may not... You may be in a health service which is steadily improving, or in one which seems to be getting steadily worse, if that were possible. Expect that you may be cut off from the rest of the world for four

months of the year. On top of everything else, AIDS may now be endemic in your district... Finally, your greatest blow may be that your predecessor, who was promised that he would be posted to your hospital for only a short time, never ordered any stores, or planted any cabbages...

But you have great blessings. In coping with all this, in creating and caring and leading and serving, you will have done something that your colleagues in the more comfortable circumstances of private practice will never have done. You are an all-rounder, and have one of the last remaining opportunities to practise the totality of medicine, rather than some infinitesimal corner of it. Sub specie aeternitatis, in the mirror of eternity, you are a hero and will surely be recognized and remembered as such.

You will need: (1) A willingness to learn from the culture of your patients. This will enrich you greatly, whether you are a national from the urban elite or a foreigner, and will greatly increase their trust in you. (2) An almost pathological desire for hard work under conditions that are not conducive to it. (3) An unflinching ability to improvise and make the best of things. (4) The capacity to withstand prolonged periods of cultural isolation. If your morale is high, so soon will be that of your staff also. Your patients will be grateful for anything you can do for them, and they will not yet have learnt to litigate against you. If you serve your hospital and the community round it for a lifetime, you will earn a unique place in its affections.

Just to prepare you, here is the kind of thing you may have to cope with.

DIDIMALA (4 years) was severely burnt. You worked for hours to put up a reliable drip and took great care to ring up for a bed in the referral hospital. When you pass by the ward an hour or two later, you find that she has indeed been sent there by ambulance, but the drip has been left behind. You ask "Why was this?" To which you get the reply, "There was no hook in the ambulance".

MARIA (5 months) presented with intermittent vomiting and abdominal swelling and was diagnosed as having intussusception. Unfortunately, the first hospital she went to had run out of anaesthetic gases and so could not operate. Her mother had to take her through three states stopping at four hospitals before she found one which could anaesthetize her (A 18.1). LESSON (1) Anaesthesia is often the limiting factor in surgery. (2) There is no need to have to rely on a supply of nitrous oxide.



Fig. 1-2: AN INDIAN HOSPITAL SCENE. An improvised ward in a small hospital in Madhya Pradesh. Most patients are accompanied by members of their families or by friends. If they are away from their villages during the planting and harvesting season, they will go hungry. After GR Howard, with the kind permission of the Editor of *Tropical Doctor*.

1.3 Twenty surgeons in one

As a doctor in one of the hospitals we have just described, you are unlikely to be a fully qualified specialist surgeon with 5 to 8 years of postgraduate training. Instead, you will probably be a 'general duty medical officer' with one or two years of surgical experience or less. But somehow you have to care for the sick in all of the 20 specialist fields shown in the frontispiece, into which surgery has fragmented in recent years. The chance of your being able to refer patients to specialists is remote. There may be no maxillofacial surgeon, or hand surgeon, in the country, and if it is a small one, it may not even have a specialist anaesthetist. Even your own teaching hospital may lack the complete range of specialists. Nor, despite present training programs, is the situation in many countries likely to improve much in the near future. Even your nearest regional hospital may only have one or two general surgeons. But surgery will be only part of your work — you will also have to be a physician, and a paediatrician, and manage the district.

So you will have to do your best in all these fields simultaneously. To help you we have collected from among the armamentarium of diverse experts: (1) Their easier methods which you could use. Fortunately, many of them, despite the fact that

they are normally only part of an expert's expertise, are not too difficult. For example, the position of safety in a hand injury (75-8), or Lord's anal stretch (22-10), are within the competence of any doctor. (2) Those methods, either easy or difficult, which you will have to use to save a patient's life. (3) Those difficult, disability-preventing but non-urgent methods, for which you should refer a patient, but may not be able to, such as sequestrectomy for osteomyelitis (7.6).

Many countries do not even have enough general duty doctors to do all the surgery that needs doing, let alone specialists. Malawi, for example, has recognized that surgery may have to be done by specially trained medical assistants, and Tanzania has trained its AMOs (Assistant Medical Officers) to do emergency surgery. Here is the report of a surgeon (Dr Gunnar Isaksson) on visiting one such AMO trained by the programme at the KCMC (Kilimanjaro Christian Medical Centre) in Tanzania. We quote it to emphasize that, not only may surgery have to be done by non-specialists, but that it is, on occasions, excellently done by non-doctors.

REPORT ON AN AMO "How nice it was to see how well he was managing his tasks... he seemed to be well in control, and happily did various operations. He had done several Caesarean sections, two laparotomies for intussusceptions, some hydrocelectomies, and fracture reductions, etc. He was treating three cases of fractured femur with skeletal traction in a very satisfactory way. His management of burns did not give cause for criticism. He had not done a sufficient number of hernia operations to feel confident about them; so he had gathered some and we operated on five of them together, after which he now wants to go on doing them himself. To go to Kiomboi was an inspiration for the work with our AMO training program. Perhaps there is no AMO teaching program in your country, and yet you are hopelessly overworked. Could you train an auxiliary to do the simpler hernias, Caesarean sections and circumcisions?"

1.4 Your surgical work

Ten to fifteen per cent of your admissions will probably be surgical, but because operating is time consuming, and some patients remain in bed for a long time, surgery may take 30% of your time, and fill half your beds. How much you will do will depend on how good you are at it. Patients will travel hundreds of kilometres to a doctor with a good surgical reputation. A bad one will soon do little surgery. Look carefully at the ages and sexes of the patients in your wards. When modern medicine first reaches a community, the first patients to present are the men, followed by the women and children. Only when medicine is well established, will you see a proportionate number of older women. If you don't find them in your wards, medicine has not reached this stage in your community. You will see few hypochondriacs, and there will be comparatively few repeat visits to the outpatient department because travel is so difficult.

You will see many of the diseases that are common in the industrial world, but in different proportions, a major difference being that so many of them present late (1.5). 'Western diseases' such as appendicitis, diverticulitis, carcinoma of the colon, haemorrhoids, and varicose veins are rare. Urethral strictures, tubal infections, fibroids and hernias are common, so are some diseases that are almost extinct in the industrial world — osteomyelitis, for example. You will probably see amoebiasis and tuberculosis of the chest, lymph nodes, abdomen, and bones. But you will seldom see carcinoma of the colon, or the thromboembolic complications of surgery that are so common in Europe; you will probably never see diverticulitis. No branch of surgery will differ more starkly from that in the industrial world than orthopaedics, where the cases you see, particularly those with

Some of your Patients

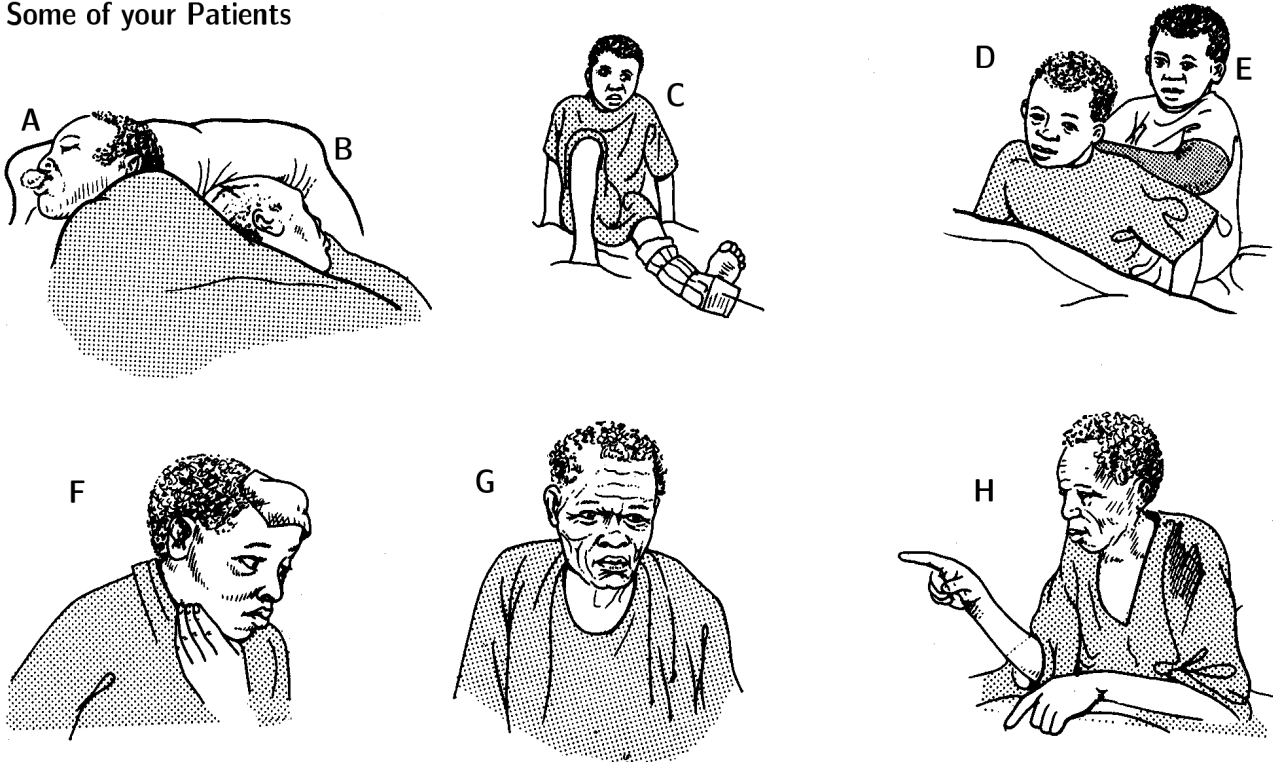


Fig. 1-3: *SOME OF YOUR PATIENTS.* Here are a random collection of patients who were in the ward when Fig. 1 was drawn. Patients A, and B are sharing the same bed. They are admitted at nearly the same time with head injuries, having both fallen off different motor cycles, neither wearing helmets. Child C, has Perthes' disease. Child D, broke his femur in the playground at school, and child E, has his fractured forearm in a cast. Patient F, was assaulted. Patient G, a very old man, fell and fractured the neck of his femur. Patient H, is to have his prostate removed. We have described the care of all of them. Note also the prevalence of trauma, both from the roads and assault, and the geriatric complaints of patients G, and H.

polio contractures, will not have been seen in Europe for thirty years.

You will have to do many kinds of operation. For example, of nearly a thousand patients operated on at Nanyuki district hospital in Kenya, 175 different diagnoses were recorded in the theatre book. Of the patients needing general anaesthesia, only tubal ligations, the evacuation of inevitable abortions, and Caesarean sections came to more than 10% of the whole. Excluding tubal ligations, only about 5% of patients needed a laparotomy. About half the total were obstetric or gynaecological cases of some kind, about 15% were fractures and dislocations, and about 8% a variety of abscesses that needed to be opened under general anaesthesia.

Three-quarters of the bony injuries you will see are likely to be dislocations of the shoulder and elbow, supracondylar fractures in children, extension fractures of the wrist, and fractures of the radius and ulna, or tibia and fibula. All other bony injuries combined will only form the other quarter. Many will be the result of road accidents.

The cases you would like to refer - if you can - will be even more varied. A consecutive list of referrals from Nanyuki were an anaplastic carcinoma for radiotherapy, gas gangrene of the buttock in a diabetic, a brachial plexus injury in a patient with a head injury, rape causing a third degree tear in a girl of 8, and a patient with carcinoma of the stomach. Nanyuki had no instruments for craniotomy, so one referral was a patient with severe headache following a head injury. Another had a burnt scalp followed by osteomyelitis of his parietal bone and cerebral symptoms.

KALPANA (a Nepali aged 46) presented with mild abdominal pain for several days, severe for four days, and diarrhoea with two loose stools tinged with blood daily for a week. She had a tender, fluctuant mass in

her right lower quadrant, and a marked leucocytosis. At laparotomy she had a patchy necrosis of her caecum with a localized perforation. A right hemicolectomy was done for suspected necrotizing amoebic colitis (31.11). The operation was a nightmare. Her colon came to pieces in the surgeon's hands and there was gross faecal contamination. She died. LESSONS (1) Expect a different spectrum of disease from that found in the industrial world. There, a fluctuant mass in the right lower quadrant is most likely to be an appendix abscess. (2) Avoid doing a right hemicolectomy for amoebiasis if you can.

1.5 Your patients

In many of the villages of the developing world, the burden of chronic disadvantage, poverty, ignorance, and insanitation are the background to life. A surgical disease on top of this may be the last straw.

As the result, patients often present late. If yours is a really disadvantaged community, tapping a hydrocele may yield litres rather than millilitres of fluid. An elephantoid scrotum may have progressed so far that it hangs to the ground (31-7). If a patient has a urethral stricture, he may leave it until he has multiple fistulae (23-10) or massive extravasation (23.10). If he has carcinoma of his penis (32.33), he may wait until much of it has been eaten away. Most carcinomas of the breast (21.4) and cervix (32.35) present too late for any hope of cure. Too often, patients only present when complications have made their lives unbearable. When even the struggle to keep alive may be a losing battle, the fact that surgical disease is normally treatable is irrelevant.

There are usually good reasons why a patient presents late. His family may have had no money for the operation or for transport, or there may be no transport. Perhaps it is the planting season, or

there is nobody to look after his children or his goats? Perhaps his disease is painless, so that he does not realize that he is ill. Perhaps his tolerance to pain, disability, deformity, and misery is so high that he has to be desperate before he seeks help? He may only come to you when he has exhausted local remedies and and the services of traditional practitioners. Transport, which may have been difficult before the rainy season, can become an insurmountable problem during it, when roads become quagmires, and rivers even more perilous. Acute surgical emergencies, in particular, may only come when patients are in the direst straits.

When a patient does come, you will not be able to send him off for an extensive series of investigations before you start treatment. Instead, you will have to learn to make a firm diagnosis from the history and examination. Expect to find that he has other diseases also. In Nepal, for example, only 15% of operations are in otherwise healthy patients. So expect your surgical patients to be malnourished, anaemic, malarious, tuberculous, or worm-ridden — or all of these things. They help to make a patient weak and wasted and a poor operative risk. Anaemia increases the risks of surgery, and in some communities the average haemoglobin may be only 80 g/l. Some patients may still be walking around with 40 or even only 20 g/l. Apart from a little breathlessness on the hills of Nepal, one 12 year old girl with a haemoglobin of only 20 g/l had no other complaints. So try to prepare your patients for surgery before you operate, especially if the cause is readily treatable.

Pain and disability are unlikely to rate highly when there is rice or maize to be planted, or when there are festivities and holidays. Although the economy may be poor, the culture may be a rich and compelling one. The cultural objections to colostomy, for example, may be so firm that a patient is unlikely to agree to have one, even temporarily, and even after you have explained how it can be managed with colostomy bags. Mastectomy may be similarly abhorrent.

Death is the great enemy of doctors and evidence of our failure. But a patient may have faced up to his own mortality, and may not always share your view. He may have learnt to live with death since childhood, and both his own attitude to it and that of his closest relatives may be very accepting. One of the greatest mistakes you can make is to send him home to die after a useless operation, having used up much of his own resources, and those of the hospital in an unsuccessful attempt to cure him.

1.6 Referral is mostly a myth

A patient with a surgical disease has first to refer himself to you, and if you cannot care for him, you have to refer him to someone



Fig. 1-4: A PRIVATE WARD in an Indian rural hospital. For a vil-lage family an illness is more than a biological disorder – it may be a social and economic crisis. After GR Howard with kind permission of the editor.

else. Referral onwards from a community health worker (CHW) takes place at all the five steps in Figure 1-5. Although surgery is done in other parts of this system, we are concerned with the district hospital, and the critical referral steps from C to D and from D to E.

Although 'referral systems' exist in all health services, the difficulties they put in a patient's way are often insurmountable. Unfortunately, for many patients referral is a myth. In many developing countries the possibilities for referral appear to have got worse during the last decade rather than better, due to their declining economies. Too often, there is just no petrol for the hospital's ambulance to take a patient to a referral hospital, or no money to buy it. Alas, in many countries the future does not seem any more hopeful.

Only too often a patient reaches a referral hospital with great difficulty, only to return no better than he went. Because there are so many uncertainties, assess the chances for each patient individually. Try to find out what happens to each of the patients you send. Just what cases is it useful to refer, how, when, and to whom? If there are referral services, be sure to use them, both to refer patients and to learn from yourself.

In the pages that follow we often suggest that you 'refer the patient', but we realize that this is often impossible. So we have done our best to tell you what to do if it is impossible. The urgency, or lack of it with which a patient needs to be referred is critical, and varies with each condition, so we have indicated just how urgent referral is in each case.

Some surgeons working in referral hospitals have a false idea of the practicalities of referral. They see only the tip of the iceberg - the patients who reach them successfully. So they may think that referral is easier than it is. There are however certain cases which referral hospitals should accept without question, and district hospitals should know what they are. They include the closure of intestinal fistulae (9.14), and difficult ankle fractures (82.3).

Referral hospitals have their problems: (1) They may be overcrowded with simple cases that you could care for in your district hospital. One of the purposes of these manuals is to make sure that any surgery that can be done in a district hospital is done there, so that referral hospitals can fulfil their proper function. (2) When the time comes to discharge a referred patient who cannot go home unaided, they may be unable to send him there because they cannot contact his rural relatives. Here is an account of what one patient went through successfully to get himself treated at a referral hospital. It is from the Chairman's address to the 1980 Annual Conference of the Association of Surgeons of East Africa. Fortunately for the patient, he was in the Chairman's care.

PATSON BANDA (49 years) was in a LandRover when it rolled over in deep sand, causing an open fracture of his right humerus and injuring his radial nerve. He was still able to walk, so he eventually reached a district hospital, where his wound was carefully toileted, and left open for delayed primary suture. His radial nerve injury was recognized, his arm was put in a collar- and-cuff sling, and he was asked to return in 48 hours. His wound was clean so it was closed. So far he had received ideal treatment.

It was decided to refer him to the provincial hospital 40 km away, across a river and a flood plain, 20 minutes by air, a day by boat, or two days by LandRover. There was no radio, and the telephone was not working, so there was no way of telling the provincial surgeon that he was coming. He was able to get a seat on a barge and was in the provincial capital 24 hours later. It was dark but he was able to find a relative with whom he could stay the night. The next day he sat in the outpatient queue and handed his slip to the medical assistant. Unfortunately, the provincial surgeon had left the previous day to attend a planning meeting at the Ministry of Health. He would not be back for two days. The provincial surgeon returned and saw him, but decided that his training had not prepared him for posterior exploration of the humerus, plating the

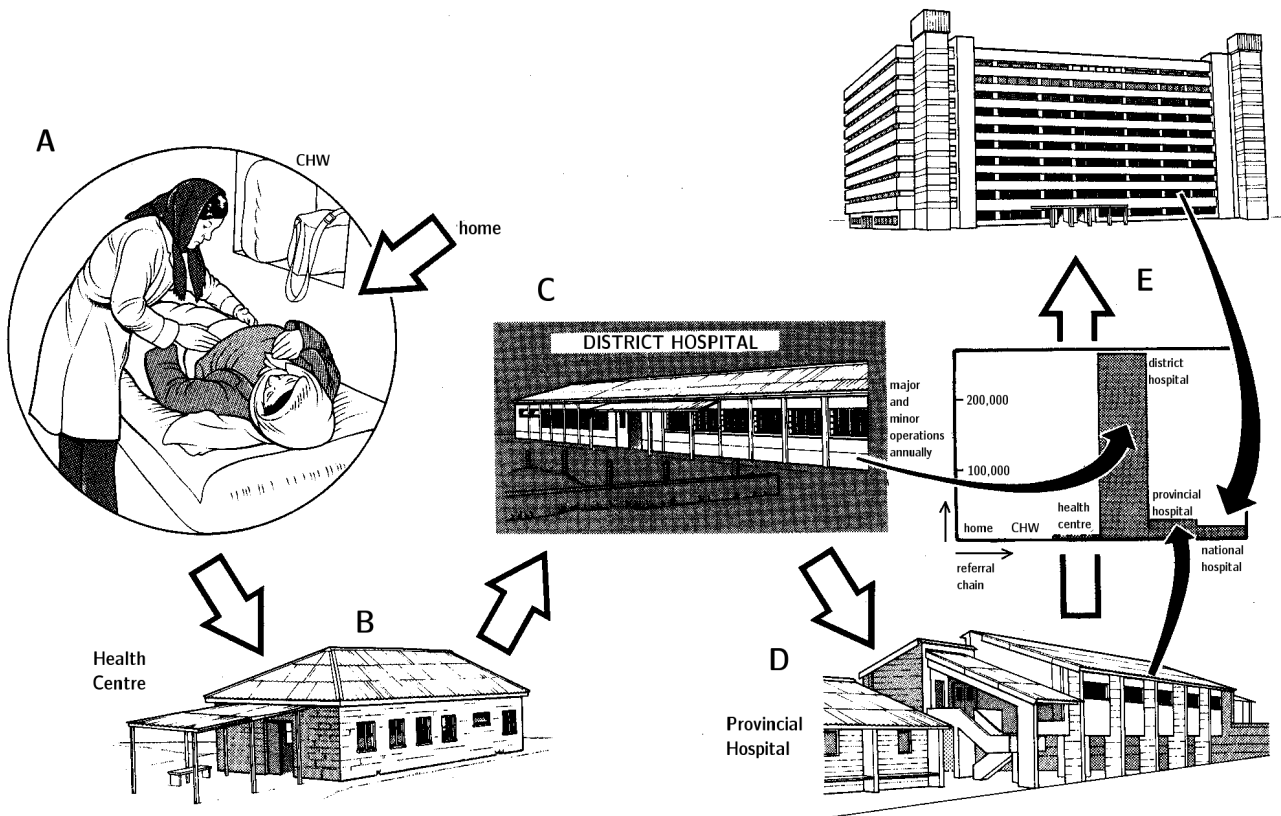


Fig. 1-5: THE REFERRAL SYSTEM. Each of these steps in the referral chain has its difficulties. A, from the patient's home to a community health worker. B, from the community health worker to the health centre. C, from the health centre to the district hospital. D, from the district to the provincial hospital. E, from the provincial to the teaching hospital. The histogram shows the number of major and minor operations combined at each stage in the referral chain in Kenya. Note the overwhelming aggregate importance of district hospital surgery. It is assumed that no surgery is done at home, or by the community health workers, and very little at the health centres, for which no data were available. Data are from the Central Province of Kenya in 1983 extrapolated to the whole country. It is also assumed that the Central Province is typical. Kenya's 7 provinces are assumed to have one provincial hospital and 16 district hospitals each. The 6 district hospitals from which data were obtained averaged 2,325 operations annually, ranging from 636 in Nyandarong to 5,708 in Muranga. Nyeri provincial hospital did 2,944 operations, and to Kenyatta National Hospital 15,333.

fracture and perhaps secondary suture of the radial nerve. Also, he had no 6/0 monofilament. So Patson was given a bus warrant, and a note to the orthopaedic surgeon in the teaching hospital in the capital city. Unfortunately, he had no money, no food, and no clean clothes for the journey, so he went home. His LandRover had been partly dismantled by thieves, but his partner had towed the wreck back to his village, and hired a lad to help him with the fishing. The family were already deeply in debt. They debated whether he should go 800 km to the capital, but his limp wrist decided them. He started on his long journey with a pack of food, a few clean clothes, and a bus warrant, but very little money. Four days later he arrived at the orthopaedic clinic on a Friday. He had no appointment, and the surgeon to whom the note was addressed had held his clinic on the previous day. The harassed sister, busy with another clinic, found that he had no relatives in the city, and no money, so she sent him to the orthopaedic ward in the hope that they might have a bed for him over the weekend. They did. On Monday the surgeon saw him. His wound had healed and he was fit for surgery, and the necessary screws, plates, adhesive drapes, and sutures were in stock. But there was a three months waiting list, so he had to wait 10 days, even for operation as a semi-emergency. A silent cheer went up from the hospital staphylococci, as they began to colonize the skin of this provincial patient. His radial nerve was freed from compression in its spiral groove, and his fractured humerus was successfully plated. Two weeks later he returned to the provincial hospital with suggestions for physiotherapy (a two day journey for each session) and instructions to return in a year for removal of the plate. He was lucky. He was one of the minority for whom the referral system worked. His radial nerve palsy recovered. The state paid for nearly 4 weeks in a teaching hospital, and 1600 km in transport. He was in debt,

and his family were hungry, but he did not have to sell his boat, or the remains of his LandRover. It could have been much worse.

TOPNO (41 years) fractured his ankle in a bus accident. The very competent doctor who saw him had learnt that difficult ankle fractures should be referred (82.3). He could manipulate fractures, but he thought that an expert would do better, so he sent the patient with a letter to the referral hospital 70 km away. After a long journey, the patient arrived too late at the fracture clinic. He was able to reach the next fracture clinic in time, only to find that the surgeon was away at a conference. So he hung around hopefully for some days, but in the end he was advised to return to his original hospital. Meanwhile, he had had no treatment except the original 'first aid' plaster. When he eventually returned to the doctor who first saw him, his fracture had partly united in a very bad position. It was now too late to manipulate him, so he now has a stiff painful ankle and is waiting to have it fused. LESSON A patient may be better in your hands, if you learn those of the expert's procedures that you can reasonably do.

**ASSESS EACH PATIENT'S CHANCES
OF EFFECTIVE REFERRAL**

REFERRAL

SHOULD YOU SEND HIM? The chances of being able to refer a patient vary greatly, and are apt to change. They depend on the answers to these questions.

(1) Is it worth sending him anyway? He may not have a disease for which the referral hospital has any effective treatment. Even if

he does reach it, he may not be sure of any better treatment than yours.

(2) Is he prepared to leave his family and his fields or his job?

(3) Can he get himself to the referral centre? In some districts, for example, the roads and airstrips are closed for weeks at a time during the rainy season.

(4) Has he or the hospital got money for transport and for lodging when he gets there? Often, neither of them have.

(5) If he does arrive, will he find his way to the right clinic, wait in the right queue and be seen and admitted? Will there be an empty bed? Will the surgeon you send him to actually be there when he arrives, or will he have gone on holiday, or to a conference in Europe.

AT THE REFERRAL HOSPITAL a patient you refer will be in competition with ordinary local cases, so try to feed him into its administrative system. Tell him exactly where to go and whom to see. Try to send him personally to a surgeon you know, and who you know will treat a case of this kind. Find out on which days the surgeon has his clinics.

Inform the surgeon that the patient is coming. Make sure that the patient knows exactly what to do, and where to go when he arrives.

Investigate him first, and state the procedure that you think he needs. If a biopsy is necessary, do it, and refer him with his report. Often a biopsy takes time and may have to be sent to the referral hospital. If referral is urgent, don't wait for the report. Send a careful letter with him, including all necessary information.

If there are any particularly good referral facilities, such as those for artificial limbs, for example, be sure to use them.

Finally, don't refer patients unnecessarily. No surgeon likes to be sent ganglions (27.11)!

1.7 What should we describe? What should you be able to do surgically? The limits of this system of surgery

God is in the details.

Mies van der Rohe

Der teufel (the devil) ist im detail.

Old German proverb

In view of the common impossibility of referral, we have tried to describe everything that you, our readers *as a whole might have to do* - if you cannot refer a patient, and which might benefit him; both the 'hot' emergency procedures and the less urgent 'cold' ones. As you will see in the next section, you *individually*, should not necessarily do everything we describe.

Our contributors have varied greatly in what they thought we should include. Some have considered you can do everything that they can do. Others have done their utmost to keep you away from the patient if they possibly can. Many began by considering that most of the procedures that they do themselves would have to be learnt by expert tuition, and could not be learnt from a manual. In the end they came to see that this manual is necessary. That personal tuition from an expert is the best way to learn anything, we take for granted. But, what if there is no expert? A manual is surely better than nothing.

Somehow, we have had to find a balance, so we have considered each procedure on its merits. Our task has been made no easier by the wide range of your abilities. You range from highly trained surgeons doing unfamiliar operations for the first time, to inexperienced doctors doing your first jobs. We have tried to serve all your needs.

Not the least of our difficulties has been your very different ability to use books. One professor of surgery remarked that these manuals would be very useful for mature general duty doctors of the old school, but not for his students. The ability to do anything out of a book varies greatly, whether it is making a cake, mending a car, or treating a fractured femur. For anyone who is not good at doing things out of books, learning to do so is an ability well worth cultivating — over the years it will make a huge difference to your skills.

It has not always been easy to distinguish the tasks which are obviously impossible for you (oesophageal atresia for example), from those which are possibly possible (duodenal or jejunoileal atresia). We have had to balance benefit, risk, and urgency. This has led us to include methods for removing the prostate, for example, but not the thyroid.

Methods have been devised for grading the difficulty of operations. One of them gives the repair of an inguinal hernia a value of one arbitrary unit. On this scale the repair of an episiotomy is given 0.2 units, a clavicle fracture 0.3, a Colles fracture 0.6, an above knee amputation 1.3, the resection of small gut 2.0, and the fusion of a hip (not described here) 3.0 units. Methods of grading were discussed, and this one might be adopted in the second edition. Instead, we have suggested you refer the more difficult cases where you can, and have stressed that some operations are only for the *careful caring operator*. These include vascular repairs (55.6), a groin flap for the back of the hand (75.27), and Girdlestone's operation for fractures of the neck of the femur (77.13).

Although the common conditions may comprise perhaps 60% of your work, the rest will include many rarer ones. *In aggregate the rarities are common*. So we have tried to describe as many of the comparative rarities as we can, in the hope that you will find about 98% of the conditions you could hope to treat surgically described here. The edges of this large collection of appropriate methods are inevitably blurred, and it has not been easy to know how rare, or how difficult we should be. For example, you will find no less than 46 hand fractures, and there is even mention of cystic hygroma. We shall probably be criticized for including oesophagoscopy and bronchoscopy, and some cancer chemotherapy. But it is better to include slightly too much rather than slightly too little - there is no need for you to do things you don't want to! Tibialis transfer (30.8) is our *tour de force*, and the great detail with which we have described it should enable our more experienced and caring readers to do it. Some methods, such as tying the major arteries, are seldom used, but are classical, in that no textbook of surgery would be complete without them. Inevitably, some parts of the "system" are tidier than others. The trauma methods, for example, seem about as complete as anything could be, but not so those for ophthalmology. Nor is there any sharp distinction between what is medicine and what is surgery, particularly in obstetrics (Chapter 17 on "The medicine of pregnancy").

We have excluded all procedures which require equipment which you are unlikely to have, and could not reasonably expect to buy. We have assumed that you have an X-ray department, but no X-rays in the theatre and no image intensifiers, ultrasound, diathermy, or equipment for any but the very simplest methods of internal fixation. Although we mostly write for hospitals which are short of both money and skill, there are some, such as those run by mines and plantations, where money is less scarce and who should be able to buy even comparatively expensive drugs for cancer chemotherapy, for example. For them all the equipment we list (even bronchoscopes and oesophagoscopes) should not be a problem. Uncertain sterilizing procedures, and limited nursing care have also guided our selection. AO methods of internal fixation are excluded on all these counts (69.3). If you try it, it is likely to live up to the epithet "Always Osteomyelitis"!

Overall: (1) We have tried to describe a system of practice which includes all the basics, *but is ahead of the practice of many district hospitals*, so that even comparatively advanced ones have something to aim for. (2) We have tried to cover most of the range of the "general surgeon" working in the districts. (3) We have tried to describe this system in complete detail, and in doing so would agree with both the quotations with which this section starts. (4) We have in our mind's eye a concept of "quality" at the district hospital level; even simple things can and should be done well. Right at the end of this manual there are some indicators to measure this by (34.6).

1.8 Should you operate?

Although the era of 'furor operandi' has passed, one still has almost daily evidence of the disastrous effects of major surgical procedures, attempted lightly by young, or even inexperienced older surgeons. The author would in no way dampen the ardour of the neophyte, or check his ambition to acquire skill. Still, it is well to suppress the feelings of cocksureness and egotistic pride...

Max Thorek, Surgical Errors and Safeguards

Whether or not you should operate on a given patient will be the most important question you will have to answer. Put yourself in his place. What would you like to happen if you were him? Several factors will influence your decision. We have already discussed one of them - can you refer him? On the whole we think that for every doctor who operates when he should not, there are many more who don't operate when they should. So one of our aims has been to get more surgery done - on the correct indications!

The mature surgeon is one who knows when not to operate! On the other hand, if you are always too cautious, you will never learn and some of your patients will never benefit.

So beware of Thorek's *furor operandi*, the furious urge to operate, and ask yourself these questions before you do so.

SHOULD YOU OPERATE?

What will happen if you don't operate? If a patient is likely to die or become disabled if he is not operated on quickly, you will have to operate. We have therefore included all the more practical emergency operations, whether difficult or not. For example, you must drill immediately for acute osteomyelitis, but a patient who needs a sequestrectomy for chronic osteomyelitis can wait. If however you cannot refer him, you may have to operate.

How difficult is the operation? At least three factors determine this: (1) Your technical knowledge, (2) your experience, and (3) your skill. We can provide you with the knowledge, and bring you some of the experience of other people, but only practice will improve your manual skill.

How safe is the operation? What disasters might happen? Little can go wrong with draining most abscesses, or manipulating most fractures, but disaster is only too possible if you decide to close an intestinal fistula or do a block dissection of the groin.

Do you have the necessary instruments, materials, and staff? Even if you don't, you may be able to improvise.

Are you yourself inclined to operate too readily, or not readily enough? Cultural attitudes to operating vary. In India or Indonesia, for example, the common failing is to be too timid, and not to operate when necessary. The reverse is true in some parts of Africa, where inexperienced operators are much too bold. So be aware of your own personal and cultural bias and try to correct for it.

What is the known or probable HIV status of the patient? See Chapter 28a.

Finally, if you have difficulty deciding what to do and are able to telephone or radio anyone who might know, don't hesitate do so so.

RULES ABOUT DECIDING WHEN TO OPERATE.

(1) You must be certain of the indication to operate, even if it is only exploratory. (2) When life is in danger take risks. (3) If an emergency is hopeless be prepared to say: No! (3) Don't do difficult elective surgery, especially if the expected outcome is likely to be of limited value to the patient.

SEVEN RULES WHEN YOU DECIDE TO OPERATE.

(1) You must be familiar with the anatomy; if necessary consult an anatomy book during the operation. (2) You must have someone familiar with anaesthesia giving the anaesthetic. If you are giving it yourself, there must be someone who can monitor its progress and the vital signs. (3) There must be a reliable system of sterilization, preferably an autoclave. (4) You must have a good light, preferably adjustable. (5) You must have the necessary equipment and supplies for resuscitation and homeostasis (infusions, infusion sets, a laryngoscope, tracheal tubes, adrenalin, calcium etc). (6) Have the highest regard for living tissue and be gentle and circumspect. Operate at your own speed. (7) Finally, don't be too elated over your successes, or too despondent over your failures. If you do fail, forgive yourself — don't 'give up'! A bad spell during which 2 or 3 patients die may be followed by another in which none of them do. Remember that Brock's first 17 mitral valvotomies all died!

CAUTION !

Remember also that with 'cold operations' disasters are more difficult to justify than with 'hot ones', both to the hospital staff and to the general public, and that accusations that the doctor is experimenting on his patients can do much harm.

If you have not done any surgery before, or only very little, start with the easier operations. You should at least be able to open abscesses (Chapter 5).

1.9 "Oh, never, never let us doubt what nobody is sure about"

Inevitably, these manuals contain a huge quantity of didactic detail with few reasons as to 'why' you should do anything, and few references to the original papers. We have tried to select the best methods for your needs. Even so, remember that accepted methods change, that few have been rigorously evaluated by controlled trials, and that some, which were widely accepted only a few years ago have now been completely abandoned or reversed.

Here are some examples of how fallible medical practice can be: (1) A low-fibre diet used to be prescribed for diverticulitis, but is now thought to be one of the causes of it. (2) Complete immobilization was and often still is considered to be the ideal treatment for all long bone fractures. It is now increasingly realized that many of them benefit from early controlled movement (69.4). (3) In many centres it has been standard practice to separate mothers from their babies immediately after birth. Now, this is completely reversed and their close contact immediately after delivery is considered essential for bonding. (4) Shaving a patient the day before an operation, which used to be standard practice, has now been shown to increase the incidence of infection...

This list could be expanded. So be prepared to 'doubt what nobody is sure about', even while you follow the didactic instructions we give.

1.10 Creating and maintaining the surgical machine

If you are lucky, you will arrive at a hospital where your colleagues and your predecessors have created a smoothly running surgical system. Or, you may arrive and find almost nothing. More likely, you will arrive and find a system which is working somehow, and which badly needs improvement. As well as actually treating the sick you may have to try to make the

FOUR SURGEONS

Which are you?

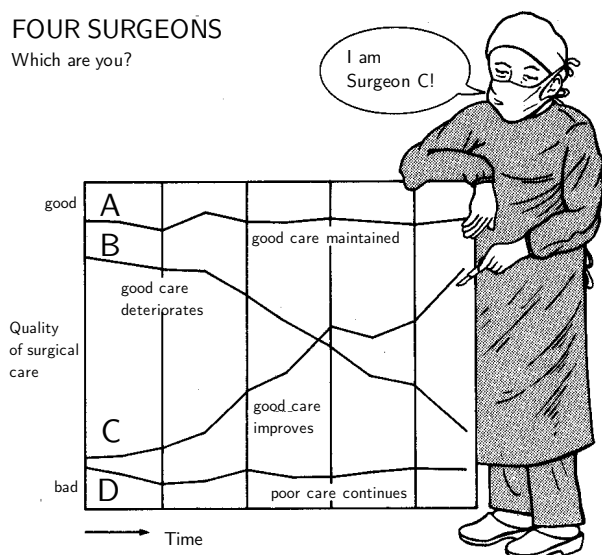


Fig. 1-6: WHICH OF THESE SURGEONS ARE YOU? Doctor A, found a nearly perfect surgical system, and stepped in an out of it without needing to change it. Doctor B, found a moderately functioning system and slowly let it deteriorate. Doctor C, found a poorly functioning system, and with great difficulty was able to improve it considerably. Doctor D, found and left chaos.

hospital as a whole, and particularly its surgical services more efficient. To do this you will have to improve: (1) The morale and training of its staff. Congratulations are likely to be much more effective than reprimands. (2) Its fittings and equipment. (3) Its administrative arrangements. (4) Your own skills. The various options before you are shown in Fig. 1-6. In doing this you must be prepared to do any task yourself, no matter how humble and how unfamiliar. There is no place for the attitude "Oh, but it's not my job..." Our jobs, wherever we are, are to create the 'machine' and make it work.

When you arrive inexperienced in a new place, study it carefully and list the things that need changing. Then, cautiously and steadily, try to implement them during the next few months or years. If you don't note them when you first arrive, you will soon take them all for granted, and do nothing. Beware of constant change, because the staff will not accept it. Get to know them and accept their advice before introducing 'improvements'. When you operate, do as best you can on your own to begin with. Then, after two or three months, when you have the feel of the place and its problems, visit the nearest hospital where they do things well, stay a week or two and learn whatever they can teach you in a short time. Then come back and put what you have learnt into practice.

ALL FOR A PIECE OF CHALK There was once a professor of surgery who found to his astonishment that his operating list had been cancelled. When he asked why his houseman replied "Because there is no chalk with which to list the cases". The professor was furious and dismissed his houseman on the spot. The DMS pleaded with him, "...such a nice boy...", even the Minister pleaded, but the professor insisted that he could not have such a person as his houseman. So he continued to clerk his own cases. Finally, weeks later his repentant houseman came to him and said "About that chalk, Sir, I think I made a mistake..." **LESSON** Failure to improvise, where this is at all possible, is never an adequate reason for not doing something.

1.11 The surgical care of the poor

The purpose of surgery is to heal the sick. What is the use of it if the sick cannot afford it? The rapid growth of the populations of many of our countries requires that we care for ever more people

TEACHING THE TEAM



Fig. 1-7: DOCTOR 'C' TEACHING HIS TEAM. When Doctor C from the previous figure first arrived at his hospital he found its obstetric wards in a desperate state, and its beds so overcrowded that mothers ruptured their uteri in the corridors almost unnoticed. He soon got to work, and here you see him correcting some of the sloppy habits of his nurses. Soon, his obstetric services were so efficient that he had empty beds. It has been suggested that this shows a very sexist and authoritarian manner of teaching, and that a round table discussion would have been better.

every year, on a health budget which is not only low to begin with, but is static, or in some countries is even declining in real terms. Despite this, our patients now know what surgery has to offer, so that their expectations increase steadily.

We easily forget just how poor some of them are. They are about fifty times poorer than patients in Europe or North America. Of the \$2 to \$5 per head per year that is available in many developing countries for all forms of health care, half or more is spent in the cities, so that only \$1 a head, or even only a few cents are available in the rural areas for both hospital and health centre care. The per capita income in India is less than \$100 a year, and in the rural areas where 80% of people live, the cash income is even lower than that. Estimates as to how much an Indian villager can spend on health care range from 36cents to \$5 annually. It is however less the cost in cash which devastates his family, than the complete disruption of their earning power. Fortunately, the kind of surgery we describe is remarkably cheap and cost-effective - compared with the high technology surgery of the industrial world. But it is not so cheap in terms of a villager's income. If you work in a government hospital, such funds as you have will be provided for you. If you work in a voluntary agency hospital, and your patients have to pay, and you really want to care for them, you will have to keep your costs low. Complicated methods can easily lead to rising costs, and so gradually drive the most needy away. Instead, your hospital may fill with richer patients, who could, if they wished, seek care in the towns. Care can indeed be very cheap. For example, one Indian hospital (Herbertpur, Uttar Pradesh, 1977) charges the equivalent of \$2.50 a day, which includes everything except food, which the patient's relatives cook. In one district hospital (Chogoria in Kenya) two thirds of the running costs are met from the patient's fees, with charges of only Kshs 20/- (\$1.5) a day, no operation costing more than Kshs. 250/- (\$20).

PULLING A HOSPITAL 'OUT OF THE RED' Here is some advice from Tumutumu PCEA Hospital in Kenya which was able to turn a substantial deficit in its accounts into a surplus in two years. Try to make the containment of costs, or their reduction, an activity which all your staff share. They and you should know how much everything costs. If you can make your financial decisions by mutual consensus, they will be implemented. Form an action committee consisting of all the spending departments - the medical superintendent, the administrator, the matron,

and the senior medical assistant. Meet weekly and pass all decisions involving money through this meeting. A good time to start holding such meetings is after some crisis has occurred, for example, being told to cut your budget by 40%. A crisis atmosphere makes people more co-operative, and more willing to change their ways.

Examine all funds coming into the hospital and all funds going out of it, scrutinize all bills and orders. Discuss demands from each department, and reject any unnecessary ones. Scrutinize all expenditure and expect to make some savings on almost everything. No single item is decisive, but collectively they make the big difference. Look at the large items first — salaries, transport, and food — even small percentage savings here will have a big overall effect. Look at your establishment figures. You may find that your hospital has got fat and that you should let it get a bit leaner by not recruiting after natural staff wastage. You may find that you have to return to the staffing ratios and technologies (such as making your own plaster bandages) of earlier years. For example, you will probably find that most patients with pneumonia can be treated without an X-ray and so can most extension fractures of the wrist.

These meetings will be critical. They will ensure the co-operation of the leaders of all sections of the hospital, who will transmit the sense of urgency to everyone else. They will also help to create an awareness of the economic implications of a decision, to establish priorities, and to ensure the continuation and extension of your economy drive. Follow up your decisions — someone must check that the fire is extinguished once the water is hot, or that the right weight of the right cabbages has been supplied. Make sure that the staff know how much money is running through their hands, and that the viability of the hospital depends on how they use dressing materials, gas, and equipment.

Money coming in is no less important than money going out. So try to keep your beds full. Work out a policy to reduce costs to the patient, and to make your services affordable to as many people as you can. Think about what they can pay, and be prepared to lower some charges.

This manual is mostly derived from experience in Africa, India and Nepal. Valuable contributions to the surgical care of the poor have however been made in South America. Adolpho Velez Gil and others found that in Colombia three quarters of all the operations were simple enough to be done on outpatients with a single anaesthetist supervising two patients simultaneously in the same theatre, mostly using local and epidural methods, and adequately supported by assistants. Operating theatres were only used for 40% of working hours, surgeons only did 120 operations a year and 'physicians' only 18. Gil was therefore concerned to increase the utilization of theatres, and the surgical productivity of both surgeons and 'physicians'. Since most of the operations were simple what was required was more generalists and fewer specialists. Is this true for your situation too?

In most hospitals, services are limited less by resources than by motivation. So expect to be able to do much more, even with what little you think you have. The rest of this section, which is based on the papers listed below, shows what can be done, even when resources seem to be already stretched to their limit. If you think that checking the stores is not your responsibility, remember that it is critically important for the financial viability of the hospital, on which your whole surgical endeavour depends.

ECONOMICAL SURGERY

STAFF Reduce staff to the bare minimum by not replacing unnecessary ones, and make sure they do a full day's work. Keep existing staff busy with additional duties. Junior staff are often willing to have more responsible jobs such as filing and typing, or even preparing intravenous fluids. Try to lay off consistently dishonest and inefficient staff. Encourage punctuality. Employ inexpensive ungraded staff where you can, to relieve more expensive staff of routine tasks. Employ multipurpose workers, such as a laboratory technician who can take X-rays.

SAVINGS ON CONSUMABLE MATERIALS

Dressings. If necessary, you can treat most wounds without dressings. Most clean closed surgical wounds don't need them. Use

gauze and cotton wool economically. Don't make dressings larger than is necessary. Resterilize all dressings which have not been used. Use narrow strapping, and don't allow it to be used anywhere except on the human body. Wash gauze sponges, immerse them in saline to remove stains, dry them and resterilize them. If necessary cut up an old polyurethane foam mattress or cushion into small squares and use these as swabs and sponges. They absorb blood and can be reesterilized. Cut up and sterilize old linen. Sterile toilet paper can be used as an alternative to swabs for some purposes.



„I pronounce you man and dressing.“

Laparotomy pads ('lap pads'). Use a sewing machine to sew enough pieces of gauze 20 × 25 cm together to make a 5 mm layer; attach a tape to one end, and when you operate attach a haemostat to the tape and leave this hanging out of the wound. Lap pads are a more convenient and economical way of washing and reusing gauze than using it as swabs, and can replace them for some purposes.

Dressing a wound dry uses many more dressings than treating it wet. So keep it wet with saline, which need not be sterile. Make this with ordinary salt and tap water. This is the basis of the saline method for burns (58.16).

If a wound is suitably sited to be immersed, as with the arm, leg, or buttocks, immerse it in saline for 3 hours twice a day. Put a leg in a bucket, an arm in a long arm bath, and let a patient with a buttock wound sit in a hip bath.

If a wound is not suitably sited for immersion, cover it with a thin layer of gauze or bandage and keep it wet with saline from a jug (58.16). Renew the gauze or bandage once a day. This is more economical in dressings than treating it dry.

Disinfectants. Don't fill gallipots to the brim. Use cotton wool, not gauze for scrubbing the skin. Don't use disinfectant for the preliminary 'scrub' to remove dirt; use soap and water. One gallipot of disinfectant will then be enough to 'prep' the skin. You can use it all day — it is self sterilizing.

Disposable items. Avoid these and replace them by permanent equipment. If you buy plastic equipment which is intended to be thrown away, choose the kind which you can autoclave or boil. Recycle everything you possibly can, and try to throw nothing away. Buy the kind of gloves you can reesterilize 3 or 4 times. Resharpen needles and scalpel blades.

Use nylon syringes, such as the French KIGLISS pattern, which you can sterilize indefinitely, and which have a rubber ring to seal the plunger which you can purchase separately. Don't use disposable urine bags; instead, use bottles and tubing from old intravenous sets.

Catheters and cannulae. Use simpler rubber catheters instead of more expensive Foley catheters; if you want to leave them in, secure them with strapping. Use steel intravenous cannulae

instead of plastic ones.

Intravenous fluids. Make your own for one fifteenth of the price of the commercial ones (A Appendix A). Where possible, use rectal rather than intravenous fluids (A 15.5). These are not suitable for rehydrating patients, but they may be adequate for maintenance.

If intravenous fluids are scarce, for postoperative patients who have had major gastrointestinal or other surgery, tie two pieces of ordinary intravenous disposable tube together. Insert them as a nasogastric tube with one tube in the stomach for suction, and the other in the distal duodenum or jejunum for feeding. In this way you will greatly reduce your need for intravenous fluid.

Oxygen is only necessary for such indications as pulmonary oedema, asthma and shock, and not for comatose or moribund patients. If it is used for patients with no hope of survival, relatives may come to believe that it is used to kill them!

Drugs. Use cheaper drugs instead of expensive ones. For curettage of the uterus use pethidine with diazepam instead of ketamine; use aminophylline instead of salbutamol, aspirin instead of paracetamol, nitrofurantoin instead of ampicillin for urinary tract infections, and morphine instead of pethidine for many applications. Look carefully at the prices you pay for drugs.

Sutures. Where possible, use surgical suture material bought in bulk on reels, or use nylon fishing line (4.6). Only use atraumatic sutures when they are absolutely necessary. With more expensive suture materials, use continuous sutures rather than interrupted ones. Buy reels instead of packs. The application of warm moist gauze packs to a bleeding surface will halve the number of bleeding vessels that you need to tie. You can tie those that persist with sewing cotton for almost nothing.

Scrubbing up Use ordinary soap not special fluids.

SAVING KITCHEN SUPPLIES

Find the cheapest supplier and buy at the right season. Find out if buying in the market may be better. Watch tenders carefully, change suppliers when necessary, and insist on good quality. Don't let them supply you with old, rotten, or small potatoes. Buy boneless meat. Use powdered milk instead of whole milk. Adjust the number of meals cooked to the bed state. Give high protein diets only on genuine indications. Reduce waste. Fill plates moderately and vary helpings according to the appetites of both patients and staff. Keep pigs and chickens to feed on waste.

ENERGY SAVINGS

Petrol or diesel. Diesel vehicles are cheaper to run. Use the smallest and most economical vehicle for a given job and fill it full. Keep logbooks and use vehicles for hospital journeys only. Drive at economical speeds and use moderate engine revolutions in all gears. Use public transport wherever possible. Encourage a style of driving that is considerate for the vehicle, especially when carrying heavy loads on bad roads.

Gas. Put lids on pots. Reduce the flames when the pot has boiled. Use pressure cookers. Soak beans overnight. Control cooking times.

Electricity. Reduce lighting to the minimum. Use fluorescent tubes instead of bulbs. Reduce hot baths to the minimum. Have one central hot water tap, from which the staff fetch water in buckets if they do not object too much!

Solar energy. Solar lighting is more practical than solar heating, because of the smaller amount of energy needed.

Washing. Use the timers to set minimum times for washing and spin drying carefully. Avoid tumble dryers unless the climate is very wet; they use much electricity.

OTHER SAVINGS

Use the space fully on all case sheets, use paper on both sides. Make your own forms with a stencil. Minimize the use of paper for internal correspondence. Use scrap paper for messages.

Don't use so much detergent that it causes foaming in the laundry and when scrubbing floors.

Register private calls, and make a 25% surcharge. Avoid long distance calls in favour of letters.

Control all items that could be used in private homes, including

torch batteries, soap, matches, pens, toilet paper, female pads, food and medicines.

Keep a pair of tubes of epoxy resin. It is surprising what you will be able to mend.

ECONOMY IS ESSENTIAL TO SURGERY

1.12 Primary care radiology

X-rays are much the most useful method of diagnostic imaging. Next comes ultrasound which you can make good use of, especially in obstetrics where it can replace X-rays for almost all indications, except X-ray pelvimetry (which we do not describe). WHO has recently made a great advance in the X-ray departments of the world's district hospitals by developing the BRS or Basic Radiological System. The BRS machine is shown in Fig. 1-8, and is made by several manufacturers to WHO's specifications. If you are thinking of buying an X-ray machine, this is the one to get. If you don't have electricity all day, you can run it on a battery which you charge when you turn your generator on. It is so simple that a radiographic assistant can easily work it, but if you have a radiographer who has been trained to use a more sophisticated machine, he will not like this one because it does not give him enough freedom to adjust the settings. The BRS machine is based on the assumptions that: (1) A good chest film needs a short exposure, and a substantial distance between the patient and the tube. (2) An X-ray of the lumbar

spine will be one of the heavier exposures required. It has therefore been designed to produce at least 100 mA at 110 kV, not one or the other, but both simultaneously. It has a fixed tube-to-film distance of 140 cm, which gives satisfactory chest films and is the ideal distance for most other investigations. The tube is fixed so that it can use an accurately focused grid of high quality. The tube and the film are always accurately focused on one another and cannot be angled independently. This makes it easy to position the patient and makes routine views exactly repeatable. The supporting arm of the tube and the film can be rotated through at least 270°, so that horizontal and vertical projections are easy, and angled views are possible. Erect views of the skull, sinuses, shoulders, or abdomen are as easy as routine views of the chest. A radiographer's manual is available; so is a manual of radiography to go with the machine.

1.13 How to use these manuals

You will notice that after three chapters on 'the basics' there are four on draining pus. Then comes the abdomen and hernias, followed by obstetrics, gynaecology, and the breast. After this there is the surgery of 'special departments' (proctology, urology, etc.) then some specifically tropical surgery, a long chapter on oncology, a short one on terminal care, and finally a miscellaneous chapter. After dealing with injuries of the various regions the second volume ends with a system of closed methods for virtually all human fractures.

In writing these manuals we have tried to make both language and the typography work for us. You will see that we have divided most sections into an initial introductory, or background part in a Roman type like this paragraph, followed by didactic instructions in another typeface. You will also notice that we use the imperative, and refer to 'the patient' and then to 'he', which does in fact usually mean 'he and she'. Alas, English has no personal pronoun which includes both sexes. Our use of 'he' to

THE BRS X-RAY SYSTEM

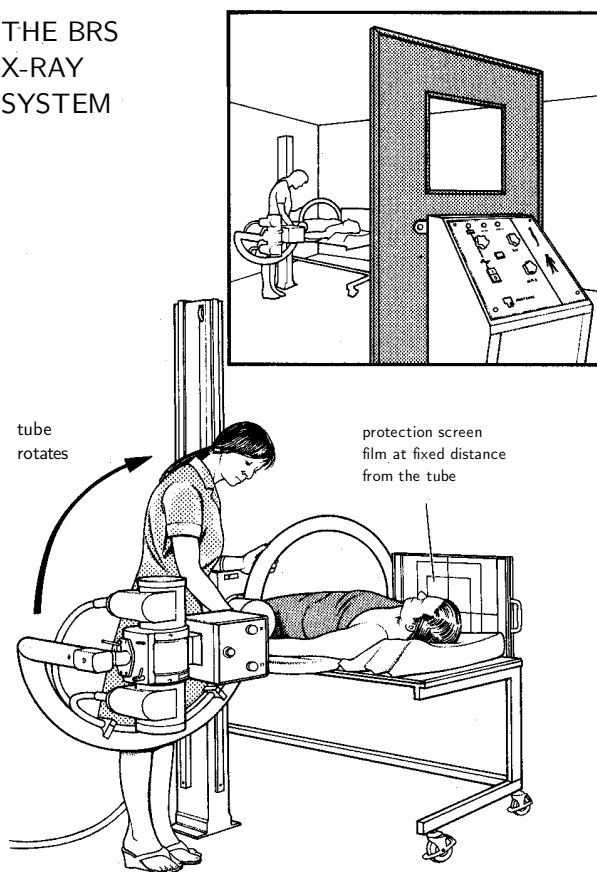


Fig. 1-8: THE BRS X-RAY SYSTEM was developed by WHO to make essential cost-effective radiology available safely and reliably to all the world's people. If you want one of these machines, write to your usual supplier of X-ray equipment and ask if he has a model made to WHO's BRS specifications. Note the screen protecting the operator. Kindly contributed by Philip Palmer.

include both sexes improves clarity, and shortens the text, but we owe our apologies to our lady readers!

Inevitably, we are mostly concerned with technology - *but behind all this lies the patient himself. That boy with the fractured radius and ulna waiting at the end of the queue might be our own son, that paraplegic our brother, that old lady with the fractured femur, our mother. Tomorrow, we might be that comatose patient with the extradural haematoma in the end bed. These patients are ourselves. Perhaps the thing that we most often miss is any explanation of what is going to happen to us, and any indication that anyone really cares.* One contributor considered that such an outright statement of values has no place in a technical compendium, and suggested it be deleted. Instead, believing the compassionate and devoted care of the sick to be one of the noblest human activities, and something of ultimate value for its own sake, we have put it into italic type!

One reader of one experimental edition commented that it had "...enormously improved the treatment of fractures in St Clair's hospital, Sotik...". We were delighted because that is "our scene". It also shows that these manuals can be put to good use. They contain much detailed factual information, and although we have done our best to make them as easily understandable as we can, if you want to use them to their best advantage, you will have to read them carefully.

A TALE OF FOUR PEOPLE, Everybody, Somebody, Anybody, and Nobody, which was found on the notice board of the Birmingham Accident Hospital. "There was an important job to be done and Every-

body agreed that it was a job that could be done by Anybody. It was agreed that Somebody should be detailed off to do it, but although Anybody could have done it, it eventually got done by Nobody. Somebody got angry about it, after all (he said) it was Everybody's job. But, while Everybody thought that Anybody could do it, Nobody realized that Everybody was going to assume that Somebody was going to do it. It ended up that Everybody blamed Somebody when Nobody did what Anybody could have done. LESSON. This book is written to benefit Everybody, so that Anybody who is put in charge of surgical patients will know that Somebody cares enough to write down methods of surgery in a way that a 'Nobody' can find that he or she can do Something even if tucked away in the middle of Nowhere".

THE PATIENTS ARE OURSELVES

SURGEON AND ANAESTHETIST

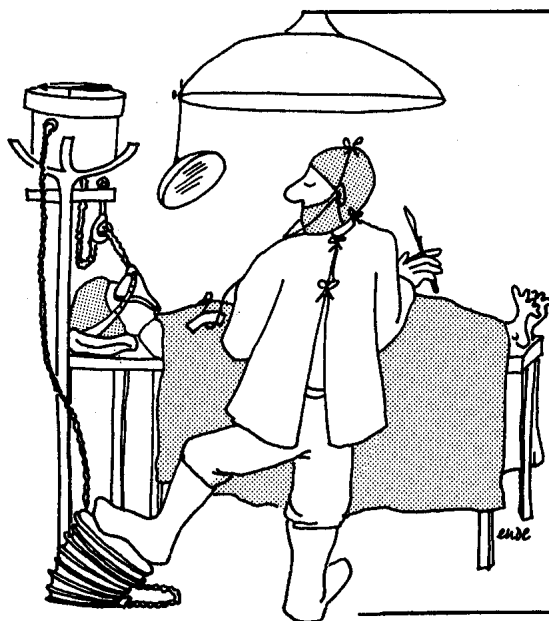


Fig. 1-9: YOU MAY HAVE TO BE SURGEON AND ANAESTHETIST. Kindly contributed by Nette de Glanville. From the Proceedings of the Association of Surgeons of East Africa.

HOW TO USE THESE MANUALS

IF YOU ARE A STUDENT, don't be overwhelmed by the mass of necessary detail you will find here. Don't panic, and don't try to learn it all by heart! These pages *differ enormously in importance*. Try to distinguish between what you should know, and what you can look up when necessary. You must know the emergency procedures, which there will not be time to look up. Study these early in your training. Know your way about these manuals, learn how to use them, keep them and look things up in them.

When you study anatomy, learn the anatomy of the operations we describe, because these are the ones which you will later have to do. Study the anatomical drawings listed below as part of your anatomy course.

Don't sell your dissecting manuals the moment the anatomy exam is over. You know your way about them. So keep them, tainted with the dissecting room though they may be. The ideal textbook of surgical anatomy has yet to be written, and dissecting manuals are the best so far.

Take this book to the wards, clinics, and operating theatre. How does the treatment you see given differ from that described here? The methods of examination we give are summaries only, practise them on a fellow student.

A SUGGESTED INITIAL READING LIST. Start by reading the whole of this chapter. In those which follow, read only the

introductory passages in Roman type, and merely glance at the detailed didactic instructions which follow in this typeface - read these carefully later when you need to do something. Start with the common things first. We have used 7 degrees of approximate commonness: Very common, common, not uncommon, uncommon, unusual, rare and very rare. This is based on experience in East and Central Africa, but it is mostly applicable to the developing world as a whole.

Read particularly the first section of each chapter and the following: The major theatre (2.1), aseptic theatre technique (2.3), autoclaving (2.4), antibiotics in surgery (2.7 to 2.9), the control of bleeding (3.1 and 3.2), bloodless limb operations (3.9), the instruments (4.1 to 4.5), suture materials, sutures and needles (4.6 to 4.8), drains (4.9), instrument sets (4.10), 'pus' (5.1 to 5.4), empyemas (6.1), peritonitis (6.2), PID (6.6), pyomyositis (7.1), osteomyelitis (7.2 to 7.5), septic arthritis, especially the positions of rest and function (7.16), hand infections (8.1), abdominal surgery (all Chapter 9), the acute abdomen and intestinal obstruction (10.1 to 10.6), appendicitis 12.1, inguinal and femoral hernias (14.1 and 14.6)...

In **Volume Two on trauma**, read Chapters 51 to 54, especially Sections 54.1 to 54.3 on wounds. Read the first section in each chapter, and particularly the sections on amputations (56.1), skin grafts (57.1 to 57.5), the entire chapters on burns (Chapter 58) and fractures (Chapter 69) especially 'adequate function with minimum risk' (69.3) and bony injuries in children (69.6 and 69.6a), and catastrophes with casts (70.4). Then read about some of the more common and important injuries: dislocation of the shoulder (71.8), fractures of the humerus (71.17), dislocation of the elbow (72.4), supracondylar fractures in children (72.6), midshaft fractures of the radius and ulna (73.6), the compartment syndrome (73.7), stiffness in hand injuries (75.2), pelvic fractures (76.2), hip and femur injuries (77.2), Perkins traction (78.4), open fractures of the tibia and fibula (81.12), and malleolar fractures (82.6).

THE ABBREVIATIONS you will meet are these: AAFB, acid and alcohol fast bacilli (tubercle bacilli). AAKS, atypical African Kaposi's sarcoma (32.21). AIDS, acquired immune deficiency syndrome. BIPP, bismuth iodoform and paraffin paste (4.11). CPD, cephalopelvic disproportion (18.6). DIP, distal interphalangeal joint. PIP, proximal interphalangeal joint. MP, metacarpophalangeal joint. EIT, examination in the theatre. EUA, examination under anaesthesia. IOP, intraocular pressure. HCG, human chorionic gonadotrophin. HIV, human immunodeficiency virus. IVU, intravenous urogram, also called an intravenous pyelogram (IVP). NSAID nonsteroidal antiinflammatory drug. PID, pelvic inflammatory disease (6.6). PPNG, penicillinase-producing *Neisseria gonorrhoeae*. PPH, post-partum haemorrhage. STD, sexually transmitted disease. VVF, vesicovaginal fistula. RVF, rectovaginal fistula.

Three capital letters in brackets, for example (TAL), refers to the addresses of the suppliers in Appendix B, in this case Talc, Teaching Aids at Low Cost.

THE MAIN ANATOMICAL DRAWINGS are: the dermatomes (A 6-8, A 7-8, 64-2), the major arteries, (3-5 etc), the scalp (63-12), the orbit (5-4), the optic discs (24-4), the cheek (61-5), the maxillary antrum (25-6), the mandibular region (5-7), the teeth (26-4 etc), the anterior abdominal wall (9-1, 23-17a), the peritoneal cavity (6-3), the biliary tract (13-29), the blood supply of the colon (66-22), the anorectum (22-1), the lower urinary tract (68-1), the relations of the ureter (20-16), the 'ligaments' of the pelvis (20-17), the peritoneal attachments in the region of the bladder (18-10), the uterine blood vessels (18-13a), the inguinal region (14-2, 14-3), the nerve supply of the hand (75-3), the bones of the hand (75-11), the tendon sheaths (8-7).

There are also the following transverse sections: the upper arm (56-8), the forearm (7-8, 73-11), the wrist (27-14a, 75-24), the hand (8-1), the finger (75-6), the thigh (7-9, 56-11), the calf (7-10, 7-11, 81-14), the ankle (27-11).

IF YOU ARE A GENERAL DUTY MEDICAL OFFICER, don't be ashamed to refer to these manuals. A patient will be more grateful for being correctly treated than for being wrongly treated because

you could not remember something and had to guess! For example, you cannot possibly remember all the steps in the general method for a spinal injury (64.3), or a hand injury (75.1), so why not refer to them in front of a patient until you have examined so many patients that the necessary clinical routines become automatic? If he is difficult to diagnose, ask him to wait until the end of the clinic, and then use the routines we give here to try to diagnose him.

Keep these manuals in the theatre. If a procedure is long or difficult, sit in an armchair and study it in peace, before you try to do it. Then study it again after you have done it. Don't expect to be able to do everything we describe immediately. *Progressively extend your practice, little by little.*

Don't let things you cannot do, because you do not have the necessary equipment or drugs, prevent you from doing the things you can do.

Whenever you refer a patient, try to learn from the person you refer him to. If possible, be there when he is examined. In the same way, if someone refers a patient to you, he should be there so that you can teach him.

What methods are your staff using? For example, if medical assistants treat fractures in your hospital, study the methods they use and encourage them to use those described here. If they might find this manual useful, see that they have a copy and go through it with them.

If a patient dies and you are not sure of the diagnosis, try to get permission for a post-mortem examination.

Make good use of the endpapers and charts (A 2-4, A 5-1, A 15-4, A 15-6) you find in these manuals. Where convenient photocopy them and stick them up on the wall, or have them printed.

IF YOU ARE A SURGICAL TEACHER, try to integrate these manuals into your teaching, and base your examination questions on them. Aim, less that the students should know these manuals, than that they should know their way around them, and be prepared to use them.

YOU TOO ARE PART OF THESE MANUALS - HELP TO WRITE FURTHER EDITIONS!

One of the limitations of the project on which these manuals were written was that although it lasted 5 years in Kenya and most of another 5 in Leeds, it was not possible to do all the intensive field-work that would have been ideal. The result is that we do not really know what difficulties you will have with the 'handbag method for treating burns', for example, or if there are important disasters which we should have warned you about, and have not. What is missing? What is redundant? We look forward to knowing what your experiences are with the methods we describe, and to getting out the floppy discs to improve them for a second edition. Any contribution, large or small, sent to me (MHK) care of Oxford University Press will be welcome. Ideally, send an annotated copy of this manual, for which we will be happy to return you a clean one, and to include you among the contributors on the cover of the next edition. We look forward to hearing, both from 'experts' and from 'very general practitioners'!

Some TALC (TAL) slide sets on particular surgical conditions would be particularly welcome.

TRANSLATIONS of these manuals or entirely new ones covering the same field are needed in French, Spanish and Portuguese. *Primary Anaesthesia* is available in French as *Eléments d'anesthésie pratique* from Arnette, 2 rue Casimier Delavigne, 75006 Paris, France. If you are insistent enough, they might perhaps translate the other manuals.

DIFFICULTIES WITH THE REFERENCES

If you have **TROUBLE LOOKING THINGS UP**, this section will probably help you. You will see that section numbers have dots in them (for example, 3.6), while figures have a dash (3-6). Where, for example, we have added a section or sections, say between sections 2.3 and 2.4, we have called them 2.3a, or 2.3b etc. References with an A in them not followed by a comma, as for example (A 2.1), refer to 'Primary Anaesthesia'. An A followed by a comma, as

A PATIENT'S RECORDS

John Moshaba ♂ 42.

C/O. Jaundice 5 days. - skin itches. Urine yellow, stools pale.
Vomiting, 2 days. - very copious. Shoots over everything.

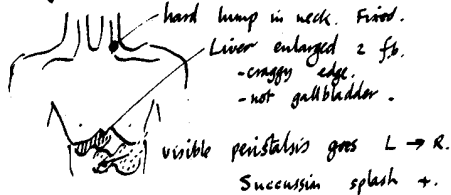
P/H. Nothing like this before.

Syphilis 10 yrs ago. Successfully treated = penicillin.

F/H. Nil relevant.

T.D.R. Has been losing weight 2 months.
Appetite poor. Friends say he looks pale.

OE. Definite jaundice. Skin excoriated - scratch marks ++.



P.R. na? No secondary felt. stool pale

Gen. T. 98.6 F.
Skin hangs loosely about him.
Trousers far too big.

R.S. na?

CVS. B.P. 120/80. J.V.P. +. He sounds na? No creps.
No oedema.

Urine. Dark with yellow froth on shaking.
Ehrlich's test for urobilinogen negative.

Δ Ca. stomach (gallens) with obstruction
and liver secondary. Obstructive jaundice

Admit surgical ward for confirmation of diagnosis.

Fig. 1-10: A PATIENT'S RECORDS, as kept by Peter Bewes.
Good notes are an excellent indication of quality of care - see
Section 34.6.

for example (A, 2-7) refers to the first illustration in a particular figure. References to 'Primary Mother Care' have an M (M 2.1). Some of the sections are long, and many of the problems and difficulties that you may want to look up are at the end of them. So the keywords in the 'Difficulties' are in capital letters (see immediately above), and the section number in the index has a 'D' after it. For example, 'trouble looking things up' is indexed under 1.14D. So, if there is a 'D' in an index entry, go to the 'Difficulties' end of that section.

These paragraphs of 'Difficulties' are also a convenient place for a variety of assorted information that does not fit earlier in the section. Some chapters, such as those on urology and tropical surgery have an entire final section devoted to 'other problems' see Section 23.30 on 'Other urological problems'.

IF YOU ARE A STUDENT, LEARN THE IMPORTANT THINGS FIRST

STOP PRESS!

As we go to press, a final page of small additions has been included at the end of these manual. The most notable among them is a method for tying the uterine arteries to control bleeding from the uterus, especially in post-partum haemorrhage. They are referred as 'Stop Press' in various places in the text.

One final word. If you get into difficulties, remember the 'Bewes manoeuvre'. Remain calm, ask an assistant to press a swab firmly on the bleeding area (or deal suitable with whatever is causing trouble). Take off your gloves, 'go and have a cup of tea', and consult these manuals. When you return in 10 minutes you will be better able to cope with the problem. Some problems, especially bleeding, may even have solved themselves meanwhile.