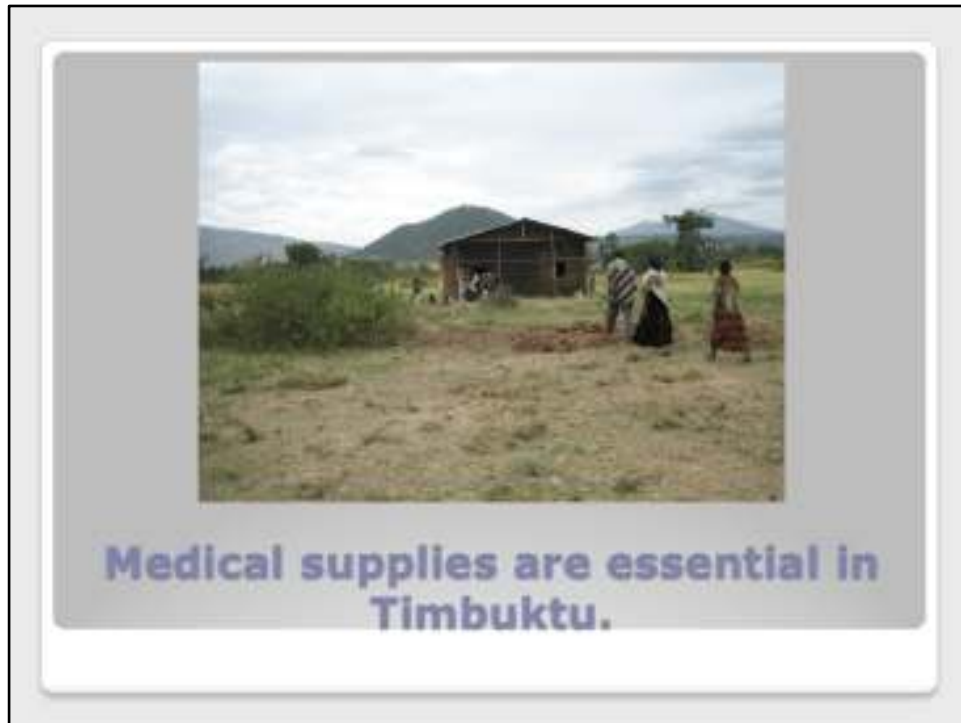


This presentation is designed to help you determine what equipment and drugs you need for your term in Timbuktu. Rather than taking notes on everything, you should take a blank page and simply make a list of what you need. Make another list of what you don't need with the reasons for it. A month from now you might be tempted to buy an otoscope, but if it is on your "don't need" list, the temptation will be easier to resist.



There is no Walgreen's Drug Store within easy driving distance. The first and most important question is whom you will be responsible to treat. Before assuming that it will be just your own family, envision your responsibility to those nationals who become close to your family. If they become ill, what will you do? If there is a very competent national clinic nearby, then your problem is solved. In that case you may not even have to provide for your own family. In most of the Timbuktus of the world, anyone with a Western education is medically responsible at least for his own family and employees.



Luggage allowances are very limited. Every ounce counts. In some areas of the world there is the additional consideration of having to backpack all your supplies or transport them by canoe. It may be helpful to make a list of what you do not need to take. For example, if the nationals in your area are weavers of cloth, this eliminates all the cloth items on your list. Buy local cloth and pay to have your suture set custom-made. Buy cloth scraps cheaply and tear them up to make bandages. Local soaps may make antiseptics unnecessary.



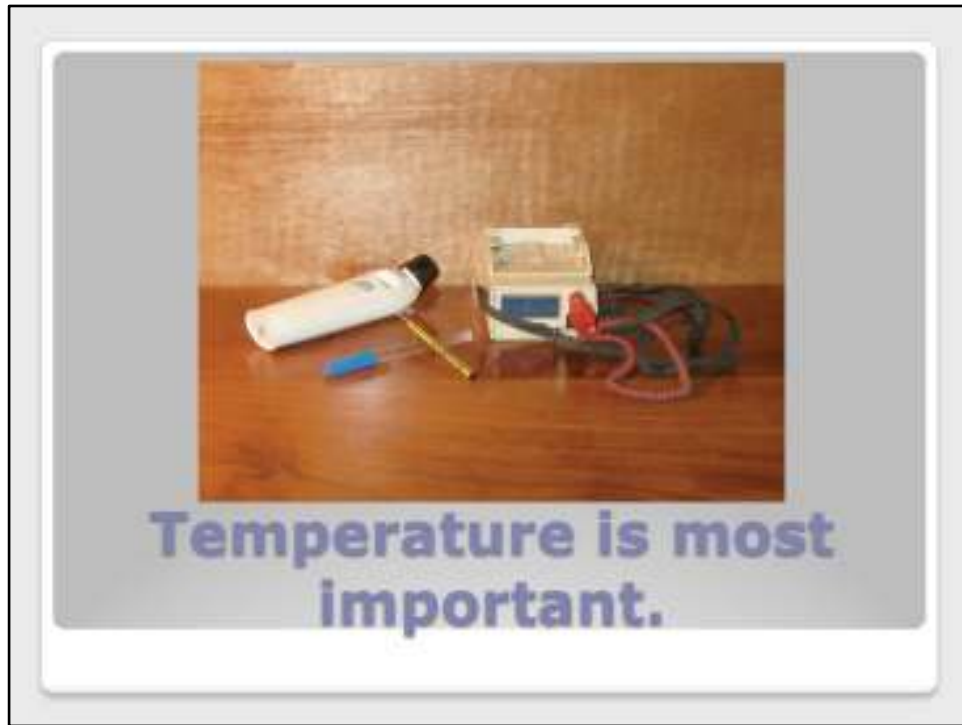
You will necessarily be ignorant of the medical problems you will face in Timbuktu. Therefore, for starters, go light-weight, low-tech, and versatile. You can always have a high-tech item sent later. High-tech equipment tends to disintegrate in the tropics. You need to have low-tech equipment as backups anyway.



First define for whom you will buy. Your own family only? Your own family and household employees? How about church leaders? What if your only translator falls sick; will you try to save his life? What if your only translator's wife falls sick and he needs a week off to care for her? Would you be inclined to shorten her illness? "Only my own family" can quickly expand to "the entire neighborhood."

- Start with diagnostics

Diagnostics are those items that you need to decide what illness you are dealing with.



Mercury or alcohol thermometers are the most accurate, the lightest, and the cheapest. If you will be deployed to high-altitude or temperate or cold climates, don't even consider an ear probe or forehead thermometer. An electronic mouth or rectal electronic thermometer is acceptable.



A watch with a second hand is the low-tech option. If your job description is medical, then a pulse oximeter is the way to go. It will save you much time and many errors in diagnosis.

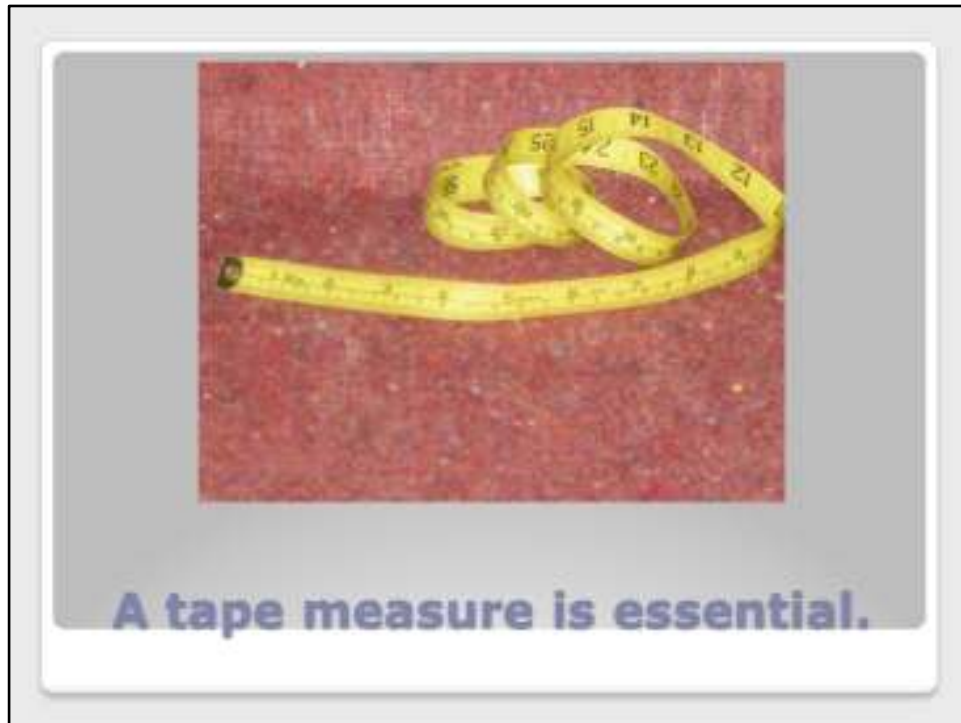
A pulse oximeter is a small electronic device that measures the amount of oxygen in the blood as a percent. It also registers the patient's pulse. They are expensive, about \$200 each, but well worth the money. They will save you a lot of time. Additionally, the respiratory rate is difficult to interpret whereas the pulse oximeter is easy. Any number above 94% indicates normal respiration; 94% or below is abnormal except at high altitudes where lower numbers, down to 92%, are acceptable.



If you intend to treat only your own family and if neither adult has a blood pressure problem, this is one item NOT to buy. If you will have to treat nationals also, it really is essential. Get the low-tech kind, without an electronic read-out. There is less to break or become misleading.



If you have to deal with only your own family and if no one has a weight problem, forget the floor scale. You will still need to know the weights of your children so that you can calculate medication dosages; weighing them yearly while on shopping trips is adequate. If your job description is medical or if there are significant nutritional problems in your area, then scales are essential. Stay away from electronic varieties. When they develop defects, they will cause you endless headaches. It is unlikely that you can have an electronic scale repaired in Timbuktu. You can probably buy a low-tech floor scale in any major city. You will probably have to buy a child's hanging scale and take it with you from the west.



A simple tape measure is valuable for determining mid-upper arm circumference, for measuring abdomens, and for measuring wounds. Be sure to get one with centimeter markings on it. When and if you use it for determining height, you can plug it right into the formula for BMI, without having to convert from inches. Most of the educated world thinks in centimeters. It is worth your time to learn to do so.



Don't buy a fancy cardiology stethoscope. They are expensive and not very useful. People who live in Timbuktu don't have coronary artery disease. The black end of the stethoscope on the left is dome-shaped. It is designed to pick up low-pitched heart sounds which you needn't worry about.

A Sprague-Rappaport-type stethoscope is shown above. The close-up is on the left; the complete instrument with accessories is on the right. It usually comes with a variety of ear pieces and ends. Hence you can choose which ear pieces are most comfortable for you and which ends are most useful. Sprague-Rappaport was originally a brand name. Sprague-Rappaport type stethoscopes borrow the design and are just as good, but they are much cheaper than the authentic variety.



Listen to heart and lung sounds in adults with the large diaphragm end. In the picture on the left, the adult diaphragm end is facing the camera. There is clear, hard plastic within the metal ring, through which you can see the screw attachment.

In the picture on the right, the pediatric diaphragm is facing the camera and tilted slightly down. Use this to listen to children. Children's lung sounds are higher pitched than adults so they are more audible with the small diaphragm.



You can change the ends of the stethoscope by unscrewing the diaphragms. If the clear plastic on the diaphragms should crack, the stethoscope kit has replacement plastic. If these should be lost or cracked, x-ray film cut to size works fine.

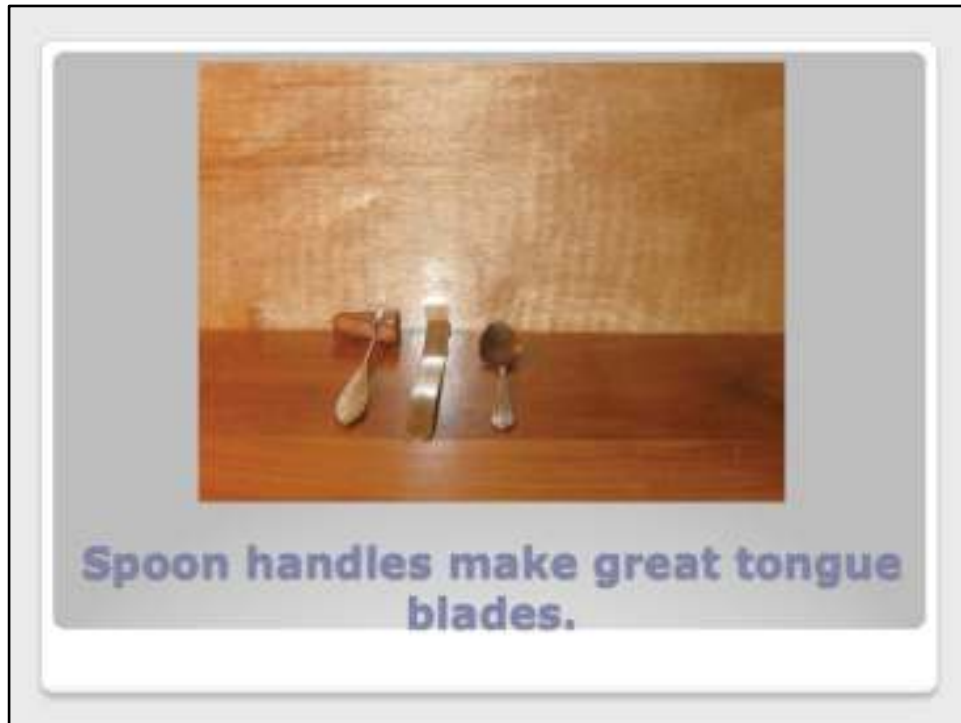
The very small black plastic end is designed to be used on newborns. If you deal only with children, then you will want ends on your stethoscope as shown on the right: a small diaphragm and a newborn bell end.



Stethoscopes usually come with long tubing. For maximum sound transmission, the ideal length of tubing is 9 inches. However, in Timbuktu that is too short for comfort; you will end up inadvertently touching your patient and acquiring his body lice. Cut down the tubing on your stethoscope to 12-15 inches. It is a workable compromise. The red stethoscope above is the original length; the blue stethoscope is the author's.



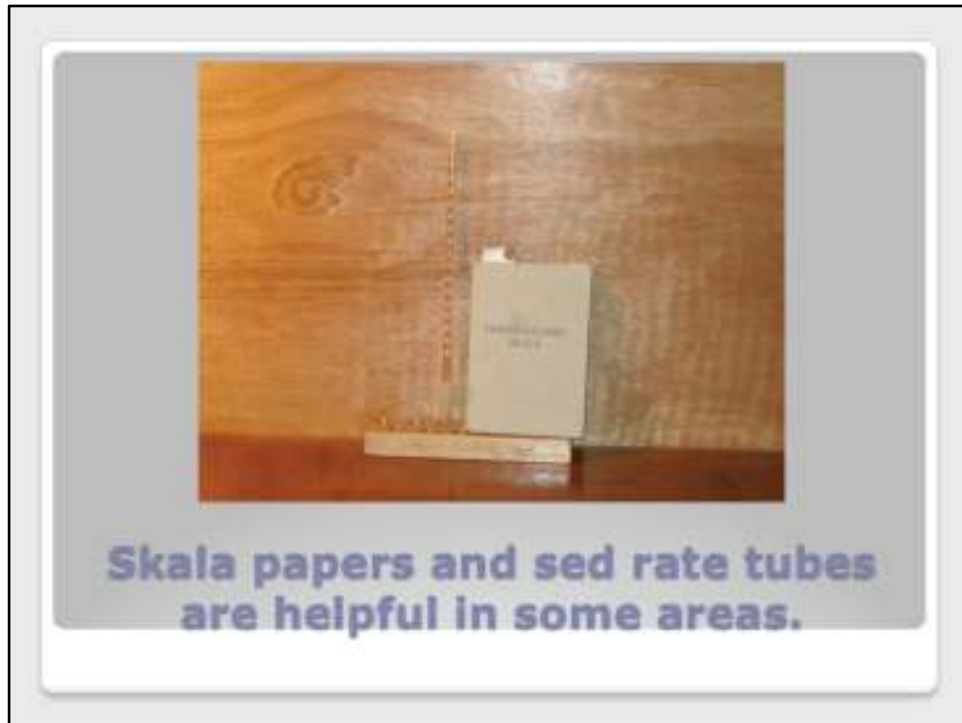
An otoscope is helpful but not essential. If your children are grown past 6 years old and haven't had many ear infections, you needn't buy and take one. A cheap otoscope from a drug store is perfectly adequate for a young family, one with children under age 6. You need something sturdier if your job description is medical to begin with, or if you suspect it will become medical because there aren't many other options in your village.



Wooden tongue blades cannot be easily cleaned and reused. You need something metal. See if you can get some metal-savy supporter to make you a tongue blade or two. Carry some cotton and alcohol along so you can swab it off between patients. A spoon handle works just fine. On the left is a reflex hammer; the handle makes a fine tongue blade. In the middle is a curved strip of metal; from whence it came is ancient history, but it has entered many mouths. On the right is an ordinary teaspoon, the handle of which works great.



Urine dipsticks are worth their weight in gold. They will enable you to make accurate diagnoses the first time, eliminating dangerous and wasteful erroneous treatments. They will also eliminate wasted trips to transport patients to a hospital.



You don't need Skala papers or sed rate tubes for just your own family. However, you do need them if you will be treating nationals or if you will be responsible for other expatriates. You particularly need Skala papers if you will be doing prenatal care. You particularly need sed rate equipment if you will be dealing with evacuation decisions.



Dicyclomine and chamomile tea are both drugs but they come under the category of diagnostics. Abdominal pain is a common symptom and one which elicits concern, for good reason. There are potentially disastrous causes of abdominal pain. Abdominal pain that is relieved by dicyclomine or by chamomile tea generally does not need a surgeon. Lack of relief is one big vote in favor of a quick trip to a surgeon. Even if you anticipate treating only your own family, don't go without one or the other of these.



LED flashlights damage the retina when they are shone directly into the eye. If your flashlight is LED, you will forget and use it on someone's eye. Keep your LED far away from your medical kit.



If you are a female or the husband of a reproductive female, you should have a vaginal speculum with you. Like the urine dipsticks, it will save you a trip to a hospital if you can see what is going on reproductively. If you will deal only with your own family, then one of the light plastic, disposable speculums from your family doctor is entirely adequate. Just pad and pack it well because it is fragile. If your job description is medical, then you should have a metal speculum that you can sterilize.

- Take procedure equipment.

**Consider some
essentials.**

No matter how low-tech or non-medical you are, there are a few essentials if you are more than an hour away from competent medical care.



Even if you intend to treat only your own family, buy and take along examination gloves, shown on the left. They come in boxes of 100. If someone bleeds all over the floor in your house, you need to protect yourself as you clean it up. Don't buy cheapo gloves or those that are labeled "extra sensitive." These gloves disintegrate at the slightest provocation, exposing your hands to deadly viruses. If your job description is not medical, one box should last you an entire three-year term. If your job is medical, you will need multiple boxes. The more expensive gloves can be washed and reused if they have not been blood-contaminated. Exam gloves come in small, medium, large, and extra-large. If you buy gloves a bit too large for your hands, they are easier to pull off without tearing. Thus washing and reusing them is more feasible.

Exam gloves are clean but not sterile. They can be used for suturing and for nearly-sterile procedures if they are washed well with soap and water after being put on. Thus special sterile gloves are not necessary for most people.

If your job description is medical, you might want to also buy sterile gloves as shown on the right. Sterile gloves come in sealed packages and they come in particular sizes. You should consult a medical person who is about your size, to find out what size you should buy. Size designations are in the 5-9 range, with half-sizes as well as full sizes.



If you have gone over the syringe and needle section in the drug lecture, then skip forward to slide 29. Otherwise read the script below and those of the next three slides.

Syringes and needles come in two main varieties, reusable and disposable. Reuseables are very hard to find; they have been virtually eliminated because of the AIDS epidemic. However, they are useful in a medical ministry since they can be sterilized indefinitely. Durbin in London still carries reuseables and they may be available from veterinary suppliers.

Disposable syringes and needles are common and readily available. Syringes come in various sizes: 1 ml, 3 ml, 5 ml, and 10 ml. You need to have 1 ml syringes for infants and small children; they are necessary to carefully measure small doses. For adults, 3 ml is the most useful size if you do not intend to suture wounds. For wound suturing, 10 ml is necessary.

Needles also come in various diameters. A number called gauge indicates a needle's diameter. The relationship between gauge and diameter is inverse; an 18 gauge needle has a larger diameter than a 25 gauge needle. For thick medicines, a large-diameter needle, 18 gauge, is necessary. For most watery medicines, 21-22 gauge is fine. If you will be doing a lot of wound suturing, then 25 gauge will be useful for



Reusable glass syringes are the author's choice, but there are problems. One is that they are hard to find and expensive to buy. Another problem is that they need to be cleaned promptly after each use. After the syringe has become wet the first time, the barrel and the plunger must be stored separately or else the glass will seal together. Once sealed, the two parts are very difficult to separate, though it can be done. Glass syringes are breakable.

It is necessary to sew cloth envelopes for the syringes to maintain sterility and for protection during transport. The cloth envelopes tend to wear out. With repeated use, they become permanently scorched and stained. Making a set of cloth envelopes is a good project for your women's missionary society.



Because of the risk of transmitting diseases, disposable syringes are in vogue. On the left is a disposable syringe packaged in paper and thin plastic. On the right is a disposable syringe packaged in rigid plastic. The rigid plastic is heavier but the cap off the back side is very useful for measuring and dispensing medicines.

There are several problems with disposable syringes. Buying and using them is wasteful. When you travel, your luggage allowance is very limited. You don't want to use it for transporting anything that can be used only once. Another problem is that disposing of the syringes is problematic. Poor people in developing areas are very resourceful in recycling western waste. An apparently new syringe might have been retrieved from a garbage pit, washed in swamp water, dried, and then sealed in a discarded package. You won't be able to tell this history by looking.

If and when you do use disposables, collect the waste in a sturdy tin can such as a 2.5 kg powdered milk can. When the can is full, heat it in an oven or an outdoor fire so that the plastic and the sharps all congeal into an unusable mass. Then bury that mass or dispose of it in an outhouse. Be sure to burn the paper envelopes so they cannot be reused.

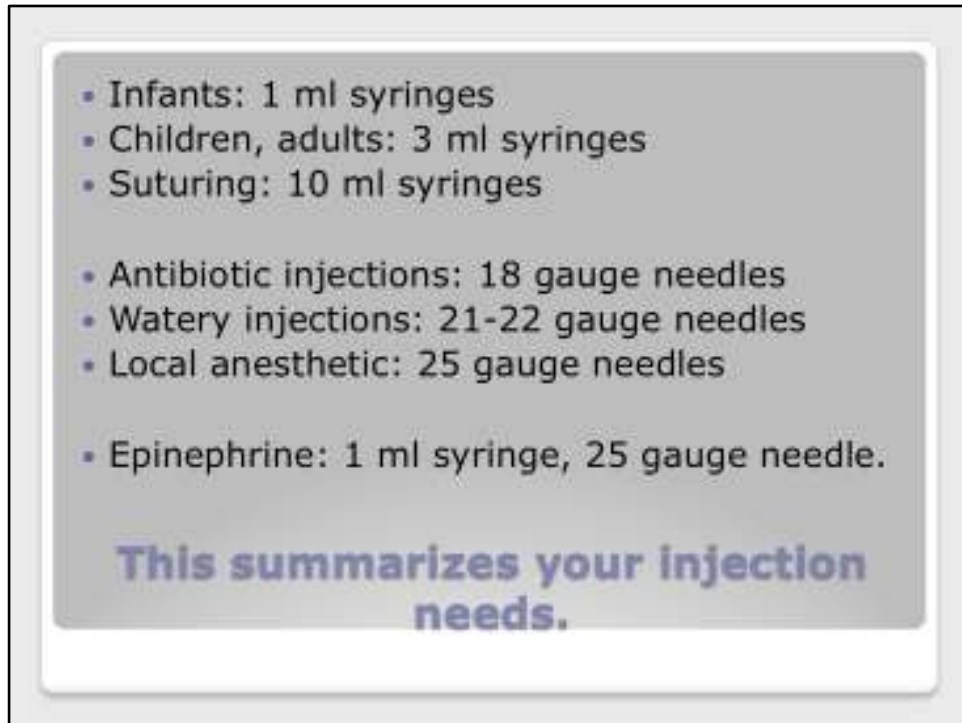


Gauge numbers run from about 13 to 27. The smaller the number, the larger the diameter of the needle. The larger diameter needles hurt more when they pierce the skin, but it is possible to force thick medicine through them. The smaller diameter needles (larger numbers) hurt much less. They cannot be used for thick medicines.

Gauge 13 needles are usually used only by veterinarians. However, this gauge also works well when inserted into the nose end of a stomach tube made from discarded IV tubing. If you can get yourself some 13 gauge needles, do so. They are hard to find.

For injecting humans, the largest diameter that you will use is 16-18 gauge. These are used for giving IV fluids fast or for injecting thick medicines IM, medicines such as long-acting penicillin. For most medications, you will use 19-23 gauge needles, the 19 gauge for antibiotics that are opaque and the 23 gauge for medications that resemble water. Gauge 25-27 needles are usually used for injecting local anesthetic before suturing a cut as well as injecting small amounts of watery medication subcutaneously, right underneath the skin.

In the photograph the needles are, from left to right 16 gauge, 19 gauge, a butterfly needle of 21 gauge, and the needle on the end of the syringe, 25 gauge. In real life it is more obvious than from the photograph, that the needles are successively of finer diameter.



Usually disposable syringes and needles are sold in boxes of 100. Syringes are available with and without attached needles. Attached needles save time if they are the right size for your purposes. They are wasteful if they are the wrong gauge. You may have to pull off a 21 gauge needle and waste it, in order to attach an 18 gauge needle to inject thick antibiotic. Generally the smaller syringes come with finer needles; you will not find a 1 ml syringe with an attached 18 gauge needle. Thus if you anticipate injecting infants with antibiotic, you need to buy 1 ml syringes and 18 gauge needles separately.

You really need at least a couple 1 ml syringes for epinephrine injections, even if your family is all adult. Diabetics all use these syringes so they are readily available. Beg or buy a few syringes from a diabetic supporter so you won't have to buy a whole boxful.



In temperate climates it is quite possible to get away without supplies for wound care. Most wounds can be simply cleaned and they will not become infected. In the tropics it is different. Within a half-hour a contaminated wound will be visibly infected. Hence Band-aids are a necessity. As with gloves, el-cheapo Band-aids are false economy. They do not stick well and thus are wasteful of both money and luggage allowance. Buy good-quality products.

For larger wounds, economizing is easy. If you have an iron, any cloth will do. Ironing a cloth sterilizes it pronto. In developing areas without electricity, irons that are heated on stoves or filled with burning coals are still available. They work just fine for sterilizing. All you need to take in addition is tape—good quality tape and plenty of it. Good quality masking tape works fine. Check out a paint store in a major city; it is better to buy tape locally rather than carrying it from the West.



It is helpful to have some elastic for holding bandages in place. In Western countries, elastic bandages designed for the purpose work fine. There are several cheaper options. One is to buy socks with long elastic tops and always use soap, never detergent, for washing them. Detergent ruins elastic. Once the foot part of the socks are worn through, cut off the feet and use the long elastic tops in place of elastic bandages.

Another option is to get the ladies' missionary society to collect and wash worn panty hose. Have them cut off the panty part and send you the legs. They are light and easily mailed in an envelope. You will find them very versatile for bandaging wounds and also for holding eye patches on the eyes.



Antiseptics are also desirable but here too you can economize. If you can find povidone iodine powder, a half-kilo will last for several terms. It is, however, hard to find. Durbin in London carries it.

Another option is to buy plain petroleum jelly from any pharmacy in any major city. It frequently comes in half-kilo containers such as the one on the right. The British term for the same stuff is soft paraffin. You can then make your own antibiotic ointment by adding oral antibiotic to the petroleum jelly and stirring it. Don't use penicillin this way because it may cause penicillin allergy. Tetracycline is suitable. Stateside povidone iodine ointment is concentrated. You can dilute it in the petroleum jelly to make it go much further.

An alternative to antibiotic ointment is simply to clean the wound initially with soap and water and then use a mild bleach solution (a teaspoon or 5 ml per liter of clean water) to rinse it daily along with changing the dressing.



You should have a basic supply of drugs with you. It is best to have some that have come from Western sources for your own use. Drug stores in major cities of developing countries will sell you anything you want over the counter. However, many of these drugs have come from India or China, and they are substandard or fake. For your own family's needs, try to obtain stateside or European products, if for nothing else than to compare to other drugs for quality control.

The following slides are only for those whose job description in Timbuktu will not be medical. They intend to supply only their own family's needs. Medical people should skip this section.



It is easy to come by drugs for symptom control: aspirin, acetaminophen, ibuprofen, and some anti-diarrhea drugs. These can be bought in any pharmacy but they are usually expensive that way. They may be obtained in bulk and thus cheaper from pharmaceutical suppliers.

Another symptom-control essential is something for nausea and vomiting. Vials of promethazine or another anti-vomiting medication, along with syringes and needles, are most helpful. Insulin syringes are entirely adequate for this purpose; the dosage is usually 1-2 ml. This can, and probably will, save you an evacuation run, if a patient is vomiting and cannot keep down oral medication. An alternative is an anti-vomiting suppository or tablets used as suppositories, but if your patient is also having diarrhea, this is not very helpful.



You will recall from the infectious disease section, that gram-positive antibiotics cause internal infections originating above the waist. They also cause skin infections and some sexually transmitted diseases. If you care only for your own family and no one is penicillin-allergic, then plain penicillin is ideal. The oral form is penicillin VK. It is cheap but it is rarely used in the States anymore, since so many bacteria are resistant to it. In Timbuktu, where there has not been 70 years of antibiotic usage, anything you catch will likely be sensitive to penicillin. If a family member has penicillin allergy, then substitute erythromycin; the same rationale applies to this.



Children under the age of 6 may need antibiotics that cover both gram-positive and gram-negative infections. Usually this is amoxicillin as a first choice. The bacteria in most Timbuktu locations are sensitive to this, whereas it is falling into disfavor in the States. It is cheaper than more recent alternatives.



For internal infections originating below the waist, you need a gram-negative antibiotic. Most commonly these are urinary tract infections and bacterial diarrhea. Actually, it is important to have several alternatives, since sensitivities are not so predictable with gram-negative infections as they are for gram-positive infections. Two good and cheap choices are cotrimoxazole for urinary infections and doxycycline for bacterial diarrhea. Doxycycline is absolutely essential for most infections involving intermediate organisms. Nothing else is as good or versatile. Rumor to the contrary, it is perfectly acceptable for children. If you want to cover more options, then ciprofloxacin is a good addition.



Two major causes of diarrhea worldwide are giardia and amebae. Both of them are responsive to metronidazole. Tinidazole is a closely related drug but it is more expensive; it is interchangeable with metronidazole in most cases.



For a major infection, for use in an emergency, try to obtain a few vials of an injectable antibiotic. Cephtriaxone is by far the best. It covers both gram-positive and gram-negative infections. It comes as a powder on the bottom of the vial, so you need to have sterile water to reconstitute it. You also need to have 18 gauge needles for injecting since the reconstituted antibiotic will not go through a fine needle.



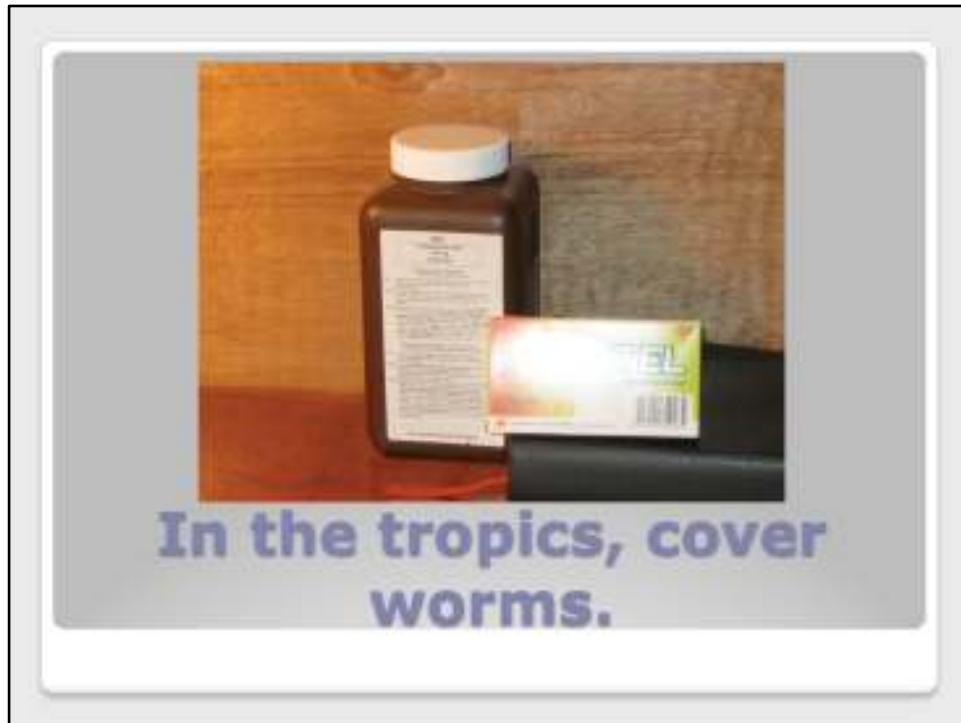
No malaria prevention is 100% reliable. Therefore, you also need drugs for treatment. You must have a different drug for treatment, not the same one that you used for prevention. Malaria prevention is particularly important for pregnant women. The combination of pregnancy and malaria is frequently lethal, particularly late pregnancy and immediately after childbirth.

There are three major options for prevention: proguanil daily plus chloroquine weekly, doxycycline daily plus chloroquine weekly, and mefloquine weekly. Proguanil plus chloroquine is standard. It is suitable for reproductive women as well as for men and children. However, it is expensive. Doxycycline, according to many sources, can be used alone, without the weekly chloroquine. In the author's experience, however, there are many cases of break-through vivax malaria. Hence it is best used with chloroquine rather than as the sole preventive. The same applies to mefloquine. It is supposedly adequate used alone but in fact is not. There is really no realistic way to avoid weekly chloroquine and still be safe.

If you use one of the other medications for prevention, then you can use mefloquine as a back-up for treatment. The best medications for treatment are currently the new artemisinin-combination drugs. However, they are very expensive. If you are conscientious about prevention, then it is worthwhile to keep just a small amount.



For nationals in Africa who are partially immune to malaria and are not taking prophylaxis, by far the best treatment is a combination of chloroquine and chlorpheniramine. Chloroquine is cheap and readily available in most pharmacies in most major cities of the tropics. Chlorpheniramine is a common antihistamine, the active ingredient in most cold medications; the tablets are miniscule and they are cheap. In Africa, chlorpheniramine reverses the resistance of severe, falciparum malaria to chloroquine. The problem is that it does not last in the body for long. It must be given every 6 hours. It may not work well in the Americas or Asia.



Mebendazole and albendazole are two deworming medications that are useful for a variety of worms, but they do not work for tapeworms. It is helpful but not essential for you to find out what worms are prevalent in your area. Mebendazole is extremely expensive in the States but it is readily available and cheap in most tropical areas. The reason for the difference is our litigious society. Mebendazole is reputed to have bad effects in early pregnancy.



In addition to the medications listed above, you should check on what local diseases may be troublesome. For example, in some areas there is schistosomiasis, a kind of worm that infects most of the national population. If you serve in such an area, it is inevitable that you or your children will be infected. The photograph is of a bottle of praziquantel, the treatment of choice for schistosomiasis.



This powerpoint covers only the essentials for the care of a small family residing in Timbuktu. Consult the appendices in Volume 1 for a more complete list.