Meet the Expert

"Prevention of Kidney Diseases"

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Hall E

17.00 to 18.30 hrs.

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Meet the Expert

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Indian nephrologists have the expertise and the facilities to provide all forms of renal replacement therapy for end-stage renal disease. The problem is that a renal transplant costs US$8000, but our per capita annual income is US$430, only 3% of the population earns more than US$1140, and 26% earn less than US$110. Only a fraction of Indians can afford it. Our government is just as poor and spends only US$9 per capita per year on health.

We set up the Kidney Help Trust in 1985 with the aim of raising funds to help patients to pay for transplantation. It did not take us long to discover how foolish we were. We could support a mere handful of patients. Is it right to collect so much money from so many to benefit so few? How does one select the lucky 15 from hundreds of thousands who die each year from renal failure? We could not just tell the rest to go home and die, and so we decided we would shift our aim and use our limited resources to prevent chronic kidney disease (CKD) to the maximum extent possible. With diabetes and hypertension widely prevalent, and the incidence increasing steadily, our plan was simple. We had to identify all diabetics and hypertensives as soon as they got the disease and control blood pressure and blood glucose well before the kidneys were damaged. And we had to do this at the least possible expense.

The people of rural India are served by a number of Primary Health Centers (PHCs), manned by two doctors and a number of paramedical workers. Each PHC covers a population of around 25,000, spread over an area of around 50 square kilometers. An individual village could be 10 kilometers from the PHC. The PHC is supposed to look after the health of the people, but they need to go to the center for attention. Traveling across fields or on cart tracks, waiting in a queue for attention, and then in another for a week’s medicines, would take half a day and would cost a day’s wages. For a family living from hand to mouth, a day without wages is a day without food. Wage earners, and that means all adults in every family, go to the PHC if they are unable to work because of severe pain or high fever, hoping to get well enough to return to their job early. Chronic diseases are ignored. We would never be able to achieve our objective through the PHCs working as they do now.

A widely accepted means of undertaking such a project is to organize a camp. The hope is that, if it is well publicized in advance, everyone will turn up at the camp for the planned study. Prestigious surveys, including some planned and funded from overseas, have been undertaken using camps. My experience has been that only those who know or suspect they have a disease will go to these camps. They are useful for acquiring statistics and for publishing a few papers, but only 30% of patients know they have diabetes or hypertension, and the other 70% would just stay away, confident that there is nothing wrong with them. And what about treatment? Patients who would have to come once a week or once a month to take their medicines would stay away for the same reason that they would avoid the PHC.

The only feasible method of detecting disease, and then of administering treatment over a long period of time, is to go to the person’s home. We have domiciliary programs in India, for tuberculosis and leprosy, but ours was the first for a non-communicable disease. And by
keeping our methods simple, we avoided the need for highly trained personnel for the job. We found our workers easily. Although economic compulsions force urban Indians, women and men, to study enough to take a job and contribute to the family income, rural India is more conservative. Few girls are sent to universities for higher education. They complete high school at the age of 15 and stay at home until they can get married at the legal age of 18. We asked some of them to work for us. We taught them to fill out our forms and registers, to record the blood pressure, and to examine the urine for protein and sugar. They made a positive contribution to our methods, too; they devised compliance registers for patients and made each person wash the container in which his or her urine was collected and the test tube in which it was examined. They had instant recognition and acceptance in the community.

Our single medical officer lives in the city and has his or her own general practice. We provide transportation to the village. The medical officer supervises the work of the field workers and treats all the patients with the cheapest drugs, reserpine and hydrochlorothiazide, metformin and glibenclamide. Details of our methods have been published. The results have been gratifying. Ninety percent of the population cooperates with us. We have controlled hypertension to 140/90 or less in 96% of the hypertensives. Glycated hemoglobin is down to 7% or less in 52% of the diabetics, and in a further 25% we have brought the level down by 10% of the original reading.

When the project had been running for 8 years, we spread our activities to the adjacent area. Both areas have the same climate; the same occupation, mainly agricultural; and the same economic level. We simultaneously surveyed the new group of 21,500 people, and the 20,000 we had served. Among other tests, we calculated glomerular filtration rate by the Modification of Diet in Renal Disease formula in both groups. In short, there were 28 per 1000 with glomerular filtration rate below normal in the new area, and 11 per 1000 in the old. Glomerular filtration rate was below 15 ml/min in 0.87 per 1000 in the new area, and none in the old. Our costs were 43 US cents per capita of the population per year.

I want you to sit back and think for a moment. We have no national figures for the number of people dying of CKD in India. It is patently absurd to project the findings from a population of 21,500 to the entire country of a thousand million, but in the absence of anything more reliable this is probably better than making wild guesses, or applying Western figures to our population. In our new area, 0.87 people per thousand of the population have CKD stage 5. Without dialysis or transplantation, which they and we and the whole country cannot afford, they will certainly die within a year. If these figures are true for the whole country, 940,000 people will die of CKD every year, and just 5000 will go on dialysis or receive transplants. Tsunamis and earthquakes pale into insignificance in comparison, and this number die every year, not just once in a few decades. If we could prevent CKD in 60% of them, or even give them just a few more years of healthy, productive life, the impact would be huge. We have not yet looked at the benefits of preventing strokes and myocardial infarcts and amputation of limbs, but I am sure these would be considerable.

The key word has been economy. Our workers stay in their own homes and are happy to earn the small sum we pay them. Our screening is by a few key symptoms, a recording of blood pressure, and urine examination for protein and sugar, not blood tests. Urine is examined by Benedict’s reagent and sulfosalicylic acid, not by dipsticks, which would add 4 cents per capita and increase our costs by 10%. We use the cheapest medicines.

We have been advised that our yields would be far higher if we concentrated on those older than 40 years. I accept the obvious truth of that but must point out that no less than 12% of the patients we picked up were aged between 20 and 40. This is the group whose protection is most important, for they will have the disease the longest. And once you go to
a house and screen the adults, it does not take much time or effort to include children, who were 0.6% of our patients.

We are convinced that we have established a model that works, that is easy to apply, and that will fit within almost any budget. Our goal now is to widen the coverage to the entire country. We are trying to convince the government to add this program to the work done by the PHCs. The cost is a small fraction of the PHC budget, and the savings should be great. It would be easier to get other nongovernmental organizations, each working in a small area, to emulate us. We were not sure it would be justifiable to divert public funds, collected specifically for this task, to training others, with uncertain results. Only a few would follow through with enthusiasm. Fortunately, the International Society of Nephrology gave me the John H Dirks Award in 2005. I have earmarked this sum for training programs. We have already conducted one such program for representatives of a dozen nongovernmental organizations and hope they will set up similar projects in their places of activity. We intend to conduct more workshops of this sort every few months as long as the International Society of Nephrology funds last.

The economics that guide me may not hold for those of you in the developed world, where manpower costs more and drugs relatively less. However, some lessons from our experience may apply to you too. Only 30% of diabetics and hypertensives are aware of their disease. Considerable damage may be done to their organs before the diagnosis is made. A certain inertia prevents people from making the effort to go somewhere for investigation, but they are often ready to cooperate if the test is brought to them. Visits to homes or offices would greatly add to the number of people diagnosed. As for my compatriots from economies like India’s, I exhort you to adopt this model. Our success is due, I feel, to the simplicity of our methods, and to our firm resolve not to let ambition run away with reality. I have received much well-meant advice to study lipids or genetics, to investigate more, to use blood glucose instead of a urine test in screening. I am sure I could have published many more scientific papers, and perhaps added to the sum total of human knowledge. But if your goal is to provide the greatest good for the greatest number with the least expense, I believe you should stick with the methods of Chennai’s Kidney Help Trust.

References
For the past 10 years, the Kidney Help Trust of Chennai has run a programme to prevent chronic renal failure by regular screening of an entire population of 21,000, and treatment of diabetes and hypertension with the cheapest available drugs. The total cost amounts to just Rs. 21.75 (54 US cents) per capita of the population per year. The program has recently been expanded to cover the adjacent area with a population of 21,500. Both the original population and the new population have been surveyed, and the kidney function has been measured. There are 28 persons with kidney function below normal per 1000 of the new population, while the population covered by the project has only 11 per thousand. Around 60% of chronic renal failure has been prevented with extremely small expense.

The function of the kidneys and the results of kidney failure

The kidneys play a vital role in the purification of the blood, and in the regulation of many aspects of the function of the body: the blood pressure, the formation of red blood cells, and the formation and maintenance of healthy bone being the most important of these. Most human beings are born with two kidneys, and their importance can be judged by the fact that together they weigh just 0.4% of the weight of the body, yet receive 25% of the blood pumped by the heart to the body, and consume 10% of the oxygen. The extremely high blood flow makes the kidney vulnerable to injury, since noxious substances carried in the blood reach the kidney in large quantities. Further, diseases that damage the blood vessels, like diabetes and high blood pressure, affect the kidneys, since they are full of blood vessels. When the kidneys fail, toxins accumulate in the blood and the patient is gradually poisoned. His blood pressure rises, he becomes anaemic and weak, and the bones become brittle and painful. He gradually succumbs to a miserable death.

How can we treat kidney failure?

With a few exceptions, most parts of our country now have numerous hospitals with facilities for dialysis (the purification of the blood) and kidney transplantation (the insertion of a healthy kidney from a living donor or a cadaver into the patient), and these procedures are carried out with very good results. Unfortunately, the cost is extremely high. Dialysis costs between Rs. 15,000/- and Rs. 20,000/- (US $ 340/- to 450/-) per month, and will have to be continued as long as the patient lives. Renal transplantation costs between Rs. 3,00,000/- and Rs. 3,50,000/- (US $ 6,750/- to 7,880/-), and requires medicines costing between Rs. 10,000/- and Rs. 1,00,000/- (US $ 225/- to 2,250/-) per year to prevent rejection of the transplant and to sustain life. Our per capita income is around Rs. 21,000/- (US $ 475/-) a year. The expenditure of the State and Central Governments on health works out to around Rs. 400/- (US $ 9/-) per capita per year. It does not take a mathematical genius to realise that India and Indians cannot afford to treat chronic renal failure. In fact, it is estimated that just 3% of patients with chronic renal failure are now being treated. The only feasible option is to prevent it, if that can be done at a lower cost.
The prevention of chronic renal failure

Diabetes accounts for around 30% of all the chronic renal failure in India and hypertension for another 10%. It has been amply demonstrated all over the world that tight control of these two conditions from the outset will protect against damage to the blood vessels and therefore to the kidneys. In addition, hypertension accelerates the decline in kidney function in all other renal diseases, and good control will give patients many more years of useful and healthy life. If other renal diseases are detected and treated early, it may be possible to cure some of them. We started with the premise that we should be able to prevent half the cases of kidney failure in the country.

The plan of action

We started with a rural area since 70% of India’s population is in the villages, and these are less well served medically. Our population consists of around 21,000 people in 26 villages in Sriperumbudur Taluk. The main workers are girls from the area who have completed their schooling. We train them to perform the simple tasks we require in a few days, and closely monitor their work for the first few weeks till we are confident of their reliability. The demographics of the entire area has been mapped out, and we have a card for each habitation.

1. Screening of every person in the area once in 18 months: our workers ask each one a simple set of questions: have you ever had swelling of the feet, difficulty in breathing, pain on passing urine, blood in the urine, the need to pass urine frequently (more than twice in an hour) or to get up from sleep at night to pass urine, or pain in the back over the kidneys. A sample of urine is examined at the site for sugar and for protein. Most diabetics will be detected by finding sugar in the urine, and protein leaks into the urine in around 80% of kidney disease. The blood pressure is recorded for all individuals over the age of 5.

2. Verification by the doctor: all who test positive by answering any of the questions in the affirmative, who have a high blood pressure (over 140/90), or who have sugar or protein in the urine, are examined by a doctor of the Kidney Help Trust who makes regular visits to each village.

3. Initial investigation: the Apollo Hospital of Chennai has been kind enough to do some simple tests for us free of charge. All subjects verified by the doctor have blood urea, serum creatinine, blood glucose and glycated haemoglobin (a test which gives the average of the blood sugar over the preceding three months) done. Those who already have evidence of kidney disease are invited to go to Apollo Hospital where they are investigated and treated free. However, very few of these patients agree to visit the hospital.

4. Treatment: diabetes is treated with glibenclamide and metformin, hypertension with reserpine, hydralazine and hydrochlorothiazide, all drugs of low cost yet of proven efficacy. Medicines are provided free by the Kidney Help Trust. Enalapril is used only in selected patients as it is more expensive. Monitoring of blood pressure is done at weekly intervals by the health workers, and diabetes is monitored with the glycated haemoglobin done every three months. The dose of medicines is adjusted to achieve good control.

5. Implementation: the health workers go to each village in turn, and establish themselves at the designated centre, which may be the verandah of the school or panchayat office, or sometimes the shade of a convenient tree. The population is invited to come there for the check, but those who do not come are visited at their homes to ensure as near complete coverage as possible.
6. The response: 90% of the populace co-operated for the survey. The figure of 21,000 mentioned earlier is that 90%. Only 30% of the patients picked up had been aware of their disease earlier. This fact underlines the importance of screening every single member of the community. One recognised method of screening populations is to run a camp in an area, where doctors are available for the public to consult and technicians to do investigations. Only those who suspect they have a problem would attend, and 70% of patients would be missed. We would lose the opportunity of treating patients from the very earliest stage of the disease. After diagnosis, 25% of the patients preferred to take treatment with their own doctors. Of the remainder, 79% co-operated for treatment.

7. The results: among those who co-operated with us for treatment, blood pressure was controlled to ideal levels (less than 140/90) in 96%, glycated haemoglobin to normal in 52% and significantly improved though not to completely normal in another 25%.

8. The efficacy of the project: this was assessed after the project had been running for 10 years, by extending the project to an adjacent area of around 21,500. The screening was done in both areas in the same year, and the findings of the two areas were compared. A test was made of the kidney function on this occasion, using a formula in each individual which gives a numerical value for the kidney function (the glomerular filtration rate or GFR). The normal value of the GFR in Indians is between 80 and 110 ml/minute. All those who were picked up by screening and were then verified by the doctor had this estimation done. GFR was found to be below 80 ml/minute in 28 per thousand in the new area that had not had the benefit of the project over the last ten years, and just 11 per thousand in the area covered by our project. It appears that we have prevented 17 patients from developing kidney failure per 1000 of the population, around 60% of those who would have gone into kidney failure without our intervention.

9. The cost of the project: funding has come from a number of individual and corporate donors. Donations to the Trust have been exempted from income tax under Section 80 G of the Income Tax Act. The total cost of the project, including salaries of the workers and the doctors, transport of the doctors from Chennai to the project area, chemicals for the simple urine tests and all the medicines used, have come to just Rs. 21.75 (54 US cents) per capita of the population per year. This does not take into account the tests done at the Apollo Hospital, whose support is gratefully acknowledged.

The course to be charted

We believe we have established and validated an effective protocol for the prevention of a large proportion of kidney failure at a very low cost. We have not measured the impact on the incidence of stroke and heart disease, which would probably be even greater than the benefits to the kidneys. This programme can easily be reproduced by small groups all over the country. It could even be taken up by members of the community themselves, with a little help from doctors and laboratories. The cost is small enough for many even among the poor to bear if all residents of an area take it up, and for those who are too poor even to afford Rs. 21/- (46 US cents) a year, there should surely be no dearth of more fortunate Indians who could help them. It could also be easily incorporated into Government Health programmes using existing staff. We believe it is our duty to disseminate this information, and would be happy to help any group to establish similar programmes.

The Kidney Help Trust

The Trust was originally formed by a group of five doctors and two lay persons who had renal patients in their family. The Trust is registered with the Government of India, and donations to the Trust are exempt from income tax. The Trust is also cleared by the government of
India to receive contributions from abroad. The intention was to help poor patients defray the expenses of renal transplantation. Donations were received from members of the public, mostly wealthy patients of one of the founders. However, it soon became clear that the cost of transplantation was so high that the corpus accumulated after two years would only cover the costs of 15 patients. With thousands of poor patients needing financial support, it was clear that a fortunate handful would benefit and the vast majority would languish and die for lack of the wherewithal to pay for treatment.

The Trust then took a decision to find more effective ways to use its limited funds to benefit a larger number of people with kidney disease. The focus was changed to the prevention of chronic renal disease using an approach of early detection and treatment of hypertension and diabetes, and of other diseases of the kidneys. We also made every effort to keep costs down, so that our programme would be easily affordable even in a poor country like ours.

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