



Collaboration between B. P. Koirala Institute of Health Sciences (BPKIHS), Dharan (Nepal) and Geneva University Hospitals (HUG, Switzerland)

Overview of past and on-going projects

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1. Context

With the exception of Kathmandu, which concentrates most resources, Nepal's health system suffers from a cruel lack of means and of qualified personnel. This situation has led to the creation in 1993 of a university hospital in Dharan, eastern Nepal: the B. P. Koirala Institute of Health Sciences (BPKIHS). The hospital was built on the former military base training Gurkhas soldiers, within the frame of Indo-Nepal cooperation. The Health Ministers of the two countries signed the agreement for establishment of BPKIHS on March 10, 1994. BPKIHS has become the second most important medical university in Nepal, now training 60 to 100 medical doctors each year. The hospital has 650 beds and hosts over 25'000 patients per year. About 180'000 patients yearly consult in the outpatient department. The BPKIHS actively supports five district hospitals in the region and has adopted community-based training approaches. Under this concept students of various programmes visit and/or get posted in primary health centres and/or district hospitals under faculty supervision. On one hand they get opportunity to learn in the community set-up and on the other hand the local health institutions get qualified health work-force regularly to provide quality services to the people.



Main Entrance of BPKIHS, Dharan



For the last twenty years, the University Hospitals of Geneva (HUG) have been engaged in humanitarian partnerships and international cooperation. These activities are a central pillar of their overall policy, and one of the priorities of the HUG. This commitment has led to the creation of the Humanitarian Affairs Committee, a fund financed from private medical fees, and a sustainable development policy that materializes in several projects implemented in developing countries. The Division of International and Humanitarian Medicine works to reinforce the humanitarian and international cooperation activities of the HUG. It carries out activities that facilitate equitable access to health and care, aiming at innovation and excellence. Being the initiator and organizer of the Geneva Forum: Towards Global Access to Health, the HUG actively promotes critical reflexion and debate on access to health. This international conference - held every two years - also serves as an exchange platform and brings together key actors in this field.

The collaboration between the BPKIHS and the HUG was initiated in 1998. A Memorandum of Understanding and a Convention were signed by the two institutions in 2002 and 2008, respectively. The fields covered by this collaboration are training, education and research. Clinical and epidemiological research projects are determined according to their potential public health impact, their relevance for the local population and the partners' respective competences. The HUG have also facilitated the creation of links between the BPKIHS and other partners. These include the World Health Organisation (WHO), the Institute of Tropical Medicine of Antwerp (ITMA), the London School of Hygiene and Tropical Medicine (LSHTM) and the La Tour Hospital in Geneva.



2. Education and training

In 2000, the Division of International and Humanitarian Medicine of HUG established with BPKIHS a clinical elective program for 6th year medical students who want to get practical training in Tropical Medicine. Every year, BPKIHS welcomes between 2 and 4 Swiss students for a 2 months elective stay. The program involves training in internal medicine, paediatrics and family medicine.

Nepalese doctors also have the opportunity to get trained on specific topics at the HUG. In 2009, Dr. B. Pradhan spent three months in the Division of Gastroenterology of HUG and Dr. S. Dhakal is scheduled to get trained for 3 months in non-invasive ventilation in the Division of Pneumology. Finally, Dr. N. Shresta is currently following a one year training program in invasive cardiology at the Cardiology Clinic of Inselspital, Bern.

3. Research Projects

3.1 Visceral Leishmaniasis

Visceral leishmaniasis (VL) is a serious parasitic infection transmitted by a sand fly. The disease was first officially recorded in Nepal in 1980 from one district, but is now endemic in 12 districts in the Central and Eastern Terai, with an estimated 8 million population at risk. In Dharan, the number of cases of VL is estimated at several thousands per year. VL mainly affects children. Infected patients usually present with fever, weight loss, enlarged spleen, and anaemia. If left untreated, the disease is always deadly, hence the importance of early diagnosis. Unfortunately diagnosis is problematic in rural areas because the clinical picture of VL is nonspecific and because invasive procedures are difficult to perform.



Sand flies are responsible for VL transmission. Entomological surveys showed that they are abundant both inside and outside houses.

Diagnosis, treatment, and prevention of VL are the subject of several research projects jointly conducted by the BPKIHS (Prof. S. Rijal, Department of Internal Medicine) and the HUG (Dr. F. Chappuis, Division of International and Humanitarian Medicine). Projects aimed at validating simple diagnostic assays have been conducted in collaboration with the WHO and the ITMA. The "rK39 dipstick" test proved to be most effective in allowing a simple and reliable diagnosis at the patient's bedside: one drop of blood taken by pricking the tip of the finger is deposited on nitrocellulose paper, and a reagent is added. If the patient is infected, an easily visible line appears in a

matter of minutes. This simple and rapid assay is now available in primary care setting, and invasive procedures such as bone marrow or spleen puncture are no longer required.

At the therapeutic level, several studies (e.g. LEISHNATDRUG project) examined the effectiveness of sodium stibogluconate (SSG), a first-line treatment for VL in Nepal for several decades, and the causes of treatment failures. This had never been done, although in the neighbouring province of Bihar in India, most patients no longer responded to this drug. Of 110 patients tested in Nepal, the overall failure rate of SSG was 10 percent, and the rate increased to 24 percent in the districts bordering Bihar. The project helped revise the national protocol for VL, which now recommends using alternative treatments such as amphotericine B and miltefosine.



Leishmania parasites as seen under a microscope.

In terms of prevention, the efficacy of long lasting insecticide-impregnated bed nets has been evaluated within the frame of the KALANET project. This EU-funded project coordinated by ITMA ended in autumn 2009. The project showed that while insecticide-impregnated bed nets were effective against malaria transmission, they did not help reduce the number of VL cases. These findings were taken into account in the design of the VL elimination program currently being implemented in Nepal, India and Bangladesh.

3.2 Snake Bites

Snake bite is an important medical emergency in rural Nepal. The WHO estimates that 20'000 people are bitten by snakes each year in Nepal, resulting in over 1'000 deaths. However, as most deaths occur in the village or during transport and are therefore not recorded, the true public health impact of snake bites is likely to be much higher. The majority of bites occur in the Terai, a lowland agricultural plain located south of the country and characterized by hot tropical climate and high population density. Most bites occur during the rainy season (April to October) that corresponds to the peak in farming activities. Snake venom contains potent neurotoxins that lead to progressive descending paralysis. Patients usually die of respiratory failure, once paralysis reaches the diaphragm and the inter-costal muscles.



Snake bites most often occur during agricultural activities



Snake venom are being collected to develop diagnostic assays and specific treatments

The BPKIHS (Prof. S. Sharma, Department of Internal Medicine) and the HUG (Dr. F. Chappuis and Dr. E. Alirol, Division of International and Humanitarian Medicine) have a long-standing collaboration in the field of snake bites. In 2001, a retrospective study conducted in five villages totalling 10'550 inhabitants made it possible to determine the actual impact of snakebites in the population. The results are impressive: each year, snakebites account for 1 death out of every 100 and are fatal in 10.5 percent of cases. A major determinant of this high mortality is that victims are not transported quickly enough to treatment centres where antidotes are available. Starting from 2004, an intervention combining community education and immediate transport of

snakebite victims by volunteers on motorbikes was implemented. A pilot study of four villages totalling 60'000 inhabitants showed that this strategy significantly lowered mortality (from 10.5 to 0.5 percent). The community awareness and motorcycle volunteer programs have been progressively extended since 2005 to 50 villages around Dharan, and now covers over 300'000 people.

Another research project, which started in spring 2010, aims at improving the clinical management of snake bite victims at the primary care level. The goal is to develop adequate species identification tools for clinicians and health staff working in rural areas. This is crucial to choose appropriate treatment and anticipate complications. In addition to the HUG and the BPKIHS, two other institutions are involved: the Biodiversity and Climate Research Institute (BiK-F) in Frankfurt am Main, Germany, and the Kathmandu Natural History Museum that is

part of Tribhuvan University. The project involves the establishment of a snake farm in BPKIHS and the collection of venoms from different species of venomous snakes.

3.3 Chronic Diseases

According to WHO, in 2005, out of 58 million deaths from all causes, non-communicable diseases account for 35 million deaths. 80% of these deaths occur in low- and middle-income countries. People in low- and middle-income countries are more exposed to chronic diseases risk factors such as hypertension, raised cholesterol, and alcohol consumption. They are less exposed to prevention efforts than people in high-income countries. In addition, they have less access to effective and equitable health care services. As a result, many people in low- and middle-income countries die younger from cardiovascular (CVDs) and other chronic diseases, often in their most productive years.

Chronic Kidney Disease

Chronic kidney disease (CKD) is a huge health burden worldwide, yet the condition struggles for recognition on global health agendas. In Nepal as in other developing countries, many people with CKD present with end-stage renal disease, at the point at which only dialysis or kidney transplantation can help. Yet, these interventions are only available in high-income countries, and to selected few in poorer nations. For patients with CKD in developing countries, end-stage renal disease is almost always a death sentence. In these countries, prevention is therefore crucial.

Nepal's 27 million inhabitants have access to just 10 nephrologists. Fewer than 10% of patients with end-stage renal disease have access to dialysis or kidney transplantation. In 2002, the BPKIHS (Prof. Sharma, Department of Internal Medicine) initiated a hospital-based program named "Renal Disease Prevention Clinic" – with the objective of improving early detection and treatment of patients with CKD.



Primary prevention of heart and kidney disease: information to the general public

In 2004, the program was extended to district hospitals and primary health care centres, and a community-based volunteer program was created. A total of 20'000 people from 4 districts of Eastern Nepal were screened for hypertension, diabetes, CKD and other chronic diseases risk factors. Obesity, diabetes, and hypertension were found in 5.4%, 8.4%, and 22% of the population respectively. This screening program was coupled with awareness-raising activities, including public lectures, educational workshops and diffusion of prevention messages in local newspapers.

The CKD prevention program was further extended to schools with the support of the HUG (Dr. Slama, Division of International and Humanitarian Medicine). To date about 8'000 children were screened, and the initial results are worrying.



Alcohol misuse and related liver diseases

The public health impact of alcohol consumption is well established. In addition to chronic diseases (i.e. liver diseases and cancers) that may affect drinkers after many years of heavy use, alcohol contributes to various trauma (e.g. road accidents) that kill or disable at a relatively young age. The WHO estimates that every year, alcohol causes 2.5 million deaths (3.8 % of total) worldwide.

Globally alcohol consumption has increased in recent decades, with all or most of that increase in developing countries. Nepal is not an exception. Types of traditional and local alcoholic beverages include country liquors (low quality alcohol made from molasses and produced in small distilleries), homemade liquors, *Jad* (made of rice), *Chhang* (made of rice by a different method) and *Raksi* (home-brewed alcohol made out of rice, millet or barely). In most part of the country, liquor is freely available.

Problem drinkers can benefit from physician intervention at the time of a clinical visit or from referral for alcoholism treatment. However, detection of alcohol abuse is particularly challenging in the busy out-patient and emergency departments. Within this context, the BPKIHS (Dr. N. Pradhan) and the HUG (Prof. A. Hadengue, Division of Gastroenterology and Hepatology & Dr P. Gache, Alcohol Dependence Unit) conducted two complementary studies in 2009.

The first study aimed at improving the detection and quantifying alcohol related problems in BPKIHS. This study was the first to validate the use of the AUDIT questionnaire as a screening tool in Nepalese language. Between March and September 2009, 1'332 patients were screened, of whom 40.3% had a drinking problem (either alcohol abuse or dependence) and 62.9% were excessive consumers.

A second study was conducted to determine the nature and quantity of alcohol consumed by these excessive drinkers. Among 447 patients seen at BPKIHS, most consumed home made locally brewed alcohol like chhang (62%), rakshi (77%) and tongba (16.3%). Very few patients consumed commercially available spirits (2.5%) or wine (12.3%). On average, patients consumed 21 Units (i.e. 10 grams of pure alcohol) per day. Chronic Liver Disease (i.e. established cirrhosis, or extensive fibrosis leading to cirrhosis) were detected in 144 of these patients. Raksi consumption was identified and an independent risk factor for the development of chronic liver disease in excess drinkers.

The results of these two studies had a significant impact: the AUDIT questionnaires in Nepalese will now be used systematically in community medicine for detecting excess drinking. In addition, health professionals and policy makers were informed of the specific toxicity due to raksi. Hopefully, this issue will be taken into account in the development of future health policies.

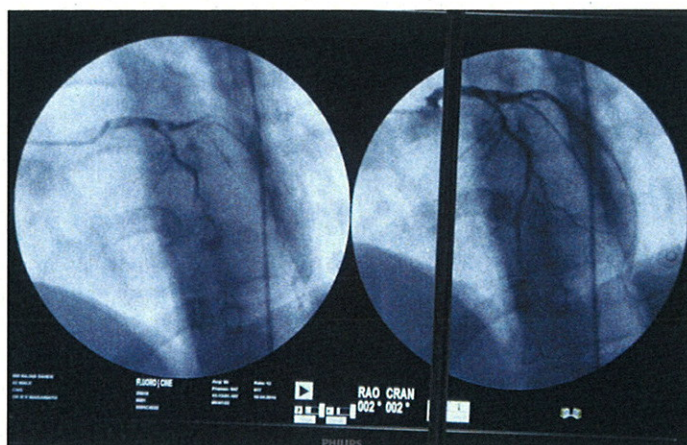
Cardiovascular Diseases

According to WHO, an estimated 17.1 million people died from cardiovascular diseases (CVDs) in 2004, representing 29% of all global deaths. Low- and middle-income countries are disproportionally affected: 82% of CVD deaths take place in low- and middle-income countries and occur almost equally in men and women. By 2030, almost 23.6 million people

will die from CVDs, mainly from heart disease and stroke. The largest increase in number of deaths will occur in the South-East Asia Region

Thanks to contacts established with the help of the Division of International and Humanitarian Medicine of HUG, a memorandum of understanding was signed in 2008 by the BPKIHS and the La Tour Foundation for Cardiovascular Research (TFCVR; Dr P. Urban). It defines two main themes of collaboration:

1. Give financial support to the ongoing program of primary prevention of cardiovascular and renal diseases (Prof. Sharma, BPKIHS)
2. Start a full program of invasive and interventional cardiology at BPKIHS, so as to treat mainly coronary and rheumatic valve diseases.



Coronary arteries, as seen during an invasive coronary angiogram

BPKIHS is the tertiary referral centre for all eastern Nepal and serves several million people. It certainly needs to acquire the ability for invasive heart procedures, since there are currently only two hospitals equipped with catheterization laboratories in the whole country, and both are in Kathmandu. To this end, the TFCVR is currently contributing the following:

- Acquire a complete cath lab and install it at BPKIHS by the end of 2010. A Philips Allura system, manufactured in India, has been chosen.
- Funding a Nepalese cardiologist (Dr. N. Shreshta) for a 12 months training period at the Inselspital in Bern (Prof. Meier and Prof. Windecker).
- Funding regular visits of experienced Swiss cardiologists (Dr. Urban and others) to BPKIHS in 2011 and 2012, to support Dr. Shreshta and the local team, and contribute to their continuing education (ca. six visits per year). Based on previous experience elsewhere, it is estimated that the local team should be fully independent after two years of such coaching.

BPKIHS provides nursing and technical staff, as well as funding for the maintenance of the x-ray equipment and for the acquisition of the necessary disposables (catheters, balloons, stents, contrast medium, etc)



4. Conclusion / Future Perspectives

The past 10 years have witnessed the strengthening of educational and research links between the BPKIHS and the HUG. An estimated 30 Swiss students have benefited from the exchange program established by the two institutions and several Nepali doctors were trained in Switzerland. A number of research projects, in a variety of fields, have been- or are currently being conducted. The translation of these studies' results into practice has had a direct positive impact on the population among which these studies were conducted. Moreover, these projects allowed both partner institutes to improve their research skills while strengthening their expertise. The collaboration between the BPKIHS and HUG helped the main investigators to enhance their international exposure and to be promoted in their respective institutions. The projects resulted in numerous publications and gave Nepali investigators the opportunity to present their work at international conferences such as the Geneva Health Forum. This is of particular importance for physicians working outside of the capital.

Joint research initiatives will expand. A large EU-funded project, the NIDIAG project, is expected to start at the end of 2010. The objective is to develop an integrated approach to both neglected and non-neglected diseases frequently encountered in primary care settings. The project involves the HUG, Swiss Tropical and Public Health Institute (STPHI), ITMA, LSHTM, BPKIHS and other institutions. In addition, a clinical trial on treatment of envenomed snake bite and several studies on chronic diseases are in the pipeline. The BPKIHS-HUG partnership has been recently recognized as one of the success stories by the Commission for Research Partnerships with Developing Countries (KFPE): http://www.kfpe.ch/key_activities/publications/success_stories/. The plan for the years to come is to further reinforce and improve this partnership.

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