Management of chronic kidney disease and its risk factors in eastern Nepal

In the past two decades, community screening programmes for chronic kidney disease have been progressively increasing in rural and urban areas of low-income and middle-income nations.[1] However, screened individuals are seldom maintained on active follow-up even when they have been identified with risk factors. This problem particularly applies to patients living in rural areas where major barriers are low awareness about renal disease and its management, and, more importantly, poor transport infrastructure and precarious family financial conditions that prevent young adults from taking time off work to attend city hospitals.

To overcome this problem, the Department of Medicine of the BP Koirala Institute of Health Sciences (BPKIHS) in Dharan, Nepal, in collaboration with the International Society of Nephrology and the Clinical Research Center for Rare Diseases of the Mario Negri Institute for Pharmacological Research in Bergamo, Italy, set up a screening and intervention programme in rural communities of eastern Nepal to improve management of chronic kidney disease and its major risk factors. BPKIHS created a network of small health-care units in communities that can refer to primary health centres or district hospitals. Meetings were held initially with local leaders (administrators, local political leaders, and school teachers) to explain the benefits of a screening and intervention programme. After these individuals gave their approval and support, a series of community awareness activities were carried out with the help of local leaders, community volunteers, and medical students and doctors from BPKIHS.

For screening, all people aged 18 years or older were invited to one of the small health-care units in close proximity to their houses. On the day of screening, the research team collected, via a short questionnaire, the patients' general information, demographic data, diet, smoking habit, alcohol consumption, and physical activity. The data recorded included family and personal medical history of kidney disease, high blood pressure, diabetes, cardiovascular disease, and any present drugs or treatments. Height, weight, and blood pressure were measured in accordance with standard guidelines. A clean midstream spot urine specimen (to assess protein concentration) and blood samples (to test for fasting blood glucose and serum creatinine concentrations) were collected. High blood pressure, fasting hyperglycaemia, proteinuria, or impaired renal function were confirmed 10 to 15 days after samples were collected, and verified by qualified doctors. Patients with hypertension, hyperglycaemia, proteinuria, or renal function impairment were invited to enter the follow-up study via scheduled visits at the health-care unit of the village or nearby. They were prescribed cheap antihypertensive, antidiabetic, or renoprotective drugs as deemed appropriate.

Of 20 811 individuals screened in the communities of eastern Nepal within this programme,[2] 4471 participants who had high blood pressure or fasting blood glucose, proteinuria, or impaired renal function were followed up annually for 3 years. Of 4471 participants, 3419 (76%) were on active monitoring after the 3 year follow-up. In this cohort, 697 (53%) of 1315 individuals with high baseline systolic blood pressure had values reduced to a healthy range, as did 878 (63%) of 1349 individuals with high baseline diastolic blood pressure, and 354 (55%) of 643 individuals with baseline hyperglycaemia. 63% of participants with dipstick proteinuria equal to or more than 1+ at baseline progressively decreased to normal values during the 3 year follow-up (table). In 48% of participants with mild-to-severe renal insufficiency (estimated glomerular filtration rate [eGFR] <60 mL/min per 1·73 m^2) at baseline, renal function improved (table). No participants progressed to end-stage renal disease, which would require renal replacement therapy with dialysis. The prevalence of participants with a predicted 10 year cardiovascular risk of 10% or more was 28% at baseline and decreased to 17% after 3 years (table).[3]

These findings show that an affordable local organisation can deliver substantial population-wide benefits to manage chronic kidney disease and its risk factors in the resource-poor setting of eastern Nepal. In the long term, the programme is expected to decrease the prevalence of end-stage renal disease and the need for renal replacement therapy and reduce cardiovascular morbidity and mortality. Although the general approach adopted in Nepal could be an example suitable for other resource-poor countries with an increasing burden of non-communicable diseases, the methods should ultimately suit local needs and

	Baseline	Visit 1	Visit 2	Visit 3
Dipstick proteinuria (n=456)				
<1+	0	225 (49%)	270 (59%)	287 (63%)
≥1+	456 (100%)	231 (51%)	186 (41%)	169 (37%)
eGFR (mL/min per 1·73m²; n=1081)				
>60	0	487 (45%)	499 (46%)	520 (48%)
<60	1081 (100%)	594 (55%)	582 (54%)	561 (52%)
Predicted 10 year cardiovascular risk (n=3418)				
No risk	1193 (35%)	..	..	1718 (50%)*
<10%	1283 (38%)	..	..	1116 (33%)*
10–20%	374 (11%)	..	..	344 (10%)
20–30%	340 (10%)	..	..	170 (5%)*
30–40%	95 (3%)	..	..	25 (1%)*
>40%	133 (4%)	..	..	45 (1%)*

Data are expressed as number of individuals (% of baseline). eGFR=estimated glomerular filtration rate. *p<0·0001 *vs* baseline.

Table: **Risk factor prevalence in patients in a chronic kidney disease management programme in eastern Nepal**

factors such as health awareness, and account for availability of human and material resources.[4,5]

We thank local volunteers and organisations operating in the communities of eastern Nepal for their active participation and support. Data were collected through the International Society of Nephrology (ISN) Kidney Disease Data Center (KDDC) and analyses were partly funded by a grant from the ISN. The screening and follow-up programme in communities of eastern Nepal was partly supported by a dedicated grant of the ISN Research & Prevention Committee (Application year: 2005; Early detection program for chronic kidney disease, hypertension, diabetes, and cardiovascular diseases in the Kingdom of Nepal: a pilot feasibility study). The funder had no role in the design, analysis, or writing of this correspondence.

We declare no competing interests.

*Sanjib Kumar Sharma, Anup Ghimire, Sergio Carminati, *Giuseppe Remuzzi, Norberto Perico*

giuseppe.remuzzi@marionegri.it

Departments of Internal Medicine (SKS), and Department of Community Medicine and Public Health (AG), BP Koirala Institute of Health Sciences, Dharan, Nepal; Clinical Research Center For Rare Diseases 'Aldo e Cele Dacco', IRCCS Istituto di Ricerche Farmacologiche Mario Negri, Bergamo, Italy (SC, GR, NP); and Unit of Nephrology and Dialysis, AO Papa Giovanni XXIII, Bergamo, Italy (GR)

1 Couser WG, Remuzzi G, Mendis S, Tonelli M. The contribution of chronic kidney disease to the global burden of major noncommunicable diseases. *Kidney Int* 2011; **80:** 1258–70.

2 Cravedi P, Sharma SK, Bravo RF, et al. Preventing renal and cardiovascular risk by renal function assessment: insights from a cross-sectional study in low-income countries and the USA. *BMJ Open* 2012; **2:** e001357.

3 WHO, ISH. WHO/ISH Risk prediction charts for 14 WHO epidemiological sub-regions. International Society of Hypertension, World Health Organization, 2007. http://ish-world.com/downloads/activities/colour_charts_24_Aug_07.pdf (accessed July 25, 2014).

4 Jha V, Garcia-Garcia G, Iseki K, et al. Chronic kidney disease: global dimension and perspectives. *Lancet* 2013; **382:** 260–72.

5 Remuzzi G, Benigni A, Finkelstein FO, et al. Kidney failure: aims for the next 10 years and barriers to success. *Lancet* 2013; **382:** 353–62.