• Major sources of vital statistics such as Sample Registration System, Civil Registration Systems, and National Family Health Survey. In addition, disease registries on specific diseases are available such as the Indian Council of Medical Research or ICMR cancer registry program, national stroke registry and they need to be brought under surveillance.[17,18] While surveillance through the use of population-based registries is critical for monitoring disease trends and evaluating NCD control programs, these need to be evaluated to assess quality parameters such as data validity, timeliness, and representativeness.[19]

• Other data available from research studies, existing monitoring, and evaluation systems can be used along with other sources of data to estimate the burden of disease.

3. The health system response and capacity. Global monitoring framework also calls for reporting by countries on health system capacity to respond to NCDs through the availability of essential medicines, counseling, affordable, and basic/appropriate technologies/equipment such as glucometers. It might be useful from program point of view to include this component also in the surveillance guidelines. Conventionally, such data are not included as a part of surveillance, but we believe we should be guided by program needs and this will be useful from program point of view.

The Political Declaration of the recent UN High-Level Meeting on NCDs (2011)[20] urges each country to integrate NCD surveillance with existing surveillance and monitoring systems, as well as into existing national health information systems. It is thus expected that surveillance be recognised as a critical component of NCD program and adequate funding be set aside for this purpose, that all available data from various sources will be collected and analyzed to estimate the burden of disease, and that surveillance data be made available widely including on the program website and used for program planning and monitoring and evaluation.

Finally, good surveillance data can play a critical role in good decision-making and ultimately for better delivery of NCD services. Experience shows that intuitively the programs which have had a better surveillance program or more reliable data, have had more success or had better program performance. It is also imperative to periodically evaluate surveillance system and assess it is quality and usefulness. The evaluation data so obtained can then be used to further improve the system.

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References
1. Public Health Surveillance. World Health Organization. Available from: http://www.who.int/topics/public_health_surveillance/en/. [Last accessed on 2018 Sep 06].
2. Frieden TR. Six components necessary for effective public health program implementation. Am J Public Health 2014;104:17-22.
3. World Health Organization. Noncommunicable Diseases and Their Risk Factors: STEPwise Approach to Surveillance (STEPS). Geneva: World Health Organization; 2003. Available from: http://www.who.int/ncds/surveillance/steps/en/. [Last accessed on 2018 Sep 06].
4. International Institute for Population Sciences (IIPS). Global Adult Tobacco Survey India (gats India). Mumbai and Ministry of Health and Family Welfare, Government of India; 2009-2010.
5. Tata Institute of Social Sciences. Global Adult Tobacco Survey GATS 2 India. Mumbai and Ministry of Health and Family Welfare, Government of India; 2016-17.
6. World Health Organisation. Global Youth Tobacco Survey. Available from: http://www.who.int/tobacco/surveillance/gyts/en/. [Last accessed on 2018 Sep 06].
7. WHO STEPS Surveillance Manual. The WHO STEPwise approach to Noncommunicable Disease Risk Factor Surveillance. World Health Organization. Available from: http://www.who.int/ncds/surveillance/steps/steps_Manual.pdf. [Last accessed on 2018 Sep 06].
8. United Nations Development Program. Sustainable Development Goals. Available from: http://www.undp.org/content/undp/en/home/sustainable-development-goals/background/. [Last accessed on 2018 Sep 06].
9. NCD Global Monitoring Framework. World Health Organization. Available from: http://www.who.int/nmh/global_monitoring_framework/en/. [Last accessed on 2018 Sep 06].
10. World Health Organization. Burden of NCDs and their risk Factors in India. Available from: http://www.searo.who.int/india/topics/noncommunicable_diseases/ncd_situation_global_report_ncds_2014.pdf. [Last accessed on 2018 Sep 06].
11. World Health Organization. Noncommunicable Diseases Country Profiles. World Health Organization; 2014. Available from: http://www.who.int/nmh/publications/ncd-profiles-2014/en/. [Last accessed on 2018 Sep 11].
12. National Centre for Disease Control and Indian Council of Medical Research/NIMR. IDSP-NCD-Risk Factor Survey. Available from: http://www.nims-icmr.nic.in/NIMS/idsp.jsp?search_idsp=idsp_home. [Last accessed on 2018 Sep 23].
13. Sarma PS, Sadanandan R, Jissa VT, Soman B, Srinivasan K, Varma RP, et al. Prevalence of major risk factors of non-communicable diseases in Kerala, India: Methodology and key findings of a state-wide representative cross-sectional survey in over 12,000 households. BMJ Open. [Under review].
14. Thakur JS, Jeet G, Pal A, Singh S, Singh A, Deepthi SS, et al. Profile of risk factors for non-communicable diseases in Punjab, Northern India: Results of a state-wide STEPS survey. PLoS One 2016;11:e0157705.

15. Integrated Disease Surveillance Programme. National Centre for Disease Control. Government of India. Available from: http://www.ncdc.gov.in/index1.php?lang=1&level=1&sublinkid=106&lid=54. [Last accessed on 2018 Sep 06].

16. Narain JP, Dikid T, Kumar R. Noncommunicable diseases: health burden, economic impact and strategic priorities. In: Narain JP, Kumar R, editors. The Textbook of Noncommunicable Diseases. The Health Challenge of 21st Century. New Delhi: Jaypee Medical Book Publishers; 2016.

17. Rath GK, Gandhi AK. National cancer control and registration program in India. Indian J Med Paediatr Oncol 2014;35:288-90.

18. National Centre for Disease Informatics and Research (Indian Council of Medical Research). Bangaluru: National Stroke Registry. Available from: http://www.ncdirindia.org/stroke/BS_About.aspx#NSRP. [Last accessed on 2018 Sep 11].

19. Yadav R, Garg R, Manoharan N, Swasticharan L, Julka P, Rath G, et al. Evaluation of Delhi population based cancer registry and trends of tobacco related cancers. Asian Pac J Cancer Prev 2016;17:2841-6.

20. Sixty-Sixth Session of the United Nations General Assembly. Political Declaration of the High-level Meeting of the General Assembly on the Prevention and Control of Non-Communicable Diseases. 16 September, 2011. Available from: https://www.undocs.org/en/A/66/L.1. [Last accessed on 2018 Sep 11].
Diabetic care delivery with package of essential noncommunicable diseases interventions protocol in rural Nepal: A district hospital-based study

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ABSTRACT

Background: Diabetes ranks fourth among the noncommunicable diseases (NCDs) in terms of proportional mortality in Nepal and is increasingly diagnosed in rural population. We aimed to evaluate the care delivery in diabetes patients in a rural primary care hospital that had implemented the World Health Organization’s Package of essential NCDs interventions (PEN) protocol.

Subjects and Methods: This was a descriptive study in a rural district hospital. The study was conducted over 5 months and was undertaken as a part of the quality improvement project in the hospital. Data were extracted from the electronic medical record of the hospital after approval from hospital administration.

Results: The total diabetic patient visits during the study period were 682 of 30,758 total outpatient visits (2%). There were 240 unique diabetic patients. The age ranged from 25 to 82 years with the median age of 52. Glycated hemoglobin was done in 15 of 59 new cases and in 33 of 181 follow-up cases. Urine protein was assessed in 65 of 240 patients. Comorbidities and complications were documented in 96 of 240 patients (40%), hypertension being the most common. Fifty-six patients (23%) had obtained control as per the target levels with different modalities of treatment, 69 (29%) had partial control, 85 (35%) struggled to reach targets, and 30 (13%) failed to appear in follow-up visits.

Conclusion: The study described our adherence to the PEN protocol and identified several areas of improvement in our diabetes care delivery such as continuous medical education activities and monitoring of care delivery with similar study in future after implementation of proposed interventions.

Keywords: Diabetes, essential medicines, package of essential noncommunicable diseases protocol, primary care, rural

Introduction

Nepal is a developing country where rural communities constitute 80% of the total population.¹ With changing lifestyles, urban influence, and improving health-care access, diabetes mellitus is increasingly diagnosed in rural population.²,³ Diabetes ranks fourth among the noncommunicable diseases (NCDs) regarding proportional mortality in Nepal.⁴ A meta-analysis suggested that the prevalence of diabetes in urban and rural communities is 8.1% and 1%, respectively.⁵,⁶

Alarmed by the prevalence and impact of diabetes, Government of Nepal has endorsed the World Health Organization’s (WHO’s) Package of Essential NCDs (PENs) protocol in July 2016 to provide cost-effective interventions for screening and management of NCDs including diabetes...
in resource-limited health-care settings.\cite{7} Bayalpata Hospital is a primary care district hospital which serves almost 300 patients per day in the outpatient department and has a catchment population of 150,000. The hospital has primary care physicians and health assistants work together to screen diabetes along with other NCDs in susceptible individuals and facilitate management. The health assistants examine, investigate, and prescribe medications and seek consultations with physicians on need basis. Health assistants are effective and cost-effective in mitigating the problem of health personnel shortage in rural community and in providing quality health care.\cite{8,9} The hospital utilizes electronic medical record system to strengthen protocol-based care and possesses a robust team of community health workers to ensure regular patients' follow-ups in the hospital. The hospital has a formulary of around 300 drugs including metformin, glimepiride, and premixed 30:70 insulin as recommended by the PEN protocol and national list of essential medicines.\cite{10,11}

The study aimed to measure the burden of diabetes in the rural hospital setting, to evaluate the team efficiency in the care of diabetes patients, and to determine the sufficiency of therapeutic armamentarium.

**Subjects and Methods**

The study was carried out in the patients attending the Outpatient Department of Bayalpata hospital, located in one of the most rural settings in Nepal. It takes nearly 10 h to reach nearest multispecialty hospitals. This was a descriptive study and was undertaken as a part of quality improvement project for diabetes care. Data were collected from the electronic medical record system of the hospital for the duration of 5 months from November 1, 2017 to March 31, 2018. All the patients visiting the outpatient department and having the diagnosis of diabetes were enrolled in the study. Prior approval was obtained from the hospital administration for data extraction from its electronic medical record system.

We collected data of patients including gender; age; investigations such as fasting and postprandial plasma glucose levels, glycated hemoglobin (HbA1c), and urine protein; comorbidities; and medicines prescribed. In the institutional protocol, diabetes was diagnosed as per the American Diabetes Association (ADA) guidelines 2017 when (i) the patient was clinically symptomatic with random plasma glucose ≥200 mg/dl or (ii) the fasting plasma glucose was ≥126 mg/dl and 2-h postprandial plasma glucose was ≥200 mg/dl.\cite{2} The classic symptoms of diabetes were polyuria, polydipsia, and unexplained weight loss. The new cases were described as cases diagnosed during the study period and the follow-up cases were the ones that were diagnosed before the study period. The outcomes after pharmacotherapy with available medications such as metformin, glimepiride, and insulin 30:70 were also evaluated in terms of control of plasma glucose on follow-up. The control of plasma glucose was assessed after at least two visits. The “control” of plasma glucose was termed when the fasting plasma glucose was 90–130 mg/dl and 2-h postprandial plasma glucose was <180 mg/dl. When only the fasting plasma glucose was under control, it was termed as “partial control” and if neither of the fasting nor postprandial plasma glucose was within expected range, the plasma glucose was termed as “not under control.” Those cases that failed to follow-up during the last 2 months of the study were labeled as “failed to follow-up.” The patients had to visit the hospital every month for refills of medications.

Data were analyzed using the Statistical Package for the Social Sciences version 21.0 (IBM Inc, Armonk, New York, USA) and Microsoft Excel 2013 (Microsoft Corporation, Redmond, Washington, USA). The categorical variables were reported in numbers and percentages. The Shapiro–Wilk test was used to test the normality of continuous variables. For normally distributed continuous variables, mean and standard deviation were used. Median and interquartile range were employed for the rest of the continuous variables. Chi-square test was used to compare differences in categorical variables. \( P < 0.05 \) was considered statistically significant.

**Results**

The total diabetic patient visits during the study period were 682 of 30,758 total outpatient visits (2%). However, there were 240 unique diabetic patients including new and follow-up cases. The new and follow-up patients were 59 (24.6%) and 181 (75.4%), respectively. Diabetes was observed more in males (187, 77.9%) than females (53, 22.1%) \( (P = 0.000) \). The age of the diabetes patients ranged from 25 to 82 years with the median age of 52 and interquartile range of 47–63. Diabetes was the most common in the age group of 41–50 years \( (P = 0.000) \) [Figure 1].

HbA1c was done in 15 of 59 new cases and ranged from 5.5% to 14%. The mean HbA1c at presentation was 8.9 ± 2.7%. Similarly, HbA1c was performed in 33 of