Implementation of World Health Organization Package of Essential Noncommunicable Disease Interventions for Cardiovascular Risk Management in Gaza/Palestine: A Retrospective Record Review Study

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Keywords

Noncommunicable diseases · Cardiovascular risk · WHO PEN protocol

Abstract

Background: Noncommunicable diseases (NCDs) are among the most common medical problems encountered in medical practice worldwide. The World Health Organization package of essential NCD (WHO PEN) interventions is a broad framework for integration of major NCDs into primary health care. These interventions include screening of diseases and their risk factors to prevent complications. WHO supports the adoption of WHO PEN into the Palestine Ministry of Health. PEN has been implemented in Gaza district since 2015, but only the protocols for cardiovascular disease and diabetes were selected for implementation. This study may help us to detect the impact of implementing PEN. **Methods:** A retrospective record review study was conducted using a random sample of 143 files from a total of 280 registered NCD patients who were followed up for 2 years at Alsourani clinic. Data were extracted manually from the medical records with the completion of a data sheet. **Results:** The study showed that most of the population was female ($n = 86$,

60.1%). The mean age was 58.8 ± 11.7 years. The vast majority were living a sedentary lifestyle ($n = 141$, 98.6%). Patients with one or more comorbidities were also tabulated according to the presence of each comorbidity among all subjects: hypertension ($n = 92$, 64.3%), any diabetes ($n = 90$, 62.9%), type 2 diabetes ($n = 86$, 60.1%), type 1 diabetes ($n = 4$, 2.8%), dyslipidemia ($n = 41$, 28.7%), neuropathy ($n = 27$, 18.9%), ischemic heart disease ($n = 20$, 14%), cerebrovascular disease ($n = 4$, 2.8%), retinopathy ($n = 8$, 5.6%), mental illness ($n = 4$, 2.8%), nephropathy ($n = 3$, 2.1%), cancer ($n = 2$, 1.4%), and respiratory diseases ($n = 1$, 0.7%). There was no statistically significant difference between pre- and post-parameter interventions for systolic and diastolic blood pressure, waist circumference, weight, body mass index, and cholesterol, as well as for tobacco use and cardiovascular risk ($p > 0.05$). In contrast, fasting blood sugar was lower, with a statistically significant difference ($p = 0.049$). **Conclusion:** NCDs in Palestine are a major health problem. Sustainability of WHO PEN interventions is recommended with insurance to support the needs of NCD patients and home visits. NCD interventions are compromised due to health care system gaps at primary care level. Therefore, we need strengthening of the primary health care system.

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Introduction

Currently, noncommunicable diseases (NCDs) are among the most common medical problems encountered in medical practice both in developed and developing countries. They are chronic diseases that result from a constellation of risk factors (genetic, environmental). They compromise mainly cardiovascular diseases, cancer, diabetes, and chronic lung diseases and associated risk factors [1, 2]. NCDs are preventable and can be treated to reduce morbidity and mortality [3].

The World Health Organization package of essential NCD (WHO PEN) interventions is a broad framework for integration of major NCDs into primary health care (PHC). These interventions include screening of diseases and their risk factors to prevent complications. It involves five actions, step by step, including early detection of complications to reduce devastating consequences (e.g., annual fundus examination of patients with diabetes to detect retinopathy in early stages and prevent blindness) [1, 4].

NCDs kill 38 million people each year, which is equivalent to 70% of all deaths globally, including 16 million premature deaths (before the age of 70), 80% of which occur in low- and middle-income countries [1].

NCDs in Palestine are a major health problem [5, 6]. Cardiovascular diseases accounted for 22.4% of all deaths in Palestine in 2011 [7]. A survey was conducted in 2010–2011 regarding risk factors. The risk factors involved in the survey were current daily smoking, less than 5 servings of fruits and vegetables per day, low level of activity, overweight, raised blood pressure (BP), raised fasting blood sugar (FBS), and raised total cholesterol. In Gaza, the percentage with none of the above first five risk factors was 0.2%; the percentage with three or more, aged 15–44 years, was 48.1%, aged 45–64 years 83.7%, and aged 15–64 years 54.6% [8]. WHO supports the adoption of WHO PEN into the Palestine Ministry of Health. In Gaza, in 2013, PHC implemented the interventions in four districts (implemented in Gaza district in 2015); only the protocols for cardiovascular disease and diabetes were selected for implementation. The Ministry of Health adopted WHO PEN to decrease the financial burden of NCDs and improve health outcomes. The objective of this study was to evaluate the impact of these interventions in reducing cardiovascular disease risk as these interventions are newly implemented.

Materials and Methods

This study is a retrospective evaluation of the implementation of the PEN over a period of 2 years. The study was conducted using a random sample of 143 files from a total of 280 registered patients who were followed up for 2 years (April 2015–March 2017) at Alsourani clinic, Gaza, Palestine. Patients included those who had renewed their files according to PEN protocol and were followed up by a team trained in the protocol. Patients were excluded from the study if their medical records contained insufficient data.

Data were extracted manually from the medical records with completion of a data sheet. Demographic and behavioral data (age, gender, tobacco use, engaged in more than 30 min of physical activity at least 5 days a week, pre-existing history of NCD) were reviewed. The following data were recorded: measured BP (raised if systolic BP [SBP] ≥ 140 and/or diastolic BP [DBP] ≥ 90 mm Hg or currently on medication for raised BP), body mass index (BMI) (overweight if ≥ 25 kg/m²), waist circumference (WC) (increased if ≥ 90 cm in women or ≥ 100 cm in men), laboratory results of FBS (raised if plasma venous value ≥ 126 mg/dL or currently on medication for raised blood glucose) and cholesterol (raised if ≥ 200 mg/dL or currently on medication for raised cholesterol), and predicted 10-year cardiovascular risk (CVR) (using the WHO/ISH risk charts relevant to the WHO subregion) before and after implementation of PEN interventions. Definitions were used to describe the studied population, while the outcome measure was change in parameters from baseline to 2 years.

Data management and analysis were conducted using the SPSS program version 23.0. Continuous variables are presented as means $\pm$ SD, whereas categorical variables are presented as numbers and percentages. The paired *t* test was used to test for differences between quantitative variables, while the McNemar test was used to compare between proportions. A *p* value of <0.05 was considered to be statistically significant.

Results

Table 1 shows demographic data and pre-existing history of NCDs. The total study population included 143 cases of NCD patients, of whom 57 were male patients (39.9%) and 86 were female (60.1%). The mean age of the studied population was 58.8 ± 11.7 years. The vast majority of our study sample confirmed that they were living a sedentary lifestyle (98.6%) and only 2 subjects claimed that they were practicing regular physical activity. At the end of the study, patients with one or more comorbidities were also tabulated according to the presence of each co-morbidity among all subjects: hypertension ($n = 92$, 64.3%), any diabetes ($n = 90$, 62.9%), type 2 diabetes ($n = 86$, 60.1%), type 1 diabetes ($n = 4$, 2.8%), dyslipidemia ($n = 41$, 28.7%), neuropathy ($n = 27$, 18.9%), ischemic heart disease ($n = 20$, 14%), cerebrovascular disease ($n = 4$, 2.8%), retinopathy ($n = 8$, 5.6%), mental illness ($n = 4$,

Table 1. Descriptive characteristics of the studied population

Age, years		58.8±11.7						
Gender	male	57 (39.9)	DM1	yes	4 (2.8)	Nephropathy	yes	3 (2.1)
	female	86 (60.1)		no	139 (97.2)		no	140 (97.9)
Activity	yes	2 (1.4)	DM2	yes	86 (60.1)	ESRD	yes	0 (0)
	no	141 (98.6)		no	57 (39.9)		no	143 (100.0)
HTN	yes	92 (64.3)	Dyslipidemia	yes	41 (28.7)	Neuropathy	yes	27 (18.9)
	no	51 (35.7)		no	102 (71.3)		no	116 (81.1)
IHD	yes	20 (14.0)	Psychiatry	yes	4 (2.8)	Diabetic foot	yes	1 (0.7)
	no	123 (86.0)		no	139 (97.2)		no	142 (99.3)
CVA	yes	4 (2.8)	Cancer	yes	2 (1.4)	Amputation	no	143 (100.0)
	no	139 (97.2)		no	141 (98.6)		yes	0 (0)
Respiratory	yes	1 (0.7)	Retinopathy	yes	8 (5.6)			
	no	142 (99.3)		no	135 (94.4)			

Data are presented as *n* (%) or mean ± SD as appropriate. HTN, hypertension; IHD, ischemic heart disease; CVA, cerebrovascular accident; DM, diabetes mellitus; ESRD, end-stage renal disease.

2.8%), nephropathy (*n* = 3, 2.1%), cancer (*n* = 2, 1.4%), and respiratory diseases (*n* = 1, 0.7%). One case only had diabetic foot with no amputations and there were no cases with ESRD.

Table 2 shows the effects of PEN implementation on SBP, DBP, FBS, WC, WT, BMI, and cholesterol. There was no statistically significant difference between pre- and post-parameter interventions for SBP, DBP, WC, WT, BMI, and cholesterol (*p* > 0.05). In contrast, FBS was lower, with a statistically significant difference in post-parameter (133.2 ± 62.5) compared to pre-parameter (144.4 ± 65.4) interventions (*p* = 0.049).

Table 3 shows the effects of PEN implementation on tobacco and CVR. There was no statistically significant difference between pre- and post-parameter interventions for tobacco and CVR (*p* value > 0.05).

Discussion

Based on our study findings, we cannot prove any association of SBP, DBP, WC, BMI, cholesterol level, tobacco use, and predicted CVR before and after WHO PEN interventions. In contrast, FBS reduced over the 2 years of interventions.

Inconsistent with our results, a study in the Democratic People's Republic of Korea, where WHO PEN interventions were implemented, found a significant reduction in risk factors and predicted CVR over a 1-year period [9]. The availability of free medicines and equipment with the system of household doctors may have helped in that improvement. Similar findings were ob-

Table 2. Pre- and post-parameter intervention among the studied population

	Intervention ¹		<i>t</i> value	<i>p</i> value
	pre	post		
SBP	120.5±11.9	122.4±12.3	1.960	0.052
DBP	78.9±7.6	80±8	1.775	0.078
WC	107±14.5	106.4±11.5	-0.826	0.410
WT	86.1±16.1	85.6±16	-1.446	0.150
BMI	32.6±5.5	32.4±5.6	-1.518	0.131
FBS	144.4±65.4	133.2±62.5	-1.984	0.049
Cholesterol	183.6±37.3	182.5±45.5	-0.304	0.762

SBP, systolic blood pressure; DBP, diastolic blood pressure; WC, waist circumference; WT, weight; BMI, body mass index; FBS, fasting blood sugar.

¹ WHO PEN intervention.

Table 3. Pre- and post-parameter intervention among the studied population

		Intervention		<i>p</i> value
		pre	post	
Tobacco	yes	8 (5.6)	6 (4.2)	0.584
	no	135 (94.4)	137 (95.8)	
CVR	<10%	107 (74.8)	110 (76.9)	0.927
	10–<20%	8 (5.6)	7 (4.9)	
	20–<30%	2 (1.4)	1 (0.7)	
	30–<40%	26 (18.2)	25 (17.5)	

CVR, cardiovascular risk.

served in the evaluation of the Bhutan PEN project [10]. Gaza faced many challenges in the implementation of WHO PEN due to a defect in the sustainability of medicines, testing devices, and strips (e.g., urinary dipstick) throughout the year. Affordability of essential medicines as an important component of universal health coverage is crucial to promoting health and achieving sustainable development [11]. Indeed, lack of home visits to patients who cannot visit the clinic regularly is another problem. It was also noticed that poor socioeconomic status of NCD patients affected the outcome and health financing. Obstacles of continuing care should be identified to improve the effectiveness of NCD interventions [12].

Additionally, in Ljubljana, three successive surveys were carried out to measure 12 years of BP dynamics in adults after an integrated NCD intervention program. No significant reduction was found in the first two surveys but in the third survey after 12 years a significant reduction was reached [13]. Although we did not find a significant association over short-term effects (2 years), the positive outcome of WHO PEN is that trained health care workers had an increased awareness of NCD management, referral criteria, and use of monitoring tools. In addition, PEN served in the documentation of risk factors (e.g., WC) and calculation of CVR and took action according to the score. A PHC approach is essential to address NCDs [14, 15]. A clinical audit for WHO PEN implementation was done in the Salbit district, Palestine. The audit showed general commitment of the staff to the protocol with some concerns and identified areas which need more training and supervision [16]. Therefore, use of an audit is an effective technique to assess the quality of services and improve it. Accordingly, strengthening the PHC system is a key challenge to improving the delivery of cost-effective interventions [17].

Conclusion

NCDs constitute a major health problem in Palestine. Sustainability of WHO PEN interventions is recommended with insurance to support the needs of NCD patients and home visits. NCD interventions are compromised due to gaps in the health care system at primary care level. Therefore, we need strengthening of the PHC system.

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Statement of Ethics

Ethical approval was obtained to check patient records for the purpose of the study.

Disclosure Statement

The authors have no conflicts of interest to declare.

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Author Contributions

R.A. developed the research question, initiated and conceptualized the study idea, reviewed previous studies and reports, and drafted the study proposal. K.E. advised on the methodology and statistical analysis section, and interpretation of results. R.A. wrote the final document and revised it frequently after input from K.E. Both authors reviewed and agreed on the final version of the manuscript.

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