Data quality and feasibility & results of data analysis

Strengthening the management of diabetes and hypertension in primary health care in Georgia

June, 2020

Data quality and feasibility - feedback from data preparation and analysis perspective

Data was collected from three clinics in Tbilisi, Georgia, in order to assess the feasibility of implementing an approach (toolkit) that relies on routine clinical data to assess essential NCD-related services provided in primary health care; specifically, for the management of diabetes and hypertension. The primary health care familities were National Family Medicine Training Center (NFMTC), Krol Medical Corporation Vake District (KMC Vake), and Krol Medical Corporation Nadzaladevi District (KMC Nadzaladevi).

The data collection tool allowed a structured collection of the data and the data collectors did an excellent job in recording the data and documenting the process (Report_chart review_feasibility study – GEO).

Variables which were not recorded uniformly in the facilities could easily be transformed to the same unit due to the detailed documentation by the data collectors (e.g. noting if fasting glucose is recorded in mmol/l or mg/dl). Also the documentation of dates worked well.

There were a few measurements which dated after 1.3.2020, or where the most recent and second most recent values had to be swapped, but those were minor issues.

For this data collection, the data collection tool was adapted and additional questions related to diabetic patients were added. The analysis showed that the new questions were useful and well applied. If there was an interest in recording the name and type of diabetes mediation, however, an additional question should be added to the collection tool (similarly to the type of statin). In this dataset, information on drug type and name were recorded additionally to the same field as the question "Is the patient prescribed any medication for diabetes (insulin or tablets such metformin, SGLT2 inhibitors, sulfonylureas, etc)).

Results of data analysis

Data were analyzed for a total of 744 patients in the general sample and 261 patients in the diabetes sample after excluding patients who did not meet the age criteria or who died during the follow-up period. In both samples, about two thirds were women (table 1A). The inclusion criteria were being aged 18 years or more for the diabetes dataset and 40 years or more for the general dataset. Despite having different inclusion criteria, the median age is quite similar with 65 and 67 in the general and diabetic dataset, respectively. In both datasets, women are a bit older than men. Regarding differences between the clinics, higher proportions of men and a lower median age were observed in KMC Nadzaladevi compared to the other clinics. KMC Vake had the highest median age with 68 (table 1B).

General dataset

All patients (table 2A, 2B, 3A, 3B)

The general dataset contained 744 patients who had visited the primary health care facilities in the last year. The median age was 65 years and the proportion of women was 63% (table 1A). The prevalence of hypertension was 66% for women and 59% for men, the prevalence of diabetes at a bit over 15% for men and women, and 23% of men and women had a history of cardiovascular diseases (CVD). There was some variation between the clinics (table 2A).

Smoking status was recorded for about 35% of the patients in the general dataset (table 3A). Overall, 4% of women and 22% of men with information on smoking were smokers (table 2A). When patients without recorded smoking status were considered as non-smokers, the smoking rates were much lower and probably underestimated the real proportions.¹ There were differences in the recording between the clinics with less than 25% in the more Krol medical Corporation clinics and 61% in NFMTC (table 3B).

Blood pressure was measured once or twice during the last 12 months from 76% and 30%, respectively (table 3A). Among those with at least one measurement, mean values for systolic blood pressure (SBP) were 130 mmHg and for diastolic blood pressure (DBP) 79 mmHg, and 69% achieved blood pressure control of SBP/DBP < 140/90 mmHg (table 2A, table 3A). There were considerable differences between the clinics (table 3B). NFMTC had the highest proportions of patients with at least one measurement (84%) the highest proportion of patients with controlled blood pressure (83%).

HbA1c was tested from only 1.9%, fasting glucose from 20%, total cholesterol from 21%, and LDL cholesterol from 12% of the patients, and all of them were more frequently recorded from women (table 3A). Again, there were considerable differences in the recording between the clinics (table 3B). Cholesterol was most frequently tested in KMC Vake, fasting glucose was most frequently tested in NFMTC.

¹ According to STEPS2016, in the adult population, about 34% of men and 7% of women are smokers. In the age category 60-69 years, still 19% of men and 4% of women smoke

⁽http://origin.who.int/ncds/surveillance/steps/STEPS_Georgia_2016_ENG_summary_2016_final.pdf).

Body mass index (BMI) was recorded for about one fifth of the patients. Weight and height, however, was recorded more frequently and, therefore, BMI could be calculated for 47% of the patients (table 3). Based on the calculated BMI, the mean value was 28 kg/m² and about a third (35 % of women and 27% of men) were obese with BMI \geq 30 kg/m² (table 2A, table 3A). In NFMTC, BMI was recorded more frequently and there was no difference in recording frequency between the recorded and the calculated BMI (table 3B).

Overall, there were no risk scores recorded by the health care professional (table 3A). However, WHO/ISH CVD risk scores could be calculated (using who ish Risk package in R) based on diabetes status, age, gender, the most recent blood pressure measurement (during last 24 months), the most recent total cholesterol value, and smoking status. Two versions were calculated: The first version assumed patients without information on smoking status to be a non-smoker and could be calculated for 76% of men and women.² Among those, 6% (8% of women and 3% of men) had a high risk score of \geq 30%. The second version excluded patients without recorded smoking status and was therefore only calculatable for about 30% of patients of which 5% had a high risk score. The proportion of high-risk patients was 26% when patients with a history of CVD were also considered as being at high-risk, and 33% when in addition to CVD also diabetes were considered as high-risk. Regarding clinic differences, NFMTC had the highest proportions of calculated risk scores with the lowest proportions of patients at high risk (table 3B).

CVD and hypertensive patients in the general dataset (tables 5A, 5B)

In the general sample the proportion of patients with a history of CVD was 23% for women and men. Among CVD patients, blood pressure, total cholesterol and LDL cholesterol were measured more frequently (81%, 30%, and 21%, respectively), however, recording of smoking did not differ and BMI was even recorded less frequently compared to the whole sample. Among those with available measurements, 21% had blood pressure controlled (<140/90 mmHg), and 47% had total cholesterol controlled (< 5 mmol/l). Drugs were prescribed in most cases similarly to men and women: 37% had statin prescribed, 45% (48% of women and 40% of men) aspirin, 66% an anti-hypertensive mediation, and 26% had all three prescribed. Higher proportions of prescriptions were observed in NFMTC.

In the general sample, 66% of women and 59% of men had a medication diagnosis of hypertension. Compared to the whole general sample, hypertensive patients had more recordings of blood pressure (82%), total cholesterol (27%) and LDL cholesterol (16%) during the last year. Among those with available measurements, 16% had blood pressure controlled and 28% had total cholesterol controlled. The proportions of patients with drug prescriptions were 22% for a statin, 31% for aspirin, 55% for anti-hypertensive medications, and 13% for all three.

² The risk is probably underestimated but has the benefit that it can be calculated for more patients. However, there is no clear trend recognizable when comparing the two score versions.

Diabetic patients

Table 4A shows the analysis of the diabetes dataset (n=261) for women (n=173, 66%) and men (n=88, 34%) separately. As the diabetes sample was collected from one clinic only (NFMTC), also patients from the general dataset were added to the analysis by clinic, resulting in a total of 376 patients (42 from KMC Nadzaladevi, 44 from KMC Vake, and 290 from NDMTC).

Diabetes dataset (tables 1A, 2A, 4A)

Diabetic women, who accounted for two thirds of the sample, were a bit older than men with median age 68 years compared to 64 years, respectively (table1A). Among diabetics, 83% were also hypertensive and 34% had a history of CVD.

Almost two thirds (65%) of the patients had a recorded smoking status. Among those with available information on smoking, 1.7% of women and 22% of men were smokers.

Among diabetic patients, who had at least one blood pressure measurement during the last year (93%), only 23% met the treatment target of SBP/DBP < 130/80 mmHg, and the mean values for SBP and DBP were 131 and 79 mmHg, respectively. About two thirds (64%) had blood pressure measured twice during the last year.

HbA1c was tested for 17% of diabetic patients. About half of the patients had fasting glucose tested and 43% of those had fasting glucose controlled with a treatment target for diabetics of < 7 mmol/l. The mean fasting glucose level was at 8 mmol/l, showing that there were some quite high values, too. Testing rates for total cholesterol was 47%, and among those, 44% had total cholesterol < 5 mmol/l. Testing rates for LDL cholesterol was lower with 15% of the patients having it tested.

More than 62% of the patients had information on BMI recorded and based on the calculated BMI, 46% of women and 24% of men were obese.

Also in the diabetes dataset, none of the patients had a recorded risk score. Based on higher recording rates of blood pressure and smoking, the WHO/ISH risk scores could be calculated for 94% (version 1: missing smoking status was considered as a non-smoker) and 61% (version 2: without patients with missing smoking status) of the patients. Based on the WHO/ISH risk score (version 1) only, 12% of women and 3% of men had a score of \geq 30% and were classified as high-risk patients. When considering CVD in addition to the WHO/ISH risk score, risk, 42% of women and 32% of men were at high risk.

The vast majority (87%) of patients was not referred to a diabetes specialist for diagnosis, and treatment and follow-up.

Almost all patients had medication for diabetes prescribed. The majority of patients (72%) had tablets prescribed, insulin was prescribed to 21% of the patients, and both tablets and insulin to 4%. Prescription of tables was more common among women and insulin more common among men.

Statin, aspirin, and anti-hypertensives were more frequently prescribed to women: Statin was prescribed to 38% of women and 25% of men, aspirin to 50% of women and 36% of men, anti-hypertensive medication to 73% of women and 56% of men, and all three to 21% of women and 18% of men.

All diabetics - comparison by clinics (table 4B)

Overall, diabetic patients in NFMTC had higher measuring rates, met the treatment targets more often, and had higher proportions of patients with drug prescriptions. However, the number of diabetic patients in the two other clinics was quite low which make it difficult to draw a clear conclusion.

Table 2B: Risk factors of patients in the general sample by clinic						
Risk factors	All	KMC Nadzaladevi	KMC Vake	NFMTC		
Current smoker*, % (n/N)	10.7	22.0	5.0	9.2		
Current smoker (all)**, % (n/N)	3.8	4.5	1.2	5.6		
Hypertension, % (n/N)	63.3	55.1	68.8	65.9		
Diabetes, % (n/N)	15.5	17.1	17.6	11.6		
History of CVD, % (n/N)	23.0	26.1	21.2	21.7		
SBP, mean ± SD	130.1 ± 17.2	130.0 ± 20.6	134.1 ± 16.1	127.0 ± 13.8		
DBP, mean ± SD	78.7 ± 8.9	78.2 ± 11.2	80.8 ± 7.8	77.4 ± 7.1		
FG, mean ± SD	6.8 ± 3.6	9.5 ± 5.5	6.8 ± 2.4	5.9 ± 2.9		
TC, mean ± SD	5.5 ± 1.1	5.5 ± 0.9	5.7 ± 1.1	5.3 ± 1.2		
BMI, mean ± SD	28.1 ± 5.1	28.0 ± 5	28.5 ± 4.9	27.7 ± 5.4		

Table 3B: Process and outcome indicators of patients in general sample by clinic					
Process and outcome indicators	All %	KMC % Nadzaladevi	KMC Vake %	NFMTC %	
Process indicators					
Smoking status recorded	35.2	20.4	24.0	61.0	
BP measured once during the last year	75.5	74.7	67.6	84.3	
BP measured twice during the last year	30.2	28.2	21.2	41.4	
HbA1c tested	1.9	3.3	0.8	1.6	
Fasting glucose tested	19.8	10.2	21.2	27.7	
Total cholesterol tested	21.0	18.8	25.6	18.5	
LDL cholesterol tested	12.0	13.1	19.2	3.6	
BMI recorded by health care professionals	21.4	6.1	12.8	45.0	
BMI calculated for the analysis	46.8	43.7	49.6	47.0	
Obese (BMI \geq 30 kg/m ²)	31.9	29.0	36.3	29.9	
Risk score recorded by health care professionals	0.0	0.0	0.0	0.0	
WHO/ISH risk score calculated (version 1* (V1))	76.3	75.9	68.0	85.1	
WHO/ISH risk score calculated (version 2** (V2))	29.8	17.6	18.0	53.8	
High-risk patients (WHO/ISH score (V1*) + CVD)	25.5	29.0	25.2	22.5	
High-risk patients (WHO/ISH score (V1*) + CVD + DM)	33.3	37.1	34.4	28.5	
Outcome indicators					
BP at normal range (SBP/DBP < 140/90 mmHg)	68.7	59.6	60.4	83.3	

Table 4B: Process and outcome indicators of diabetic patients in both samples (general and diabetes sample) by clinic						
Process and outcome indicators	All %	KMC Nadzaladevi %	KMC Vake %	NFMTC %		
Process indicators						
Smoking status recorded	56.4	21.4	29.	65.5		
BP measured once during the last year	87.8	71.4	70.5	92.8		
BP measured twice during the last year	53.7	26.2	25	62.1		
HbA1c tested	14.9	16.7	2.3	16.6		
Fasting glucose tested	49.2	26.2	34.1	54.8		
Total cholesterol tested	42	26.2	29.5	46.2		
LDL cholesterol tested	15.7	19	27.3	13.4		
BMI recorded by health care professionals	49.7	11.9	18.2	60		
BMI calculated for the analysis	57.4	40.5	43.2	62.1		
Obese (BMI \geq 30 kg/m ²)	41.7	41.2	63.2	39.4		
WHO/ISH risk score calculated (version 1*(V1))	88.6	73.8	70.5	93.4		
WHO/ISH risk score calculated (version 2** (V2))	51.9	19	15.9	62.1		
High-risk patients (calculated WHO/ISH score (V1*) ≥ 30%)	13.5	38.7	32.3	8.5		
High-risk patients (calculated WHO/ISH score	11 0	62 5	28.6	8 0)		
High-risk patients (WHQ/ISH score (V1*) + CVD)	11.0	52 A	28.0	20.2		
High-risk patients (WHO/ISH score (V1*)+CVD	41.0	J2.4	47.7	59.5		
+DM)	100	100	100	100		
Refered to DM specialist?						
No	82.2	59.5	70.5	87.2		
Yes (for diagnosis)	0	0	0	0		
Yes (for treatment and follow-up)	12.5	2.4	29.5	11.4		
Yes (for all)	5.3	38.1	0	1.4		
DM drug						
DM drug: No	13.3	45.2	34.1	5.5		
DM drug: tablets	64.4	35.7	52.3	70.3		
DM drug: insulin	18.6	11.9	13.6	20.3		
DM drug: tablets and insulin	3.7	7.1	0	3.8		
Statin prescribed	31.1	21.4	25	33.4		
Aspirin prescribed	40.7	21.4	31.8	44.8		
Anti-hypertensive drug prescribed	62.5	50	50	66.2		
Triple therapy prescribed	18.1	14.3	13.6	19.3		
Outcome indicators						
BP at normal range (SBP/DBP < 130/80 mmHg)	21.8	20	9.7	23.4		
Fasting glucose controlled (FG < 7 mmol/l)	38.9	0	33.3	42.1		
Total cholesterol controlled (TC < 5 mmol/l)	42.4	36.4	23.1	44.8		

Table 1A: Demographic characteristic of	patients in both samples (general and diabetes samp	le) by gender
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Demographics	Both	Women	Men
General sample			
Gender			
Female, % (n/N)	63.2 (470/744)	100.0 (470/470)	0.0 (0/274)
Male, % (n/N)	36.8 (274/744)	0.0 (0/470)	100 (274/274)
Age, median (IQR)	65.0 (55-74)	66.0 (55-74)	64.0 (54-73)
18-39 years, % (n/N)	0.0 (0/744)	0.0 (0/470)	0.0 (0/274)
40-49 years, % (n/N)	15.3 (114/744)	13.6 (64/470)	18.2 (50/274)
50-59 years, % (n/N)	20.7 (154/744)	19.8 (93/470)	22.3 (61/274)
60-69 years, % (n/N)	26.9 (200/744)	28.3 (133/470)	24.5 (67/274)
70-79 years, % (n/N)	24.7 (184/744)	24.7 (116/470)	24.8 (68/274)
80+ years, % (n/N)	12.4 (92/744)	13.6 (64/470)	10.2 (28/274)
Diabetes sample			
Gender			
Female, % (n/N)	66.3 (173/261)	100 (173/173)	0.0 (0/88)
Male, % (n/N)	33.7 (88/261)	0.0 (0/173)	100 (88/88)
Age, median (IQR)	67.0 (59-72)	68.0 (62-73)	63.5 (54-72)
18-39 years, % (n/N)	1.1 (3/261)	0.6 (1/173)	2.3 (2/88)
40-49 years, % (n/N)	6.1 (16/261)	4.0 (7/173)	10.2 (9/88)
50-59 years, % (n/N)	18.0 (47/261)	13.3 (23/173)	27.3 (24/88)
60-69 years, % (n/N)	36.4 (95/261)	42.2 (73/173)	25.0 (22/88)
70-79 years, % (n/N)	29.5 (77/261)	32.9 (57/173)	22.7 (20/88)
80+ years, % (n/N)	8.8 (23/261)	6.9 (12/173)	12.5 (11/88)

Abbreviations: IQR, inter quartile range.

Table 1B: Demographic characteristic of patients in the general sample by clinic						
Demographics	All	KMC Nadzaladevi	KMC Vake	NFMTC		
General sample						
Gender						
Female, % (n/N)	63.2 (470/744)	58.8 (144/245)	63.6 (159/250)	67.1 (167/249)		
Male, % (n/N)	36.8 (274/744)	41.2 (101/245)	36.4 (91/250)	32.9 (82/249)		
Age, median (IQR)	65.0 (55-74)	63.0 (55-70)	68.0 (56-75)	65.0 (54-75)		
18-39 years, % (n/N)	0.0 (0/744)	0.0 (0/245)	0.0 (0/250)	0.0 (0/249)		
40-49 years, % (n/N)	15.3 (114/744)	14.7 (36/245)	16.0 (40/250)	15.3 (38/249)		
50-59 years, % (n/N)	20.7 (154/744)	25.3 (62/245)	14.4 (36/250)	22.5 (56/249)		
60-69 years, % (n/N)	26.9 (200/744)	32.2 (79/245)	24.0 (60/250)	24.5 (61/249)		
70-79 years, % (n/N)	24.7 (184/744)	16.7 (41/245)	32.0 (80/250)	25.3 (63/249)		
80+ years, % (n/N)	12.4 (92/744)	11.0 (27/245)	13.6 (34/250)	12.4 (31/249)		

Abbreviations: IQR, inter quartile range.

Table 2A: Risk factors of patients in both samples (general and diabetes sample) by gender

Risk factors	Both	Women	Men
General sample			
Current smoker*, % (n/N)	10.7 (28/262)	3.7 (6/162)	22 (22/100)
Current smoker (all)**, % (n/N)	3.8 (28/744)	1.3 (6/470)	8 (22/274)
Hypertension, % (n/N)	63.3 (471/744)	65.7 (309/470)	59.1 (162/274)
Diabetes, % (n/N)	15.5 (115/744)	15.5 (73/470)	15.3 (42/274)
History of CVD, % (n/N)	23.0 (171/744)	23.2 (109/470)	22.6 (62/274)
SBP, mean \pm SD	130.1 ± 17.2	130.4 ± 17.7	129.5 ± 16.3
DBP, mean \pm SD	78.7 ± 8.9	78.2 ± 9.2	79.5 ± 8.5
FG, mean \pm SD	6.8 ± 3.6	7.1 ± 4	6.3 ± 2.3
TC, mean \pm SD	5.5 ± 1.1	5.6 ± 1.1	5.3 ± 1.1
calculated BMI, mean \pm SD	28.1 ± 5.1	28.3 ± 5.4	27.6 ± 4.6
Diabetes sample			
Current smoker*, % (n/N)	7.7 (13/169)	1.7 (2/120)	22.4 (11/49)
Current smoker (all)**, % (n/N)	5.0 (13/261)	1.2 (2/173)	12.5 (11/88)
Hypertension, % (n/N)	82.8 (216/261)	89.0 (154/173)	70.5 (62/88)
Diabetes, % (n/N)	100.0 (261/261)	100.0 (173/173)	100 (88/88)
History of CVD, % (n/N)	33.7 (88/261)	35.3 (61/173)	30.7 (27/88)
SBP, mean \pm SD	130.7 ± 12.5	131.1 ± 12.4	129.9 ± 12.8
DBP, mean \pm SD	78.7 ± 7.8	78.9 ± 8.3	78.4 ± 6.6
FG, mean \pm SD	8.0 ± 3.4	7.9 ± 3.5	8.2 ± 3.3
TC, mean \pm SD	5.0 ± 1.1	5.2 ± 1.1	4.7 ± 1
calculated BMI, mean \pm SD	29.7 ± 4.8	30.2 ± 5.1	28.7 ± 3.9

Abbreviations: CVD, cardiovascular disease; SBP, systolic blood pressure; DBP, diastolic blood pressure; FG, fasting glucose; TC, total cholesterol; BMI, body mass index; SD, standard deviation.

* Patients with missing smoking status were excluded.

** Patients with missing smoking status were considered as non-smoker.

Table 2B: Risk factors of patients in the general sample by clinic

Risk factors	All	KMC Nadzaladevi	KMC Vake	NFMTC
General				
Current smoker*, % (n/N)	10.7 (28/262)	22.0 (11/50)	5.0 (3/60)	9.2 (14/152)
Current smoker (all)**, % (n/N)	3.8 (28/744)	4.5 (11/245)	1.2 (3/250)	5.6 (14/249)
Hypertension, % (n/N)	63.3 (471/744)	55.1 (135/245)	68.8 (172/250)	65.9 (164/249)
Diabetes, % (n/N)	15.5 (115/744)	17.1 (42/245)	17.6 (44/250)	11.6 (29/249)
History of CVD, % (n/N)	23.0 (171/744)	26.1 (64/245)	21.2 (53/250)	21.7 (54/249)
SBP, mean \pm SD	130.1 ± 17.2	130.0 ± 20.6	134.1 ± 16.1	127.0 ± 13.8
DBP, mean \pm SD	78.7 ± 8.9	78.2 ± 11.2	80.8 ± 7.8	77.4 ± 7.1
FG, mean \pm SD	6.8 ± 3.6	9.5 ± 5.5	6.8 ± 2.4	5.9 ± 2.9
TC, mean \pm SD	5.5 ± 1.1	5.5 ± 0.9	5.7 ± 1.1	5.3 ± 1.2
BMI, mean ± SD	28.1 ± 5.1	28.0 ± 5	28.5 ± 4.9	27.7 ± 5.4

Abbreviations: CVD, cardiovascular disease; SBP, systolic blood pressure; DBP, diastolic blood pressure; FG, fasting glucose; TC, total cholesterol; BMI, body mass index; SD, standard deviation.

* Patients with missing smoking status were excluded.

** Patients with missing smoking status were considered as non-smoker.

Process and outcome indicators	Both	Women	Men
	% (n/N)	% (n/N)	% (n/N)
General sample			
Process indicators			
Smoking status recorded	35.2 (262/744)	34.5 (162/470)	36.5 (100/274)
BP measured once during the last year	75.5 (562/744)	76.2 (358/470)	74.5 (204/274)
BP measured twice during the last year	30.2 (225/744)	32.8 (154/470)	25.9 (71/274)
HbA1c tested	1.9 (14/744)	2.3 (11/470)	1.1 (3/274)
Fasting glucose tested	19.8 (147/744)	21.7 (102/470)	16.4 (45/274)
Total cholesterol tested	21.0 (156/744)	23.0 (108/470)	17.5 (48/274)
LDL cholesterol tested	12.0 (89/744)	12.6 (59/470)	10.9 (30/274)
BMI recorded by health care professionals	21.4 (159/744)	23.0 (108/470)	18.6 (51/274)
BMI calculated for the analysis	46.8 (348/744)	47.2 (222/470)	46.0 (126/274)
Obese (BMI ≥ 30 kg/m̂)	31.9 (111/348)	34.7 (77/222)	27.0 (34/126)
Risk score recorded by health care professionals	0.0 (0/744)	0.0 (0/470)	0.0 (0/274)
WHO/ISH risk score calculated (version 1*(V1))	76.3 (568/744)	76.4 (359/470)	76.3 (209/274)
WHO/ISH risk score calculated (version 2** (V2))	29.8 (222/744)	29.4 (138/470)	30.7 (84/274)
High-risk patients (calculated WHO/ISH score (V1*) \geq 30%)	6.0 (34/568)	7.5 (27/359)	3.3 (7/209)
High-risk patients (calculated WHO/ISH score (V2**) \ge 30%)	5.4 (12/222)	5.8 (8/138)	4.8 (4/84)
High-risk patients (WHO/ISH score (V1*) + CVD)	25.5 (190/744)	26.8 (126/470)	23.4 (64/274)
High-risk patients (WHO/ISH score (V1*) + CVD + DM)	33.3 (248/744)	33.4 (157/470)	33.2 (91/274)
Outcome indicators			
BP at normal range (SBP/DBP < 140/90 mmHg)	68.7 (386/562)	68.2 (244/358)	69.6 (142/204)

Abbreviations: BP, blood pressure; HbA1c, glycated haemoglobin; LDL, low-density lipoprotein; BMI, body mass index; WHO/ISH risk score, World Health Organization/International Society of Hypertension cardiovascular risk score; SBP, systolic blood pressure; DBP, diastolic blood pressure.

* Patients with missing smoking status were considered as non-smoker for risk score calculation.

** Patients with missing smoking status were excluded from risk score calculation.

Table 3B: Process and outcome indicators of patients in general sample by clinic

Process and outcome indicators	All	KMC Nadzaladevi	KMC Vake	NFMTC
	% (n/N)	% (n/N)	% (n/N)	% (n/N)
General sample				
Process indicators				
Smoking status recorded	35.2 (262/744)	20.4 (50/245)	24.0 (60/250)	61.0 (152/249)
BP measured once during the last year	75.5 (562/744)	74.7 (183/245)	67.6 (169/250)	84.3 (210/249)

BP measured twice during the last year	30.2 (225/744)	28.2 (69/245)	21.2 (53/250)	41.4 (103/249)
HbA1c tested	1.9 (14/744)	3.3 (8/245)	0.8 (2/250)	1.6 (4/249)
Fasting glucose tested	19.8 (147/744)	10.2 (25/245)	21.2 (53/250)	27.7 (69/249)
Total cholesterol tested	21.0 (156/744)	18.8 (46/245)	25.6 (64/250)	18.5 (46/249)
LDL cholesterol tested	12.0 (89/744)	13.1 (32/245)	19.2 (48/250)	3.6 (9/249)
BMI recorded by health care professionals	21.4 (159/744)	6.1 (15/245)	12.8 (32/250)	45.0 (112/249)
BMI calculated for the analysis	46.8 (348/744)	43.7 (107/245)	49.6 (124/250)	47.0 (117/249)
Obese (BMI \ge 30 kg/m ²)	31.9 (111/348)	29.0 (31/107)	36.3 (45/124)	29.9 (35/117)
Risk score recorded by health care professionals	0.0 (0/744)	0.0 (0/245)	0.0 (0/250)	0.0 (0/249)
WHO/ISH risk score calculated (version 1*(V1))	76.3 (568/744)	75.9 (186/245)	68.0 (170/250)	85.1 (212/249)
WHO/ISH risk score calculated (version 2** (V2))	29.8 (222/744)	17.6 (43/245)	18.0 (45/250)	53.8 (134/249)
High-risk patients (calculated WHO/ISH score (V1*) \ge 30%)	6.0 (34/568)	8.6 (16/186)	8.8 (15/170)	1.4 (3/212)
High-risk patients (calculated WHO/ISH score (V2**) \geq 30%)	5.4 (12/222)	16.3 (7/43)	6.7 (3/45)	1.5 (2/134)
High-risk patients (WHO/ISH score (V1*) + CVD)	25.5 (190/744)	29.0 (71/245)	25.2 (63/250)	22.5 (56/249)
High-risk patients (WHO/ISH score (V1*) + CVD + DM)	33.3 (248/744)	37.1 (91/245)	34.4 (86/250)	28.5 (71/249)
Outcome indicators				
BP at normal range (SBP/DBP < 140/90 mmHg)	68.7 (386/562)	59.6 (109/183)	60.4 (102/169)	83.3 (175/210)

Abbreviations: BP, blood pressure; HbA1c, glycated haemoglobin; LDL, low-density lipoprotein; BMI, body mass index; WHO/ISH risk score, World Health Organization/International Society of Hypertension cardiovascular risk score; SBP, systolic blood pressure; DBP, diastolic blood pressure.

* Patients with missing smoking status were considered as non-smoker for risk score calculation.

** Patients with missing smoking status were excluded from risk score calculation.

Table 4A: Process and outcome indicators of diabetic patients from the diabetes sample by gender

Process and outcome indicators	Both	Women	Men	
	% (n/N)	% (n/N)	% (n/N)	
Diabetes sample				
Process indicators				
Smoking status recorded	64.8 (169/261)	69.4 (120/173)	55.7 (49/88)	
BP measured once during the last year	93.1 (243/261)	94.2 (163/173)	90.9 (80/88)	
BP measured twice during the last year	64.4 (168/261)	67.6 (117/173)	58 (51/88)	
HbA1c tested	17.2 (45/261)	16.8 (29/173)	18.2 (16/88)	
Fasting glucose tested	53.6 (140/261)	52 (90/173)	56.8 (50/88)	
Total cholesterol tested	47.1 (123/261)	48.6 (84/173)	44.3 (39/88)	
LDL cholesterol tested	14.6 (38/261)	11.6 (20/173)	20.5 (18/88)	
BMI recorded by health care professionals	62.5 (163/261)	61.3 (106/173)	64.8 (57/88)	
BMI calculated for the analysis	64.4 (168/261)	63 (109/173)	67 (59/88)	
Obese (BMI ≥ 30 kg/m)	38.1 (64/168)	45.9 (50/109)	23.7 (14/59)	
WHO/ISH risk score calculated (version 1*(V1))	93.5 (244/261)	94.2 (163/173)	92 (81/88)	
WHO/ISH risk score calculated (version 2** (V2))	61.3 (160/261)	65.3 (113/173)	53.4 (47/88)	
High-risk patients (calculated WHO/ISH score (V1*) \geq 30%)	8.6 (21/244)	11.7 (19/163)	2.5 (2/81)	
High-risk patients (calculated WHO/ISH score (V2**) \geq 30%)	9.4 (15/160)	12.4 (14/113)	2.1 (1/47)	
High-risk patients (WHO/ISH score (V1*) + CVD)	38.3 (100/261)	41.6 (72/173)	31.8 (28/88)	
High-risk patients (WHO/ISH score (V1*) + CVD + DM)	100.0 (261/261)	100 (173/173)	100 (88/88)	
Referred to DM specialist?				
No	87.4 (228/261)	87.3 (151/173)	87.5 (77/88)	
Yes (for diagnosis)	0.0 (0/261)	0.0 (0/173)	0.0 (0/88)	
Yes (for treatment and follow-up)	11.5 (30/261)	11.6 (20/173)	11.4 (10/88)	
Yes (for all)	1.1 (3/261)	1.2 (2/173)	1.1 (1/88)	
DM drug				
DM drug: No	3.8 (10/261)	2.9 (5/173)	5.7 (5/88)	
DM drug: tablets	71.6 (187/261)	74 (128/173)	67 (59/88)	
DM drug: insulin	20.7 (54/261)	18.5 (32/173)	25 (22/88)	
DM drug: tablets and insulin	3.8 (10/261)	4.6 (8/173)	2.3 (2/88)	
Statin prescribed	34.5 (90/261)	38.2 (66/173)	27.3 (24/88)	
Aspirin prescribed	45.6 (119/261)	50.3 (87/173)	36.4 (32/88)	
Anti-hypertensive drug prescribed	66.7 (174/261)	72.3 (125/173)	55.7 (49/88)	
Triple therapy prescribed	20.3 (53/261)	21.4 (37/173)	18.2 (16/88)	
Outcome indicators				
BP at normal range (SBP/DBP < 130/80 mmHg)	22.6 (55/243)	22.7 (37/163)	22.5 (18/80)	
Fasting glucose controlled (FG < 7 mmol/l)	42.9 (60/140)	43.3 (39/90)	42 (21/50)	
Total cholesterol controlled (TC $< 5 \text{ mmol/l}$)	43.9 (54/123)	39.3 (33/84)	53.8 (21/39)	

Abbreviations: BP, blood pressure; HbA1c, glycated haemoglobin; LDL, low-density lipoprotein; BMI, body mass index; WHO/ISH risk score, World Health Organization/International Society of Hypertension cardiovascular risk score; DM, diabetes mellitus; SBP, systolic blood pressure; DBP, diastolic blood pressure; FG, fasting glucose; TC, total cholesterol.

* Patients with missing smoking status were considered as non-smoker for risk score calculation.

** Patients with missing smoking status were excluded from risk score calculation.

Process and outcome indicators	All	KMC Nadzaladevi	KMC Vake	NFMTC
	% (n/N)	% (n/N)	% (n/N)	% (n/N)
Diabetics from both samples				
Process indicators				
Smoking status recorded	56.4 (212/376)	21.4 (9/42)	29.5 (13/44)	65.5 (190/290)
BP measured once during the last year	87.8 (330/376)	71.4 (30/42)	70.5 (31/44)	92.8 (269/290)
BP measured twice during the last year	53.7 (202/376)	26.2 (11/42)	25 (11/44)	62.1 (180/290)
HbA1c tested	14.9 (56/376)	16.7 (7/42)	2.3 (1/44)	16.6 (48/290)
Fasting glucose tested	49.2 (185/376)	26.2 (11/42)	34.1 (15/44)	54.8 (159/290)
Total cholesterol tested	42 (158/376)	26.2 (11/42)	29.5 (13/44)	46.2 (134/290)
LDL cholesterol tested	15.7 (59/376)	19 (8/42)	27.3 (12/44)	13.4 (39/290)
BMI recorded by health care professionals	49.7 (187/376)	11.9 (5/42)	18.2 (8/44)	60 (174/290)
BMI calculated for the analysis	57.4 (216/376)	40.5 (17/42)	43.2 (19/44)	62.1 (180/290)
Obese (BMI ≥ 30 kg/m̂)	41.7 (90/216)	41.2 (7/17)	63.2 (12/19)	39.4 (71/180)
WHO/ISH risk score calculated (version 1*(V1))	88.6 (333/376)	73.8 (31/42)	70.5 (31/44)	93.4 (271/290)
WHO/ISH risk score calculated (version 2** (V2))	51.9 (195/376)	19 (8/42)	15.9 (7/44)	62.1 (180/290)
High-risk patients (calculated WHO/ISH score (V1*) \geq 30%)	13.5 (45/333)	38.7 (12/31)	32.3 (10/31)	8.5 (23/271)
High-risk patients (calculated WHO/ISH score (V2**) \geq 30%)	11.8 (23/195)	62.5 (5/8)	28.6 (2/7)	8.9 (16/180)
High-risk patients (WHO/ISH score (V1*) + CVD)	41.8 (157/376)	52.4 (22/42)	47.7 (21/44)	39.3 (114/290)
High-risk patients (WHO/ISH score (V1*) + CVD + DM)	100 (376/376)	100 (42/42)	100 (44/44)	100 (290/290)
Refered to DM specialist?				
No	82.2 (309/376)	59.5 (25/42)	70.5 (31/44)	87.2 (253/290)
Yes (for diagnosis)	0 (0/376)	0 (0/42)	0 (0/44)	0 (0/290)
Yes (for treatment and follow-up)	12.5 (47/376)	2.4 (1/42)	29.5 (13/44)	11.4 (33/290)
Yes (for all)	5.3 (20/376)	38.1 (16/42)	0 (0/44)	1.4 (4/290)
DM drug				
DM drug: No	13.3 (50/376)	45.2 (19/42)	34.1 (15/44)	5.5 (16/290)
DM drug: tablets	64.4 (242/376)	35.7 (15/42)	52.3 (23/44)	70.3 (204/290)
DM drug: insulin	18.6 (70/376)	11.9 (5/42)	13.6 (6/44)	20.3 (59/290)
DM drug: tablets and insulin	3.7 (14/376)	7.1 (3/42)	0 (0/44)	3.8 (11/290)
Statin prescribed	31.1 (117/376)	21.4 (9/42)	25 (11/44)	33.4 (97/290)
Aspirin prescribed	40.7 (153/376)	21.4 (9/42)	31.8 (14/44)	44.8 (130/290)
Anti-hypertensive drug prescribed	62.5 (235/376)	50 (21/42)	50 (22/44)	66.2 (192/290)
Triple therapy prescribed	18.1 (68/376)	14.3 (6/42)	13.6 (6/44)	19.3 (56/290)
Outcome indicators				
BP at normal range (SBP/DBP < 130/80 mmHg)	21.8 (72/330)	20 (6/30)	9.7 (3/31)	23.4 (63/269)
Fasting glucose controlled (FG < 7 mmol/l)	38.9 (72/185)	0 (0/11)	33.3 (5/15)	42.1 (67/159)
Total choles terol controlled (TC $< 5 \text{ mmol/l}$)	42.4 (67/158)	36.4 (4/11)	23.1 (3/13)	44.8 (60/134)

Abbreviations: BP, blood pressure; HbA1c, glycated haemoglobin; LDL, low-density lipoprotein; BMI, body mass index; WHO/ISH risk score, World Health Organization/International Society of Hypertension cardiovascular risk score; DM, diabetes mellitus; SBP, systolic blood pressure; DBP, diastolic blood pressure; FG, fasting glucose; TC, total cholesterol.

* Patients with missing smoking status were considered as non-smoker for risk score calculation.

** Patients with missing smoking status were excluded from risk score calculation.

Table 5A: Process and outcome indicators of	patient in the general d	lataset with hypertension	and CVD by gender

Process and outcome indicators	Both	Women	Men
	% (n/N)	% (n/N)	% (n/N)
General sample			
CVD patients			
Smoking status recorded	33.9 (58/171)	30.3 (33/109)	40.3 (25/62)
Current smoker*	13.8 (8/58)	6.1 (2/33)	24.0 (6/25)
Current smoker (all)**	4.7 (8/171)	1.8 (2/109)	9.7 (6/62)
BP measured once during the last year	81.3 (139/171)	79.8 (87/109)	83.9 (52/62)
BP measured twice during the last year	40.9 (70/171)	41.3 (45/109)	40.3 (25/62)
Total cholesterol tested	29.8 (51/171)	30.3 (33/109)	29.0 (18/62)
LDL cholesterol tested	21.1 (36/171)	18.3 (20/109)	25.8 (16/62)
BMI recorded by health care professionals	16.4 (28/171)	14.7 (16/109)	19.4 (12/62)
BMI calculated for the analysis	43.3 (74/171)	42.2 (46/109)	45.2 (28/62)
Obese (BMI ≥ 30 kg/m̂)	29.7 (22/74)	28.3 (13/46)	32.1 (9/28)
Statin prescribed	37.4 (64/171)	36.7 (40/109)	38.7 (24/62)
Aspirin prescribed	45.0 (77/171)	47.7 (52/109)	40.3 (25/62)
Anti-hypertensive drug prescribed	66.1 (113/171)	67.0 (73/109)	64.5 (40/62)
Triple therapy prescribed	25.7 (44/171)	25.7 (28/109)	25.8 (16/62)
BP at normal range (SBP/DBP < 140/90 mmHg)	20.9 (29/139)	19.5 (17/87)	23.1 (12/52)
Total cholesterol controlled (TC $< 5 \text{ mmol/l}$)	47.1 (24/51)	39.4 (13/33)	61.1 (11/18)
Hypertensive patients			
Smoking status recorded	39.3 (185/471)	38.8 (120/309)	40.1 (65/162)
Current smoker*	8.1 (15/185)	3.3 (4/120)	16.9 (11/65)
Current smoker (all)**	3.2 (15/471)	1.3 (4/309)	6.8 (11/162)
BP measured once during the last year	81.7 (385/471)	82.5 (255/309)	80.2 (130/162)
BP measured twice during the last year	39.7 (187/471)	41.1 (127/309)	37.0 (60/162)
Total cholesterol tested	26.8 (126/471)	28.2 (87/309)	24.1 (39/162)
LDL cholesterol tested	15.9 (75/471)	16.2 (50/309)	15.4 (25/162)
BMI recorded by health care professionals	24.0 (113/471)	25.9 (80/309)	20.4 (33/162)
BMI calculated for the analysis	48.0 (226/471)	48.9 (151/309)	46.3 (75/162)
Obese (BMI \ge 30 kg/m ²)	33.6 (76/226)	37.1 (56/151)	26.7 (20/75)
Statin prescribed	21.7 (102/471)	21.7 (67/309)	21.6 (35/162)
Aspirin prescribed	30.6 (144/471)	31.7 (98/309)	28.4 (46/162)
Anti-hypertensive drug prescribed	54.6 (257/471)	56.3 (174/309)	51.2 (83/162)
Triple therapy prescribed	13.4 (63/471)	14.2 (44/309)	11.7 (19/162)
BP at normal range (SBP/DBP < 140/90 mmHg)	15.6 (60/385)	15.3 (39/255)	16.2 (21/130)
Total cholesterol controlled (TC < 5 mmol/l)	27.8 (35/126)	23.0 (20/87)	38.5 (15/39)

Abbreviations: BP, blood pressure; LDL, low-density lipoprotein; BMI, body mass index; WHO/ISH risk score, World Health Organization/International Society of Hypertension cardiovascular risk score; DM, diabetes mellitus; SBP, systolic blood pressure; DBP, diastolic blood pressure; TC, total cholesterol.

* Patients with missing smoking status were excluded.

** Patients with missing smoking status were considered as non-smoker.

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Process and outcome indicators	All	KMC Nadzaladevi	KMC Vake	NFMTC
	% (n/N)	% (n/N)	% (n/N)	% (n/N)
General sample				
CVD patients				
Smoking status recorded	33.9 (58/171)	23.4 (15/64)	17.0 (9/53)	63.0 (34/54)
Current smoker*	13.8 (8/58)	13.3 (2/15)	11.1 (1/9)	14.7 (5/34)
Current smoker (all)**	4.7 (8/171)	3.1 (2/64)	1.9 (1/53)	9.3 (5/54)
BP measured once during the last year	81.3 (139/171)	90.6 (58/64)	64.2 (34/53)	87.0 (47/54)
BP measured twice during the last year	40.9 (70/171)	40.6 (26/64)	34.0 (18/53)	48.1 (26/54)
Total cholesterol tested	29.8 (51/171)	32.8 (21/64)	32.1 (17/53)	24.1 (13/54)
LDL cholesterol tested	21.1 (36/171)	26.6 (17/64)	28.3 (15/53)	7.4 (4/54)
BMI recorded by health care professionals	16.4 (28/171)	10.9 (7/64)	5.7 (3/53)	33.3 (18/54)
BMI calculated for the analysis	43.3 (74/171)	56.3 (36/64)	39.6 (21/53)	31.5 (17/54)
Obese (BMI ≥ 30 kg/m̂)	29.7 (22/74)	25.0 (9/36)	33.3 (7/21)	35.3 (6/17)
Statin prescribed	37.4 (64/171)	29.7 (19/64)	43.4 (23/53)	40.7 (22/54)
Aspirin prescribed	45.0 (77/171)	42.2 (27/64)	45.3 (24/53)	48.1 (26/54)
Anti-hypertensive drug prescribed	66.1 (113/171)	64.1 (41/64)	64.2 (34/53)	70.4 (38/54)
Triple therapy prescribed	25.7 (44/171)	23.4 (15/64)	26.4 (14/53)	27.8 (15/54)
BP at normal range (SBP/DBP < 140/90 mmHg)	20.9 (29/139)	22.4 (13/58)	8.8 (3/34)	27.7 (13/47)
Total cholesterol controlled (TC $< 5 \text{ mmol/l}$)	47.1 (24/51)	38.1 (8/21)	47.1 (8/17)	61.5 (8/13)
Hypertensive patients				
Smoking status recorded	39.3 (185/471)	22.2 (30/135)	27.3 (47/172)	65.9 (108/164)
Current smoker*	8.1 (15/185)	16.7 (5/30)	4.3 (2/47)	7.4 (8/108)
Current smoker (all)**	3.2 (15/471)	3.7 (5/135)	1.2 (2/172)	4.9 (8/164)
BP measured once during the last year	81.7 (385/471)	83.7 (113/135)	70.9 (122/172)	91.5 (150/164)
BP measured twice during the last year	39.7 (187/471)	37.0 (50/135)	29.7 (51/172)	52.4 (86/164)
Total cholesterol tested	26.8 (126/471)	26.7 (36/135)	32.0 (55/172)	21.3 (35/164)
LDL cholesterol tested	15.9 (75/471)	20.0 (27/135)	24.4 (42/172)	3.7 (6/164)
BMI recorded by health care professionals	24.0 (113/471)	8.9 (12/135)	12.8 (22/172)	48.2 (79/164)
BMI calculated for the analysis	48.0 (226/471)	44.4 (60/135)	49.4 (85/172)	49.4 (81/164)
Obese (BMI \ge 30 kg/m ²)	33.6 (76/226)	28.3 (17/60)	38.8 (33/85)	32.1 (26/81)
Statin prescribed	21.7 (102/471)	20.0 (27/135)	23.8 (41/172)	20.7 (34/164)
Aspirin prescribed	30.6 (144/471)	26.7 (36/135)	30.2 (52/172)	34.1 (56/164)
Anti-hypertensive drug prescribed	54.6 (257/471)	53.3 (72/135)	44.8 (77/172)	65.9 (108/164)
Triple therapy prescribed	13.4 (63/471)	13.3 (18/135)	14.5 (25/172)	12.2 (20/164)
BP at normal range (SBP/DBP < 140/90 mmHg)	15.6 (60/385)	15.0 (17/113)	5.7 (7/122)	24.0 (36/150)
Total cholesterol controlled (TC < 5 mmol/l)	27.8 (35/126)	22.2 (8/36)	29.1 (16/55)	31.4 (11/35)

Abbreviations: BP, blood pressure; LDL, low-density lipoprotein; BMI, body mass index; WHO/ISH risk score, World Health Organization/International Society of Hypertension cardiovascular risk score; DM, diabetes mellitus; SBP, systolic blood pressure; DBP, diastolic blood pressure; TC, total cholesterol.

* Patients with missing smoking status were excluded.

** Patients with missing smoking status were considered as non-smoker.