

Prevalence of patients using antihypertensive medication in Greenland, and an assessment of the importance of diagnosis for the associated quality of care – a cross-sectional study

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ABSTRACT

This study aimed to estimate the age- and sex specific prevalence of patients using antihypertensive medication in Greenland, and compared the quality of care between patients with and without a diagnosis for hypertension. The study was a cross-sectional study comparing patients using antihypertensive medication in 2020 (6,629 patients) and 2021 (7,008 patients), respectively. For data from 2021, patients with a medical diagnosis code were identified. Data was obtained from the Greenlandic electronic medical record. The population of Greenland was used as background population. Quality of care was evaluated based on suggested indicators by international guidelines and goals from Steno Diabetes Centre Greenland. The prevalence of patients aged ≥ 20 years using antihypertensive medication had increased from 16.7% in 2020 to 17.5% in 2021. The prevalence increased by age and was higher among women compared to men. In 2021, the prevalence of patients aged ≥ 20 years with a medical diagnosis code for hypertension was 7.9%. The use of antihypertensive medication in Greenland is common. The associated quality of care was low. However, process indicators were significantly improved when patients had a medical diagnosis code. Future focus must be on initiating initiatives ensuring that more patients are registered with a medical diagnosis code.

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Introduction



Hypertension affects more than 1.28 billion people aged 30–79 years worldwide; a number which has doubled since 1990 [1]. Hypertension increases the risk of developing stroke and ischaemic heart diseases [2,3], and is globally a major cause of premature death [4]. The risk for cardio metabolic disease has increased in Greenland driven by lifestyle changes and a possible genetic susceptibility [5].

Hypertension is defined as blood pressure (BP, mm Hg) ≥ 140 systolic or ≥ 90 diastolic [6,7]. Men are historically known to have a higher blood pressure than women [8] and the incidence of hypertension is positively correlated with age [9]. The risk factors for hypertension are; family history, age over 65 years, diabetes or kidney disease, unhealthy eating habits, physical inactivity, overweight, smoking, and alcohol consumption [4]. Many of these lifestyle-related factors are common in Greenland [10,11]. In particular, smoking and overweight are two major public health issues in Greenland, with around 60% of the population

smoking on daily basis [10] and around one-third of the population having a BMI $+30$ [11]

In 2011, the health care system in Greenland initiated a lifestyle initiative focussing on quality of care among patients with hypertension, diabetes, and chronic obstructive pulmonary disease (COPD) [12]. The population survey on health in Greenland from 2018 shows an increase in the proportion of people with high blood pressure in Greenland since 2005–2010 [11], but the prevalence of patients using antihypertensive medication has not been investigated in Greenland since 2011, where it was estimated as being 11.4% for all patients aged 20 years or above [13]. This is a lot lower than among Inuit in Nunavik, where a cross-sectional study showed a self-reported prevalence of hypertension of 17% [14], and among Inuit from Ottawa were a non-age adjusted prevalence for hypertension of 25% was found [15].

Today, not all patients receiving antihypertensive treatment are diagnosed with a medical diagnosis code in the electronic medical record (EMR). Also in

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2020, Steno Diabetes Centre Greenland (SDCG) was established with an aim to strengthen the work of the lifestyle initiative and improve diagnostic activity and quality of care of patients with hypertension, diabetes and COPD in all of Greenland [16]. Yet, the current baseline prevalence of patients treated with antihypertensive medicine, patients diagnosed with hypertension, and the quality of care remains unexplored.

The aim of this study was to estimate the age- and sex-specific prevalence of patients treated with hypertensive medication in 2020 and 2021, and evaluate the importance of registering patients with a medical diagnosis code on the associated quality of care.

Materials and methods

Study design

The study was carried out as a cross-sectional study based on data obtained from the EMR in Greenland, comparing patients using antihypertensive medication in 2020 and 2021, respectively. *Setting*

Greenland is a large island covering 2 million km² and is located in the arctic region. Despite the large area, only 56,000 people are living in Greenland distributed in towns and small settlements along the coastline. 90% of the population are ethnic Greenlanders (Inuit) [17]. The Greenlandic health care system is divided into five health care regions. In each health care region, one regional hospital is placed in the largest town. The remaining towns and small settlements have health care centres and smaller health care units respectively. Lifestyle outpatient clinics or lifestyle outpatient clinic functions are placed at the regional hospitals and health care centres. These outpatient clinics or outpatient clinic functions are responsible for control and treatment of hypertension. SDCG is responsible for management of hypertension in Greenland in the primary health care including early detection, national guidelines, education and training of health care professionals, patient information, and monitoring of prevalence and quality of care. The specialised treatment of hypertension is placed physically in the capital, Nuuk, but it is possible through telemedicine to get the specialised treatment out in the remaining towns and small settlements [16]. Medication, hospital treatment and the health care service in general, are free of charge for permanent residents in Greenland [18].

Study population and variables

The study population consists of Greenlandic residents aged 20 or above using antihypertensive medication in

Table 1. Quality indicators.

<i>Process indicators</i>	
Percentage of patients in whom smoking status was assessed within the previous year	^a
Percentage of patients in whom BMI was measured within the previous year	
Percentage of patients in whom blood pressure was measured within the previous year	
Percentage of patients in whom eGFR was measured within the previous year	
<i>Proximal outcome indicators</i>	
Percentage of patients who were current smokers within the previous year	
Percentage of patients with systolic home blood pressure < 140 mmHg within the previous year	^b
Percentage of patients with systolic home blood pressure > 160 mmHg within the previous year	^b

^aQuality indicators proposed by DSAM [21]

^bQuality indicators as suggested by World Hypertension League Expert Committee [7]

ultimo 2020 and ultimo 2021. The background population was the Greenlandic population aged 20 years or above by 1st of January 2021 for the December 2020 data extraction and 1st of January 2022 for the December 2021 data extraction. Patient data from all parts of Greenland was extracted from EMR, except the town, Tasiilaq, where the EMR has not yet been fully implemented. Inclusion criteria for participation in the study was registration of an active prescription of one or several of the anatomical therapeutic chemical (ATC) classification codes C02, C03, C04, C05, C07, C08, C09 and C10 [19], which are the different types of medication used targeting hypertension in Greenland. Information extracted from the EMR included age, weight, height, blood pressure (mmHg) (home blood pressure if any, if not office blood pressure), smoking status, estimated glomerular filtration rate (eGFR) (ml/min) and ATC codes. BMI was calculated. In 2021 we also extracted medical diagnosis codes for hypertension; ICPC-2 codes; K85, K86, K87 and/or ICD10 codes: D1109, D110, D1119A, D1159 from the EMR. Basic characteristics of men and women aged 20 years or above from the 2020 and 2021 data extractions were compared. Data of the background population were extracted from the online statistic bank by Statistics Greenland [20]. Data on quality of care was extracted from the EMR. Quality of care was described according to quality indicators proposed by the Danish College of General Practitioners [21], indicators suggested by World Hypertension League Expert Committee [7], and indicators from the SDCG guidelines [16]. The quality indicators defining the quality of care are presented in Table 1.

Statistical analysis

Estimates of the prevalence were calculated with 95% confidence intervals (CI). When calculating the age- and sex-specific prevalence of patients using

antihypertensive medication, patients were divided into age groups of 10 years. Chi-square tests were used to compare frequencies. Normally distributed parameters were described using mean and standard deviation (SD). Check for normality was done using histograms and means were compared using t-test. Statistical analysis on data from 2020 was performed in SPSS® version 27 and data from 2021 was analysed in R version 4.1.2.

The study was approved by The Science Ethics Committee in Greenland (reference no. 2016–09) and by The Agency for Health and Prevention in Greenland. All data was handled anonymously.

Results

In 2020, 6,629 patients (3,438 females and 3,191 males) with a mean age of 62 years, BMI of 31 kg/m² and blood pressure of 138/83 mmHg, had an active prescription of antihypertensive medication, while the number in 2021 had increased to 7,008 patients (3,594 women and 3,414 men). In 2021, 45% (3,144/7,008) of the patients who had an active prescription of antihypertensive medication had a registered medical diagnosis code of hypertension.

Basic characteristics

Table 2 presents the basic characteristics of the study population in 2020 and 2021, respectively. Men were significantly older, weighed more, were taller and had a higher diastolic blood pressure compared to women in both 2020 and 2021. In 2021, men had significantly higher levels of eGFR compared to women ($p < 0.001$, 79 ml/min vs. 74 ml/min).

Prevalence

Table 3 shows the estimated age- and sex-specific prevalence of patients using antihypertensive medication in 2020 compared to 2021. From 2020 to 2021, the total prevalence of patients aged 20 years or above increased from 16.7% to 17.5% (an increase at 4.8% in one year). The prevalence of patients using antihypertensive medication was significantly higher among women compared to men for all ages in both 2020 and 2021 ($p < 0.001$), except for women and men aged 80+ years in 2020. The increase from 2020 to 2021 was significant for both men and women. The prevalence increased by age. The increased prevalence of hypertension was most likely in the age group 50–59 years. In the age group 80+ years, the prevalence of patients using antihypertensive medication was 84.7% in 2020 and 81.0% in 2021.

The estimated prevalence of patients aged 20 years or above registered with a diagnosis code for hypertension was 7.9% in 2021 (data not shown).

Quality of care

Table 4 shows the quality of care for patients using antihypertensive medication (men vs. women, 2020 vs. 2021). No sex-related difference was observed.

All process indicators were significantly improved in 2021 compared to 2020 ($p < 0.001$). Registration of smoking status had increased from 39.0% in 2020 to 44.1% in 2021 ($p < 0.001$), and BMI from 36.9% in 2020 to 44.2% in 2021 ($p < 0.001$). Registration of blood pressure had increased from 44.2% in 2020 to 49.7% in 2021 ($p < 0.001$). Registration of eGFR increased from 52.5% in 2020 to 58.1% in 2021 ($p < 0.001$). No difference

Table 2. Basic characteristics 2020 vs. 2021.

	2020					2021					2020		2021		
	Women		Men		p	Women		Men		p	Total		Total		
	Mean (SD)	N	Mean (SD)	N		Mean (SD)	N	Mean (SD)	N		Mean (SD)	N	Mean (SD)	N	p
Age (years)	62 (13.4)	3,438	63 (11.4)	3,191	0.001	61 (13.5)	3,594	63 (11.4)	3,414	<0.001	62 (12.5)	6,629	62 (12.5)	7,008	0.708
Weight (kg)	77 (18.6)	1,384	90 (21.1)	1,292	<0.001	76 (18.4)	2,558	89 (20.3)	2,424	<0.001	83 (21.0)	2,676	83 (20.5)	4,982	0.101
Height (cm)	156 (7.5)	1,306	171 (8.3)	1,212	<0.001	157 (7.3)	2,432	171 (8.2)	2,312	<0.001	163 (10.6)	2,518	164 (10.4)	4,744	0.420
BMI (kg/m ²)	31 (6.8)	1,290	31 (6.3)	1,193	0.287	31 (6.8)	2,429	31 (6.1)	2,301	0.351	31 (6.6)	2,483	31 (6.5)	4,730	0.007
eGFR (ml/min)	76 (19.4)	1,813	77 (20.3)	1,667	0.097	74 (16.8)	3,058	79 (19.3)	2,936	<0.001	76 (19.8)	3,480	77 (18.2)	5,994	0.189
Blood pressure (mm Hg)															
– systolic	138 (16.6)	1,541	137 (15.5)	1,390	0.092	137 (16.5)	2,748	138 (16.6)	2,631	0.426	138 (16.1)	2,931	138 (16.6)	5,379	0.912
– diastolic	82 (10.4)	1,540	84 (10.6)	1,389	<0.001	81 (10.3)	2,749	84 (11.1)	2,629	<0.001	83 (10.6)	2,929	83 (10.8)	5,378	0.548

P values below 0.05 are in bold.

Table 3. Age-specific prevalence among women and men 2020 vs. 2021.

	2020			2021			2020			2021		
	Women (95% CI) (n/N)	Men (95% CI) (n/N)	p	Women (95% CI) (n/N)	Men (95% CI) (n/N)	p	Women (95% CI) (n/N)	Men (95% CI) (n/N)	p	Women (95% CI) (n/N)	Men (95% CI) (n/N)	p
Prevalence among adults ≥ 20 years of age	18.94 (18.37–19.51) (3,438/18,154)	15.10 (14.62–15.58) (3,191/21,135)	<0.001	19.19 (18.63–19.76) (3,594/18,724)	16.01 (15.52–16.50) (3,414/21,326)	<0.001	16.72 (16.35–17.09) (6,629/39,649)	17.50 (17.13–17.87) (7,008/40,050)	0.004	17.50 (17.13–17.87) (7,008/40,050)	17.50 (17.13–17.87) (7,008/40,050)	0.004
<i>Prevalence in age groups</i>												
20–29 years	1.86 (1.46–2.25) (82/4,417)	0.63 (0.39–0.86) (27/4,316)	<0.001	2.67 (2.17–3.17) (106/3,974)	0.68 (0.43–0.93) (28/4,143)	<0.001	1.29 (1.05–1.53) (109/8,463)	1.65 (1.37–1.93) (134/8,117)	0.052	1.65 (1.37–1.93) (134/8,117)	1.65 (1.37–1.93) (134/8,117)	0.052
30–39 years	4.15 (3.52–4.78) (160/3,856)	2.02 (1.59–2.44) (84/4,169)	<0.001	4.03 (3.43–4.63) (166/4,122)	2.11 (1.69–2.53) (94/4,450)	<0.001	3.04 (2.66–3.42) (244/8,025)	3.03 (2.67–3.40) (260/8,572)	0.978	3.03 (2.67–3.40) (260/8,572)	3.03 (2.67–3.40) (260/8,572)	0.978
40–49 years	9.68 (8.56–10.80) (260/2,686)	6.47 (5.62–7.31) (210/3,248)	<0.001	9.52 (8.42–10.61) (262/2,753)	7.41 (6.51–8.30) (245/3,308)	0.003	7.92 (7.23–8.61) (470/5,934)	8.36 (7.67–9.06) (507/6,061)	0.374	8.36 (7.67–9.06) (507/6,061)	8.36 (7.67–9.06) (507/6,061)	0.374
50–59 years	22.51 (21.25–23.78) (944/4,193)	17.07 (16.01–18.12) (838/4,910)	<0.001	24.53 (23.17–25.88) (949/3,869)	18.41 (17.29–19.54) (839/4,557)	<0.001	19.58 (18.76–20.39) (1,782/9,103)	21.22 (20.35–22.09) (1,788/8,426)	0.007	21.22 (20.35–22.09) (1,788/8,426)	21.22 (20.35–22.09) (1,788/8,426)	0.007
60–69 years	43.93 (41.92–45.93) (1,034/2,354)	36.97 (35.26–38.67) (1,139/3,081)	<0.001	42.84 (40.95–44.72) (1,130/2,638)	38.02 (36.38–39.66) (1,281/3,369)	<0.001	39.98 (38.68–41.28) (2,173/5,435)	40.14 (38.90–41.38) (2,411/6,007)	0.866	40.14 (38.90–41.38) (2,411/6,007)	40.14 (38.90–41.38) (2,411/6,007)	0.866
70–79 years	71.32 (68.45–74.20) (679/952)	59.27 (56.46–62.08) (697/1,176)	<0.001	67.48 (64.61–70.34) (693/1,027)	58.67 (55.92–61.42) (724/1,234)	<0.001	64.66 (62.63–66.69) (1,376/2,128)	62.67 (60.68–64.67) (1,417/2,261)	0.170	62.67 (60.68–64.67) (1,417/2,261)	62.67 (60.68–64.67) (1,417/2,261)	0.170
80+ years	85.58 (81.77–89.40) (279/326)	83.40 (78.65–88.16) (196/235)	0.480	84.46 (80.61–88.30) (288/341)	76.60 (71.51–81.70) (203/265)	0.014	84.67 (81.69–87.65) (475/561)	81.02 (77.90–84.15) (491/606)	0.099	81.02 (77.90–84.15) (491/606)	81.02 (77.90–84.15) (491/606)	0.099

n/N, number of patients/population.

P values below 0.05 are in bold.

Table 4. Quality of care among women and men 2020 vs. 2021.

Process indicator within the previous year, % (n/N)	2020		2021		p	2020		2021		p
	Women (95% CI) (n/N)	Men (95% CI) (n/N)	Women (95% CI) (n/N)	Men (95% CI) (n/N)		Women (95% CI) (n/N)	Men (95% CI) (n/N)	Total (95% CI) (n/N)	Total (95% CI) (n/N)	
- Patients in whom smoking status was assessed	38.7 (37.06–40.31) (1,330/3,438)	39.3 (37.57–40.96) (1,253/3,191)	44.1 (42.51–45.75) (1,586/3,594)	44.1 (42.45–45.78) (1,506/3,414)	0.628	0.988	39.0 (37.79–40.14) (2,583/6,629)	44.1 (42.96–45.28) (3,092/7,008)	<0.001	
- Patients in whom BMI was measured	36.8 (35.21–38.44) (1,266/3,438)	36.9 (35.24–38.79) (1,178/3,191)	43.2 (41.59–44.83) (1,553/3,594)	45.1 (43.47–46.81) (1,541/3,414)	0.938	0.104	36.9 (35.71–38.03) (2,444/6,629)	44.2 (48.99–45.31) (3,094/7,008)	<0.001	
- Patients in whom blood pressure was measured	44.8 (43.16–46.48) (1,541/3,438)	43.6 (41.84–45.28) (1,390/3,191)	48.9 (47.25–50.52) (1,757/3,594)	50.62 (48.94–52.29) (1,728/3,414)	0.301	0.148	44.2 (43.02–45.41) (2,931/6,629)	49.7 (48.56–50.90) (3,485/7,008)	<0.001	
- Patients in whom eGFR was measured	51.6 (49.93–53.27) (1,774/3,438)	53.5 (51.73–55.19) (1,706/3,191)	57.3 (55.64–58.88) (2,058/3,594)	58.9 (57.28–60.58) (2,012/3,414)	0.129	0.156	52.5 (51.29–53.70) (3,480/6,629)	58.1 (56.92–59.23) (4,070/7,008)	<0.001	
<i>Proximal outcome indicator within the previous year, % (n/N)</i>										
- Patients who were current smokers	43.1 (40.42–45.74) (573/1,330)	39.5 (36.80–42.21) (495/1,253)	44.3 (41.82–46.71) (702/1,586)	39.6 (37.11–42.04) (596/1,506)	0.065	<0.01	41.3 (39.46–43.26) (1,068/2,583)	42.0 (40.24–43.72) (1,298/3,092)	0.665	
- Patients with systolic home blood pressure < 140 mmHg	56.1 (52.85–59.32) (507/904)	60.4 (57.07–63.78) (490/811)	57.0 (54.05–59.92) (624/1,095)	60.1 (57.15–63.12) (623/1,036)	0.069	0.140	58.1 (55.80–60.47) (997/1,715)	58.5 (56.43–60.61) (1,247/2,131)	0.837	
- Patients with systolic home blood pressure > 160 mmHg	8.4 (6.60–10.22) (76/904)	5.8 (4.19–7.40) (47/811)	7.5 (5.93–9.05) (82/1,095)	5.7 (4.28–7.11) (59/1,036)	<0.05	0.096	7.2 (5.95–8.39) (123/1,715)	6.6 (5.56–7.67) (141/2,131)	0.505	
									20.2 (18.40–22.09) (369/1,823)	

n/N, number of patients/population.

P values below 0.05 are in bold.

was observed in proximal outcome indicators within the previous year.

Table 5 shows the quality of care in 2021 among patients registered with a medical diagnosis code compared to patients without a medical diagnosis code. The quality of care of all process indicators was significantly higher among the diagnosed patients compared to undiagnosed patients ($p < 0.001$). Smoking status was assessed in 51.2% of the diagnosed patients compared to only 38.4% of the undiagnosed patients. BMI was measured in 51.6% of the diagnosed patients compared to 38.1% of the undiagnosed patients. A significantly higher proportion of the diagnosed patients had their blood pressure measured compared to the undiagnosed patients (57.2% vs. 43.6%). eGFR was measured in 72.6% of the diagnosed patients compared to only 46.3% of the undiagnosed. No difference was observed between the diagnosed patients and undiagnosed patients when looking at proximal outcome indicators.

Discussion

The prevalence of patients aged 20 years or above increased from 16.7% in 2020 to 17.5% in 2021. In 2021, the prevalence of patients aged 20 years or above registered with a medical diagnosis code was 7.9%. The quality of care increased from 2020 to 2021 but is still below standards for all parameters and thus failed to meet the guidelines [7,16,21]. Interestingly, we observed a significantly improved quality of care among diagnosed patients compared to undiagnosed patients. This indicates improvements with quality of care and with adding medical diagnosis codes in the EMR when patients are visiting for a clinical appointment.

Prevalence

The prevalence found in this study is much higher than reported 10 years ago (11.4%) [13]. This indicates a true increase in prevalence of hypertension in Greenland which correspond to an increase in overweight and obesity among the population as well as an ageing population, thus the proportion of the population above 60 has raised from 11.0% in 2011 to 15.4% in 2021 [22]. Furthermore, there has also been increased focus on treatment of hypertension in Greenland within the last decade. This may be a result of the lifestyle initiative initiated in 2011. The prevalence in our study was lower compared to Inuit from Ottawa (25%) [15] but was higher than among Inuit in Canada (12.2%) [23].

The population survey on health in Greenland from 2018 indicates a higher prevalence of hypertension in Greenland than our study; 76% for men and 61% for women (from a sample of 2,539 participants aged 15–94 years) [11]. However, almost 2/3 of the men and half of the women was not using antihypertensive medication, and will thus not have been included in our study. Our estimates are thus possibly underestimated. This indicates that undetected hypertension remain an important public health issue in Greenland and underlined the importance of early detection and case finding activities.

In 2021, the prevalence of patients aged 20 years or above with a medical diagnosis code was 7.9%. Most likely, many of the patients receiving antihypertensive medication are incorrectly lacking registration of a medical diagnosis code. A continued focus on initiating initiatives to ensure more patients being registered with a medical diagnosis code is thus expected to result in increased prevalence of patients diagnosed with hypertension and better treatment.

In this study, more women than men were using antihypertensive medication. This might be explained

Table 5. Quality of care among patients with and without a medical diagnosis code in 2021.

Process indicator within the previous year, % (n/N)	Patients without a medical diagnosis code		Patients with a medical diagnosis code		p
	Total (95% CI) (n/N)	Total (95% CI) (n/N)	Total (95% CI) (n/N)	Total (95% CI) (n/N)	
- Patients in whom smoking status was assessed	38.4 (36.82–39.89) (1,482/3,864)		51.2 (49.46–52.96) (1,610/3,144)		<0.001
- Patients in whom BMI was measured	38.1 (36.56–39.63) (1,472/3,864)		51.6 (49.84–53.34) (1,622/3,144)		<0.001
- Patients in whom blood pressure was measured	43.6 (42.07–45.20) (1,686/3,864)		57.2 (55.49–58.95) (1,799/3,144)		<0.001
- Patients in whom eGFR was measured	46.3 (44.70–47.85) (1,788/3,864)		72.6 (71.02–74.14) (2,282/3,144)		<0.001
<i>Proximal outcome indicator within the previous year, % (n/N)</i>					
- Patients who were current smokers	42.1 (39.59–44.62) (624/1,482)		41.9 (39.45–44.27) (674/1,610)		0.904
- Patients with systolic home blood pressure < 140 mmHg	57.6 (54.53–60.63) (581/1,009)		59.4 (56.48–62.23) (666/1,122)		0.489
- Patients with systolic home blood pressure > 160 mmHg	6.2 (4.75–7.74) (63/1,009)		7.0 (5.46–8.44) (78/1,122)		0.519

n/N, number of patients/population.

P values below 0.05 are in bold.

by the fact that women more frequently are in contact with the health care system compared to men [24]. The prevalence of patients using antihypertensive medication increased by age, which is in line with an increase in blood pressure with age among Greenlanders [25].

Quality of care

In this study, we evaluated the quality of care by evaluating the registration rates of different process indicators.

Men were significantly older, weighed more, were taller and had a higher diastolic blood pressure compared to women. This is consistent with the fact that middle-aged men are visiting the health care system more infrequently than women [24] and that Greenlandic women have lower 24 hour blood pressure measurement than men [25].

All process indicators were significantly improved in 2021 compared to 2020. Overall, the quality of care was low, although registration of process indicators was significantly improved among diagnosed patients compared to undiagnosed patients. This is in line with the observation for diabetes in Greenland, where adding medical diagnosis codes and continuing monitoring of the diabetes population and the quality of care has resulted in stable quality of care in more than a decade [26].

However, the registration of process indicators increased from 2020 to 2021 and was improved among diagnosed patients compared to undiagnosed patients, none of the process indicators met the criteria of the guidelines. International and Danish guidelines as well as the goals set by SDCG state that 85% of the hypertensive patients should have smoking status assessed and blood pressure measured within the previous year. In our study, only 51.2% of the diagnosed patients had their smoking status assessed during the previous year, while 57.2% had their blood pressure measured. Among the undiagnosed patients, the proportion was even lower (38.4% and 38.1%, respectively).

No difference was observed in proximal indicators from 2020 to 2021, as expected in a short observation period of only one year. When looking at the proximal indicators, our study found some of the recommendations from the guidelines to be reached accordingly, in our study, 59.4% of the diagnosed patients had a blood pressure <140 mmHg (guideline criteria = above 40%), and only 7.0% had a blood pressure >160 mmHg (guideline criteria: below 20%).

Strengths and limitations

A major strength of this study is that it covers 95% of the entire Greenlandic population above 20 years, although

without Tasiilaq. Another strength is that patients were identified through the EMR, even though it is still possible that few patients have handwritten prescriptions, which might underestimate the prevalence. The EMR is an integrated part of the clinicians daily routine, so only few hand-written prescriptions might be found.

The quality of care reported in this study may be underestimated concerning smoking, blood pressure, and BMI performance indicators, since these values will only be extracted if registered correctly in the lifestyle table in the EMR. Most likely, some clinicians have registered the blood pressure incorrectly (e.g. in text format rather than in the table) leading to underestimation. Yet, correct registration of diagnosis and clinical parameters is an important part of quality of care in order to visualise data for the next clinician and to monitor the quality of care on regional and national level. Furthermore, incorrect registration may be linked to lack of knowledge concerning national guidelines and low quality on other parameters. This must also be related to the high turnover in health care professionals. Thus, the reported quality of care depending on correct registration are considered the best measurement.

Conclusions

In conclusion, the prevalence of patients aged 20 years or above treated with antihypertensive medication in 2021 was 17.5%. More women than men used antihypertensive medication and the prevalence increased by age. The associated quality of care did not meet all criteria of National and International guidelines, but was improved in 2021 compared to 2020. Our study demonstrates the importance of registering patients with a diagnosis code, as we found the quality of care to be significantly improved among diagnosed patients compared to undiagnosed patients. Initiatives supporting increased focus on registration of patients receiving antihypertensive treatments are thus warranted. This study shows that hypertension is an important public health issue in Greenland and needs ongoing attention.

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Authors' contributions

MHN cleaned the data, conducted the analysis on the 2021 dataset and drafted the manuscript. MB conducted the analysis on the 2020 dataset and drafted the manuscript. MLP supervised the overall project and draft the manuscript. All authors read and approved the final manuscript.

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