

Prevalence of the use of antihypertensive medications in Greenland: a study of quality of care amongst patients treated with antihypertensive drugs

Maria Bundgaard¹, Dorte Ejg Jarbøl¹, Maja Skov Paulsen¹, Jytte Lindskov Jacobsen² and Michael Lyng Pedersen^{2*}

¹Research Unit of General Practice, Institute of Public Health, University of Southern Denmark, Odense, Denmark; ²Queen Ingrid Health Care Centre, Nuuk, Greenland

Objectives. The primary objective was to estimate the prevalence of patients diagnosed with hypertension using the proxy marker of antihypertensive drug therapy in Greenland and to compare the prevalences within the 5 health regions in Greenland. The second objective was to review 2 quality indicators in antihypertensive care.

Study design. Observational and cross-sectional study reviewing electronic medical records.

Methods. Information about age and gender was collected from all patients receiving antihypertensive drug prescriptions within a 2-year period prior to the data extraction in January 2011. Only patients aged 20 or above were included. The age- and gender-specific prevalence of patients in antihypertensive treatment was calculated using the population as it was 1 January 2010 in Greenland as background population. A subsample consisting of patients in antihypertensive treatment aged 20 or above born within the first 5 days of each month was identified. Review of electronic medical records 1 year back in time (1 January 2010 onwards) was carried out and information on blood pressure obtained. The quality of care was evaluated with respect to 2 indicators: follow-up management and blood pressure level, respectively.

Results. The total number of patients in treatment with antihypertensive drugs was 4,462 (1,998 males and 2,464 females) corresponding to a prevalence of 11.4% (4,462/39,231). The prevalence was higher among females than among males. The prevalence increased with age and differed among the 5 health regions. The percentage of patients in antihypertensive treatment with minimum 1 follow-up visit within 1 year (blood pressure measured and registered in a health clinic) was only 77.7%. Some 45% of patients in antihypertensive treatment achieved blood pressure below 140/90 mmHg.

Conclusion. Hypertension is a common disorder in Greenland. The quality of antihypertensive care is suboptimal and leaves room for improvement. A national strategy based on guidelines, use of electronic drug prescriptions and recording of blood pressures combined with continuous monitoring the quality is recommended in order to prevent complications of untreated hypertension.

Keywords: *Greenland; Inuit; Arctic; hypertension; primary health care; quality*

Received: 21 February 2012; Revised: 11 May 2012; Accepted: 15 May 2012; Published: 13 June 2012

Globally hypertension has become a common disorder affecting approximately one-third of the world's adult population and it is predicted to increase with 60% towards 2025 (1). Hypertension is associated with a number of serious conditions and accounts worldwide for approximately 13.5% of all

premature deaths, 54% of all strokes and 47% of ischemic heart diseases (2).

Hypertension is a heavy burden not only in the economically developed countries, but also in the economically developing countries (1). The developing countries are facing a new situation, where obesity and

overweight are becoming even more common and coexist with undernutrition and infectious diseases (3). With exception of the sub-Saharan African population, cardiovascular disease is now the leading cause of death in the developing countries (4).

In Greenland infectious diseases and accidents were once the biggest health challenges in society (5,6). Although incidence of infectious diseases is still higher than in other western countries, lifestyle-related diseases have now surpassed these (5,6). The lifestyle-related disorders/diseases now abundant in the Arctic regions are: obesity, hypertension, diabetes mellitus Type 2, and cardiovascular diseases (5–10). The change in health epidemiology in Greenland is likely to be due to the social and cultural transition that has occurred in Greenland and other parts of the Arctic region during the past 40–50 years (5,6).

Cardiovascular disease is associated with multiple risk factors that can be divided into non-modifiable risk factors (age, gender and genetics) and modifiable risk factors (smoking, physical inactivity, overweight/obesity, diabetes mellitus, cholesterol and hypertension) (11,12). Among Inuit in the Arctic the overall cardiovascular mortality has been reported higher than in European/North American populations (13). It was commonly believed that the high intake of sea mammals rich in polyunsaturated fatty acids protected the Inuits against cardiovascular disease. However, this belief has recently been questioned (10,13). Supporting the new observations of increasing mortality from ischemic heart disease with increasing westernisation in the Arctic region (13), several studies have found increased risk of cardiovascular disease and modifiable risk factors among the Inuit. The risk factors now abundant included smoking, obesity, hypertension, insulin resistance and diabetes mellitus (8,14,15).

Increasing awareness, treatment and control of hypertension are associated with a reduction in cardiovascular disease and total mortality (16,17). An early intervention with focus on hypertension would therefore be beneficial. There is, however, sparse knowledge of prevalence of patients treated with antihypertensive drugs in Greenland. Furthermore, the present quality of antihypertensive care given by the Greenlandic healthcare clinics is unknown.

The objective of the present study was to estimate the national prevalence of patients treated with antihypertensive drugs in Greenland, to compare the prevalences within the 5 health regions and to determine the quality of care in patients treated with antihypertensive drugs.

Material and methods

The study was designed as a cross-sectional study of the Greenlandic population. Observational data were collected retrospectively through the electronic medical

record (EMR) implemented in the Greenlandic primary healthcare system.

Patients who had antihypertensive drugs prescribed electronically were used as a proxy for patients diagnosed with hypertension. This method was selected firstly to produce baseline data with outcomes that are very feasible and easy to reproduce and therefore to correlate, reinvestigate and monitor. Secondly, this method was the only one that electronically could identify patients that might have hypertension since the diagnosis field in the EMR is not used routinely in Greenland.

Setting

Greenland is a big country covering an area of over 2 million km² and is thus the world's largest island. The country is only sparsely populated with approximately 56,000 inhabitants living widely spread along the coast. There are 18 towns and around 60 minor settlements. Furthermore, the country is divided into 4 governmental regions and 5 health regions (18).

Approximately 90% of the population is of Greenlandic origin (native Inuit), whereas the last 10% are immigrants (mostly Danes). The native Greenlanders are closely related to the Inuit and Yupik in Canada, Alaska and Siberia (19) together inhabiting the circumpolar or Arctic region.

The management of antihypertensive treatment is handled locally in each primary healthcare clinic. In addition, a number of more complicated patients living in Nuuk are treated in the outpatient clinic at the Department of Internal Medicine, Queen Ingrid's Hospital in Nuuk.

All primary healthcare clinics use the same EMR, implemented in the autumn 2007. Part of the EMR is an electronic module for drug prescriptions, which is widely used among primary healthcare clinics. Handwritten prescriptions are still used in Queen Ingrid's Hospital and in a few of the primary healthcare clinics. It is not possible to trace these prescriptions electronically. All prescriptions in Greenland are valid for 1 year.

Study population

Prevalence

The study population was identified retrospectively through a statistic module part of the EMR system. The criteria for inclusion were patients aged 20 or above and who had antihypertensive drugs prescribed electronically within a period of 2 years prior to the time of data extraction in January 2011. Antihypertensive drugs were defined as drugs with Anatomical Therapeutic Chemical (ATC) codes C02–C04 and C07–09. The electronic identification was done for each of the 16 healthcare clinics separately during January 2011.

Information about age and gender was obtained for all patients included in the study population.

Quality

A subsample of all patients included in the study population and born within the first 5 days of each month was assembled to evaluate the quality of care in patients treated with antihypertensive drugs. A review of their medical records was done during a 1-year period prior to the time of data extraction 1 January 2011 (Fig. 1). If a blood pressure (BP) measurement was recorded in the EMR within the previous year the BP value was included in the study. In cases where more than 1 BP was recorded in the EMR, the lowest blood pressure was included.

Analysis

Prevalence

The age- and gender-specific prevalence of patients ≥ 20 and patients ≥ 40 was calculated, using the Greenlandic population as of 1 January 2010 as background population (20). The prevalence of patients (aged 40 or above) was furthermore compared within the 5 health regions in Greenland.

In a subanalysis data from 5 clinics were excluded to accommodate for a potential underestimation of the prevalence due to clinics, where the electronically prescriptions was not fully implemented. The new prevalence estimates were calculated for adult patients (aged 40 or above).

Quality

The quality of care among patients treated with antihypertensive drugs was evaluated with regard to 2 different quality indicators listed in Table I. The first variable was a process indicator measuring the percentage of patients in antihypertensive treatment having their BP measured and registered in the EMR within 1 year. No selection or exclusion was made on the BP measurements extracted from the EMR. Therefore both measurements from patients in the primary and secondary health care units were included. The second variable was an outcome indicator measuring the percentage of patients

in antihypertensive treatment having their BP controlled, for example systolic BP < 140 and diastolic BP < 90 (11,12). The quality indicators were based on recommendations from hypertension guidelines (11,12) and chosen to respond in the best possible way to the following 5 criteria: acceptability, feasibility, reliability, sensitivity and validity (21). Due to guidelines, controlled BP defined as systolic BP < 140 and diastolic BP < 90 was chosen (11,12). Although the limits of blood pressure control differ according to co-morbidities (diabetes mellitus, kidney disease or ischemic heart disease) no differentiation was made (11,12).

Statistics

Chi-square tests were used to compare frequencies between regions. Normally distributed parameters were described using mean and standard deviation (SD). Check for normality was done using Q-Q plots. Means were compared using t-test. P-value at 0.05 was used as level of significance. Estimates were calculated with 95% confidence intervals. Statistical analyses were performed using SPSS 17.0.

Results

Prevalence

In total 4,462 (1,998 males and 2,464 females) persons received an electronic prescription for an antihypertensive drug corresponding to a prevalence of 11.4% (4,462/39,231) (95% CI: 11.1–11.7) in Greenland 2009–2010.

The prevalence of patients treated with antihypertensive drugs was higher among females, 14.1% (2,464/17,421) compared to males, 9.9% (1,998/20,245), ($p < 0.001$). The age- and gender-specific prevalence for all patients aged 20 or above is illustrated in Fig. 2. The prevalence of patients treated with antihypertensive drugs increased with age. There was no age difference ($p = 0.438$) among the females and males receiving antihypertensive treatment.

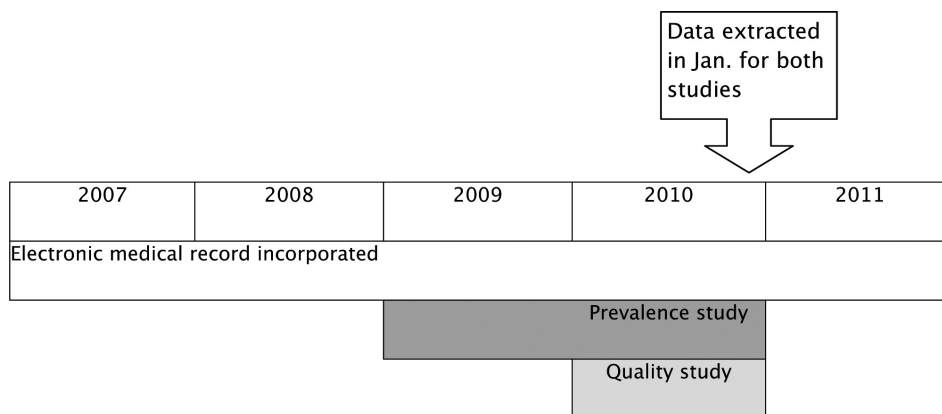


Fig. 1. Timeline: incorporation of EMR, study period and data collection.

Table I. Indicators of quality

| Area of intervention | Type | Indicator | Limit |
|----------------------|-------------------|--|--|
| Follow-up management | Process indicator | Annual rate of patients having their BP measured | Minimum 1 BP measurement within 1 year |
| Blood pressure level | Outcome indicator | BP control rate | Systolic <140 mmHg |
| | | – | Diastolic <90 mmHg |
| | | – | Syst./Diast. <140/90 mmHg |

The prevalence of patients aged 40 or above treated with antihypertensive drugs was 15.9% (4,259/26,806) (95% CI: 15.5–16.3) for all inhabitants in Greenland and the prevalence differed among the 5 health regions ($p < 0.001$). There was no age difference among the patients in the 5 health regions ($p > 0.7$). They did, however, differ with respect to gender ($p < 0.001$).

Five of the 16 health clinics were excluded in the subanalysis. The overall prevalence for adult patients (aged 40 or above) in the subanalysis became 19.7% (2,928/14,879) (95% CI 19.0–20.3), indicating an underestimation of approximately 20% assuming the same real prevalence of diagnosed hypertension in all clinics.

Quality

A total of 703 patients were included in the study of quality in antihypertensive care. The subsample represents 16% (703/4,462) of all patients (aged 20 or above) treated with antihypertensive drugs in Greenland 2009–2010 (Table II). The subsample did not differ in age ($p > 0.1$) or gender ($p = 0.535$) from the study population. Age and systolic and diastolic blood pressure followed the normal distribution.

A total of 77.7% (95% CI: 74.3–80.5) of patients treated with antihypertensive drugs had their blood pressure measured at least once within 1 year. In addition 59.2% (95% CI: 55.5–62.8) had their blood pressure measured at least twice within 1 year. The follow-up rate differed among the 5 health regions in Greenland ($p = 0.012$).

Of all patients treated with antihypertensive drugs 45% (95% CI: 41.6–48.6) achieved blood pressure below 140/90 mmHg. Among the hypertensive patients receiving at least 1 follow-up visit in 1 year 58.5% (95% CI 54.0–63.0) achieved a blood pressure below 140/90 mmHg. Individual rates for systolic and diastolic blood pressure are listed in Table II.

Discussion

Main findings

The prevalence of patients treated with antihypertensive drugs in Greenland was 11.8% for all patients aged 20 years or above and 15.9% for the population aged 40 or above. The annual follow-up rate of patients treated with antihypertensive drugs was estimated to be 77.7 and 45% achieved a blood pressure level below 140/90 mmHg.

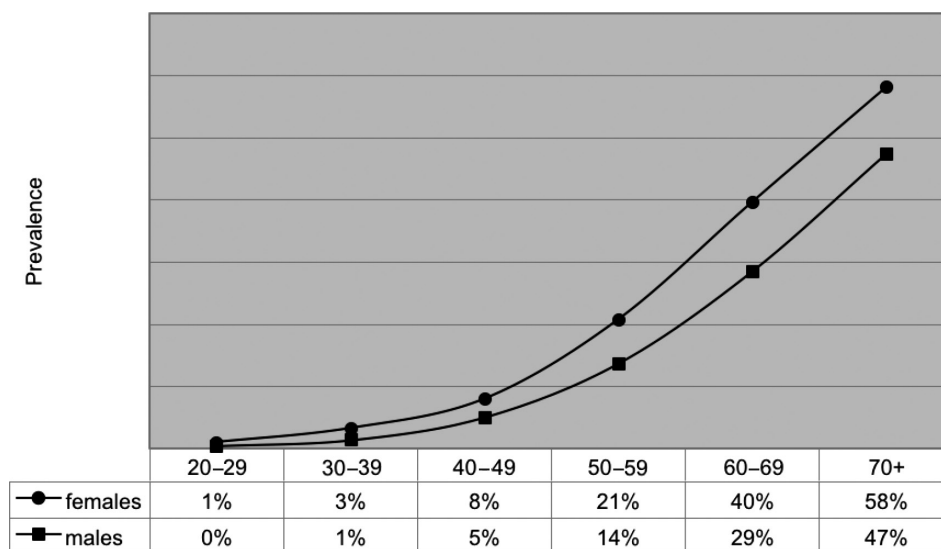


Fig. 2. Age and gender specific prevalence of patients in treatment with antihypertensive drugs in Greenland.

Table II. Prevalence (%) and quality of care within the 5 health regions in Greenland

| | Region 1 | Region 2 | Region 3 | Region 4 | Region 5 | p-value | All | 95% CI |
|--|------------------|------------------|------------------|--------------------|------------------|---------|---------------------|-----------|
| Prevalence of patients in antihypertensive treatment | | | | | | | | |
| 20 years or above | 9 (577/6,438) | 13.9 (778/5,597) | 14.2 (953/6,705) | 9.8 (1,497/15,258) | 12.6 (657/5,233) | < 0.001 | 11.4 (4,462/39,231) | 11.1–11.7 |
| 40 years or above | 11.1 (560/5,028) | 21.7 (741/3,419) | 19.2 (902/4,700) | 15.1 (1,427/9,450) | 14.9 (629/4,209) | < 0.001 | 15.9 (4,259/26,806) | 15.5–16.3 |
| Quality of antihypertensive care | | | | | | | | |
| Blood pressure measured within 1 year | 81.9 (86/105) | 86.9 (86/99) | 79.9 (111/139) | 71 (186/262) | 76.5 (75/98) | 0.012 | 77.7 (544/703) | 74.3–80.5 |
| Controlled blood pressure in all patients in the subsample | 54.3 (57/105) | 53.5 (53/99) | 44.6 (62/139) | 42.4 (111/262) | 35.7 (35/98) | 0.03 | 45.2 (318/703) | 41.6–48.6 |
| Controlled blood pressure in all patients having minimum 1 follow-up visit | 66.3 (57/86) | 61.6 (53/86) | 55.9 (62/111) | 59.7 (111/186) | 46.7 (35/75) | 0.124 | 58.5 (318/544) | 54.0–63.0 |
| Patients with controlled systolic blood pressure | 72.2 (62/86) | 66.3 (57/86) | 60.4 (67/111) | 67.2 (125/186) | 54.7 (41/75) | 0.142 | 64.7 (352/544) | 60.7–68.7 |
| Patients with controlled diastolic blood pressure | 89.5 (77/86) | 89.5 (77/86) | 82 (91/111) | 62.4 (116/186) | 80 (60/75) | < 0.001 | 77.4 (421/544) | 73.9–80.9 |

Strengths and weaknesses

Prevalence

Data recorded in the EMR system from all primary health care clinics in Greenland were in the present study used to estimate prevalence of diagnosed hypertension and quality of antihypertensive care. The immediate benefits of this method were firstly the possibility of using a standardised search tool and, secondly, the possibility of including all patients in Greenland with contact to the health care system. The drawback of this method was that some clinics do not use the EMR regularly or thoroughly when prescribing drugs or recording patient data. Therefore there was a potential underestimation of the prevalence.

We used electronic antihypertensive drug prescriptions as an approximation for patients diagnosed with hypertension. With this method the outcomes are very feasible and easy to reproduce and therefore to correlate, reinvestigate and monitor. On the other hand there are obvious limitations which should be taken into account in the interpretation of the results. For example, the drugs classified as antihypertensives can have other indications than hypertension (heart failure, oedema etc.) which could lead to misclassification errors and an overestimation of the prevalence estimates. This overestimation may be as much as 25% since only 75% of patients treated with antihypertensive drugs in an older study indicated in a questionnaire that they had hypertension (22). A more recent study has documented that using both a diagnosis and prescription claim has greater sensitivity and specificity than using a diagnosis claim only (23). The percentage of patients in Greenland treated with antihypertensive drugs that actually has hypertension in is, however, unknown. On the other hand it could be expected that the real prevalence in the population is much higher than estimated in the study due to a large amount of undiagnosed patients with hypertension. This would potentially balance the bias in the prevalence estimation. A recent study in Denmark based on blood pressure measurements performed at home, thus demonstrated that only 72% of those having hypertension were aware of it while only 64% were treated for hypertension (24). A recent population survey performed in Greenland based on causal blood pressure measurements indicated that only 25% of those with hypertension were aware of it (25).

This problem also limits the analysis of the quality in the management of patients treated with antihypertensive drugs. However, all patients receiving antihypertensive drugs for any reason should have their blood pressure monitored regularly and we have no reason to believe that these other conditions would be handled neither better nor worse than patients treated with antihypertensive drugs for hypertension.

Quality

The subsample used in the quality review represented a large sample with 703 patients, equalling 16% of the total study population. The subsample was selected using the date of birth, which must be considered an independent variable in this context. The patients in the subsample did not differ in age or gender from the rest of the study population. The subsample can therefore be considered a reliable representative of the study sample.

The blood pressure measurements obtained from the EMR in the quality review were not measured under standardised circumstances, as blood pressure measurements were included for doctors' surgery, emergency room and hospitalised patients. This means that the actual rate of follow-up visits, where blood pressure measurements were intentional and scheduled to monitor the antihypertensive treatment, was likely to be overestimated. This should be borne in mind when considering the already very low follow-up rate. The blood pressure level in the patients treated with antihypertensive drugs must be interpreted with caution as they reflect causal measurements. Nevertheless, they represent values to which the physician takes or should take action when considering treatment and follow-up.

The blood pressure measurements included in the study did not exclude patient with lower blood pressure recommendations, for example in patients with comorbidities increasing their risk of cardiovascular death such as diabetes mellitus, kidney diseases, and ischemic heart disease. Furthermore, only the lowest blood pressure registered in the EMR was obtained. Both conditions may potentially lead to an overestimation of the quality of controlled blood pressure.

The quality review included 2 quality indicators for the evaluation of antihypertensive care. For a complete evaluation of the present antihypertensive care it would be desirable to have included other important and relevant indicators of quality such as initial laboratory test, lifestyle modification including weight, smoking, and alcohol consumption, a risk profile and adherence to treatment, etc. (26). However, the study design only allowed for investigation of feasible data extracted from the EMR. We therefore we chose to focus solely on 2 important and strong markers of the general antihypertensive care; the follow-up rate and the blood pressure level, respectively.

Discussion of the results

Prevalence

The prevalence of patients treated with antihypertensive drugs in Greenland was approximately 12% of the Greenlandic population aged 20 or above. A Canadian study of the age- and gender-specific prevalence of Canadians diagnosed with hypertension reported a mean prevalence at 19.2% (8–25.3%) (16). The area

where the 8% was found was the region of Nunavut, which is an area with a low population density and primarily inhabited by Inuits like Greenland and, therefore, interesting and comparable to our results. The difference between the prevalence of diagnosed hypertension from Inuits in Canada and Greenland is not large.

The prevalence of patients treated with antihypertensive drugs in our study is much lower than the prevalence of hypertension among participants in a recent population survey in Greenland where 40% of males and 32% of females were classified as hypertensive (25). However, the diagnoses were based on a causal blood pressure measurements or self reported hypertension and cannot be directly compared to a clinical established diagnosis of hypertension due to the white coat effect affecting more than 20% of patients with an elevated causal blood pressure measurement (27). In the population survey, around a quarter (prevalence around 10%) were treated for hypertension, corresponding quite well to the prevalence documented in the present study.

A recent study among 832 Inuits aged 15 and above participating in a cross-sectional population study in Canada carried out in 2004 found an overall hypertension rate of 19% measured through blood pressure levels above 140/90 mmHg or receiving antihypertensive drugs (15). Comparing this estimate of the overall prevalence of hypertension in an Inuit population with our prevalence estimation of patients aged 20 or above diagnosed with hypertension in Greenland indicates that only two-thirds of all hypertensive patients are recognised and treated for hypertension in Greenland.

The prevalence of patients treated with antihypertensive drugs differed within the 5 health regions in Greenland, suggesting either that the occurrence of hypertension varies geographically in Greenland or the detection rate of hypertensive patients in some of the clinics is lower than others or reflecting differences in the use of the electronic prescriptions. The last 2 possibilities are modifiable and leave room for improvement.

A study of the cross-sectional blood pressure among the Inuit in the Arctic regions included 4 different Inuit populations from Canada, Alaska and Greenland (28). The study of the Greenlandic Inuit was carried out between 1999 and 2001 where 1,295 participants aged 18 or above were included. They found that 9% of the study population in Greenland received antihypertensive drugs during the study period. When comparing this estimated prevalence of patients in antihypertensive treatment with our estimate found nearly 10 years later it showed a 30% increase. This could either be due to an increased incidence of hypertension in the population and/or an increased detection rate.

Quality

The review of the quality in the antihypertensive care revealed a great challenge for improvement, especially regarding the annual follow-up visits with only 77.7% of patients treated with antihypertensive drugs having their blood pressure measured within 1 year. In comparison, a Canadian study found that approximately 89% of their patients diagnosed with hypertension visited the physician within 1 year (lowest rates were seen among the youngest patients 20–39) (29). The difference in the follow-up rates becomes nearly 50% between the 2 countries. The 5 health regions in Greenland differed also significantly ($p=0.012$) in their follow-up rates, suggesting that higher quality is achievable.

Blood pressure level below 140/90 mmHg was achieved in 45% of the patients included in the subsample. A Danish study of treatment, awareness and control of hypertension found the control rate to be 57% in a sample of Danish hypertensive patients receiving antihypertensive treatment (24). Likewise the control rate from a similar study in Canada was found to be nearly 65% increasing from 13.3% in 2 decades (17). As discussed earlier there is a potential overestimation of our rate estimation of controlled blood pressure and when comparing to what has been observed in other countries the rate lies well in the lower end, leaving room for improvement

Conclusion

We found a prevalence of nearly 12% in the Greenlandic population being treated with antihypertensive drugs. The prevalence differed significantly within the 5 health regions. Regarding the quality in antihypertensive care only 77.7% of the patients diagnosed with hypertension received annual follow-up blood pressure measurements, of which 45% achieved BP below 140/90 mmHg.

These findings support our initial belief and state that hypertension is now a prevalent disease in Greenland, especially when bearing in mind that our findings only reflect the diagnosed cases of the hypertensive population. Additionally, we found that the quality in the antihypertensive care was suboptimal and leaves room for improvement.

Perspectivation

The Greenlandic health care system faces a great challenge in respect to overcoming the new burden of lifestyle-related disease now abundant and increasing in Greenland. Improvement of the antihypertensive care in Greenland will most likely lead to better detection, treatment and control of the hypertensive patients and thereby lead to a reduction of cardiovascular morbidity and mortality – similar to what has been reported in Canada due to their extensive intervention programme against uncontrolled hypertension (16,17,30).

When considering the challenges in the Greenlandic healthcare system with a widely spread population, challenges in infrastructure and recruitment of qualified medical staff to the most remote areas in the country (31), an early and uncomplicated intervention against modifiable risk factors such as hypertension will have a great impact on both the individual and health economic costs. A national strategy based on guidelines, use of electronic drug prescriptions and recording of blood pressures combined with continuous monitoring of the quality is recommended in order to prevent complications of untreated hypertension.

Acknowledgement

A special appreciation for the linguistic assistance from Lise Keller Stark.

Conflict of interest and funding

The authors have not received any funding or benefits from industry or elsewhere to conduct this study.

References

1. Kearney PM, Whelton M, Reynolds K, Munther P, Whelton P, He J. Global burden of hypertension: analysis of worldwide data. *Lancet*. 2005;365:217–23.
2. Lawes CM, Vander Hoorn S, Rodgers A. Global burden of blood-pressure-related disease, 2001. *Lancet*. 2008;371:1513–8.
3. World Health Organisation. Obesity and overweight. World Health Organisation; 2012 [cited 2011 Oct 19]. Available from: <http://www.who.int/mediacentre/factsheets/fs311/en/>.
4. World Heart Federation. Cardiovascular disease risk factors. Geneva: World Heart Federation; 2012 [cited 2011 Oct 19]. Available from: <http://www.world-heart-federation.org/cardiovascular-health/cardiovascular-disease-risk-factors/>.
5. Bjerregaard P, Young TK, Dewailly E, Ebbeson SO. Indigenous health in the Arctic: an overview of the circumpolar Inuit population. *Scand J Public Health*. 2004;32:390–5.
6. Backer V, Bjerregaard P, Friberg JT, Homøe P, Jensen KB, Jørgensen ME, et al. Greenland – a changing disease pattern. *Ugeskr Læger*. 2005;167:1389. [in Danish]
7. Jørgensen ME, Bjerregaard P, Borch-Johnsen K. Diabetes and impaired glucose tolerance among the Inuit population of Greenland. *Diabetes Care*. 2002;25:1766–71.
8. Ebbeson SO, Adler AI, Risica PM, Ebbesson LO, Yeh JL, Go OT, et al. Cardiovascular disease and risk factors in three Alaskan Eskimo populations: the Alaska-Siberia project. *Int J Circumpolar Health*. 2005;64:365–86.
9. Young TK, Bjerregaard P, Dewailly E, Risica PM, Jørgensen ME, Ebbeson SO. Prevalence of obesity and its metabolic correlate among the circumpolar Inuit in 3 countries. *Am J Public Health*. 2007;97:691–5.
10. Chateau-Degart ML, Dewailly E, Louchini R, Counil E, Noël M, Ferland A, et al. Cardiovascular burden and related risk factors among Nunavik (Quebec) Inuit: insights from baseline findings in the circumpolar Inuit Health in transition cohort study. *Can J Cardiol*. 2010;26:190–6.
11. Hypertensio arterialis – behandlingsvejledning [Hypertension arterialis – Guidelines]. Copenhagen: Danish Hypertension Society; 2009 [cited 2011 Sept 4]. Available from: <http://www.>

- dahs.dk/fileadmin/Behandlingsvejled0910-endelig-printversion.pdf. [in Danish]
12. US Department of Health and Human Services. The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure [Internet]. Washington: National Institute of Health, US Department of Health and Human Services; 2003 [cited 2011 Sept 4]. Available from: <http://www.nhlbi.nih.gov/guidelines/hypertension/express.pdf>
 13. Bjerregaard P, Young TK, Hegele RA. Low evidence of cardiovascular disease among the Inuit – what is evidence? *Atherosclerosis*. 2003;166:351–7.
 14. Jørgensen ME, Bjerregaard P, Kjaergaard JJ, Borch-Johnsen K. High prevalence of markers of coronary heart disease among Greenland Inuit. *Atherosclerosis*. 2008;196:772–8.
 15. Chateau-Degat ML, Dewailly E, Noël M, Valera B, Ferland A, Counil E, et al. Hypertension among the Inuit from Nunavik: should we expect an increase because of obesity? *Int J Circumpolar Health*. 2010;69:361–72.
 16. Campbell NR, Chen G. Canadian efforts to prevent and control hypertension. *Can J Cardiol*. 2010;26(Suppl C):S14–7.
 17. McAlister FA, Wilkins K, Joffres M, Leenen FHH, Fodor G, Gee M, et al. Changes in the rates of awareness, treatment and control of hypertension in Canada over the past two decades. *CMAJ*. 2011;183:1007–13.
 18. Grønland – kort fortalt [Greenland briefly]. Nuuk: Grønlands selvstyre departement for boliger, infrastruktur og trafik; 2010 [cited 2011 Nov 2]. Available from: http://www.climategreenland.gl/files/pdf/Grønland+og+klimaet+-+kort+fortalt_rettet.pdf. [in Danish]
 19. Szathmari EJ. MtDNA and the peopling of the Americas. *Am J Hum Genet*. 1993;53:793–9.
 20. Statistics Greenland. Population January 1st by residence, gender, age and place of birth 1977–2011. Nuuk: Statistics Greenland; 2011 [cited 2011 Nov 2]. Available from: <http://bankstat.gl/Dialog/varval.asp?ma=BEEST1&path=../Database/Greenland/Population/Population%20in%20Greenland/&lang=1>.
 21. Campbell SM, Braspenning J, Hutchinson A, Marshall MN. Research methods used in developing and applying quality indicators in primary care. *BMJ*. 2003;326:816–9.
 22. Quam L, Ellis LB, Venus P, Clouse J, Taylor CG, Leatherman S. Using claims data for epidemiologic research. The concordance of claims-based criteria with the medical record and patient survey for identifying a hypertensive population. *Med Care*. 1993;31:498–507.
 23. Bullano MF, Kamat S, Willey VJ, Barlas S, Watson DJ, Brenneman SK. Agreement between administrative claims and the medical record in identifying patients with a diagnosis of hypertension. *Med Care*. 2006;44:486–90.
 24. Kronborg CN, Hallas J, Jacobsen IA. Prevalence, awareness, and control of arterial hypertension in Denmark. *J Am Soc Hypertens*. 2009;3:19–24.
 25. Bjerregaard P, Aidt E. Levevilkår, livsstil og helbred [Report about population survey in Greenland 2005–2009]. Copenhagen: Statens Institut for Folkesundhed; 2010. p. 21–22 [in Danish]
 26. Asch SM, Kerr EA, Lapuerta P, Law A, McGlynn EA. A new approach for measuring quality of care for women with hypertension. *Arch Intern Med*. 2001;161:1329–35.
 27. Pickering TG, James GD, Boddie C, Harshfield GA, Blank S, Laragh JH. How common is white coat hypertension? *JAMA*. 1988;259:225–8.
 28. Bjerregaard P, Dewailly E, Young TK, Blanchet C, Hegele RA, Ebbeson SVO, et al. Blood pressure among the Inuit (Eskimo) populations in the Arctic. *Scand J Public Health*. 2003;31:92–9.
 29. Campbell NRC, So L, Amankwah E, Quan H, Maxwell C. Characteristics of hypertensive Canadians not receiving drug therapy. *Can J Cardiol*. 2008;24:485–90.
 30. Onysko J, Maxwell C, Eliasziw M, Zhang JX, Johansen H, Campbell NR. Large increases in hypertension diagnosis and treatment in Canada after a healthcare professional education program. *Hypertension*. 2006;48:853–60.
 31. Redegørelse on Sundhedsreformen, 2010 [Health care Reform 2010]. Nuuk: Departementet for sundhed; 2010 [cited 2011 Nov 2]. Available from: http://www.peqqik.gl/da/Sundhedsreformen/~media/Publikationer/Sundhedsreform_redegoerelse_EM2010/Redegørelse%20om%20Sundhedsreformen_dk_ubilag.ashx. [in Danish]

***Michael Lyng Pedersen**

Box 3333
3900 Nuuk
Greenland
Email: milp@peqqik.gl