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Outcomes of decentralizing hypertension care from district hospitals to health centers in Rwanda, 2013–2014

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Setting: Three district hospitals (DHs) and seven health centers (HCs) in rural Rwanda.

Objective: To describe follow-up and treatment outcomes in stage 1 and 2 hypertension patients receiving care at HCs closer to home in comparison to patients receiving care at DHs further from home.

Design: A retrospective descriptive cohort study using routinely collected data involving adult patients aged ⩾18 years in care at chronic non-communicable disease clinics and receiving treatment for hypertension at DH and HC between 1 January 2013 and 30 June 2014.

Results: Of 162 patients included in the analysis, 36.4% were from HCs. Patients at DHs travelled significantly further to receive care (10.4 km vs. 2.9 km for HCs, $P < 0.01$). Odds of being retained were significantly lower among DH patients when not adjusting for distance (OR 0.11, $P = 0.01$). The retention effect was consistent but no longer significant when adjusting for distance (OR 0.18, $P = 0.10$). For those retained, there was no significant difference in achieving blood pressure targets between the DHs and HCs.

Conclusion: By removing the distance barrier, decentralizing hypertension management to HCs may improve long-term patient retention and could provide similar hypertension outcomes as DHs.

Hypertension is a significant cause of death and disability worldwide.[1–3] It is the leading risk factor for cardiovascular diseases (CVDs), which are a major cause of death in sub-Saharan Africa. In low- and middle-income countries (LMICs), resources needed to effectively manage hypertension are often clustered in urban-based referral hospitals.[4] This underscores the need for decentralization of hypertension care to rural areas. However, delivering health care in the rural environment presents unique challenges such as limited trained personnel, management protocols, diagnostic equipment and medications.[5–7]

To overcome these inherent barriers of rural settings, evidence has shown that task-shifting care to nurses can lead to cost-effective care for more patients compared to a physician-centered model.[8–10] This approach can be valuable for decentralized models based in district hospitals (DHs) and health centers (HCs). Another critical innovation component for resource-limited settings is integration. In the case of non-communicable diseases (NCDs) such as hypertension, type 1 and 2 diabetes, heart failure, asthma, and others can be managed within a single, integrated delivery platform to allow for greater resource efficiency.[11–14]

Until recently, NCD services in Rwanda were only available at referral hospitals and not integrated into the primary healthcare system. In 2006, the Rwandan Ministry of Health (MOH), with support from Partners In Health (PIH), established the first nurse-led integrated NCD clinics at three rural DHs, which were expanded to HCs in 2013.[15] Expert NCD nurses from the DH serve as onsite mentors for the HC NCD nurses. The decentralization of care from the DH to HCs provides greater access to care while maximizing the resources capacities at each level.

In the present study, we assessed the association of nurse-led, mentorship-supported hypertension care, decentralized from rural DHs to HCs using patient retention and blood pressure (BP) control after 12 months of follow-up as indicators. By comparing hypertension care in DHs to HCs, we aimed to provide evidence that can inform further decentralization of NCD treatment models in Rwanda and similar settings.

STUDY POPULATION, DESIGN AND METHODS

Study design

We used routinely collected clinic data from patients who enrolled in the NCD program in three rural districts for hypertension care in this retrospective descriptive cohort study following the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) guidelines.[16]

Study setting

Rwanda is a low-income country with approximately 11 million people, 80% of whom reside in rural areas.[17,18] The doctor-to-population ratio is 4/100 000, and the nurse-to-population ratio is 40/100 000.[18] NCDs account for 17% of the disease burden and CVDs are among the top 10 causes of disability-adjusted life-years.[3] PIH/Rwanda supports three MOH-run DHs in Kirehe, Kayonza and Burera that serve a combined catchment area of over 800 000 people.[19] As of January 2013, NCD clinics were operating at all three DHs and seven of 43 HCs. The HCs were staffed by two nurses who participated in a 1-week training course in NCD diagnosis and management of asthma, stage 1 and 2 hypertension and non-insulin dependent diabetes. At each DH, one nurse with advanced NCD training was elected to join the Mentorship and

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Enhanced Supervision at Health Centers (MESH) program, which was created by PIH/Rwanda and the MOH to support the decentralization of programs from DHs to HCs.[20–23]MESH is a sustained, collaborative program in which a highly experienced health care provider applies clinical checklists to help guide improvement in the quality of care delivered by other providers at lower levels of care. Table 1 provides a comparison of additional operational features of the NCD clinic at the HC and DH.

Diagnosis and treatment provision is facilitated by protocols.[15] Patients found with persistent systolic blood pressure (SBP) measurements of ⩾140 mm of mercury (mmHg) and/or 90 mmHg of diastolic blood pressure (DBP) were diagnosed and staged accordingly (Table 2). Patients in all hypertension categories were treated initially in the DHs. Over time, stable, stage 1 or 2 patients were referred for follow-up care at the nearest HC with an NCD hypertension program. If the nearest HCs lacked an NCD clinic, the patients remained at the DH. Nurses evaluated patients using clinical examination and history taking to guide drug titration. Follow-up visits were scheduled after 1–3 months depending on the patient's stability. All patients received medication(s)and counselling to foster home-based care.[15]

Study population

We included all patients aged at least 18 years with stage 1 or 2 hypertension treated at any of the NCD clinics in the three PIH-supported MOH districts, enrolled between 1 January 2013 and 30 June 2014. Patients with other comorbidities were included if hypertension was their primary diagnosis. We excluded stage 3 patients (management required at DH) and those who moved between clinics or transferred out during the study period.

Data collection and statistical analysis

During patient visits, nurses recorded demographic and clinical information on structured hypertension paper forms, which was entered into an electronic medical record (EMR) system by data clerks. Quality of data was validated through routine data quality audits by data managers. For this study, data on demographics, clinical visits, comorbidities and laboratory results were extracted from the EMR. Distance to the facility was calculated in km using ArcGIS software v10 (ESRI, Redlands, CA, USA) as the Euclidean distance from the patients' village to the facility where the patient sought care. The following three outcomes at 12 months after enrollment were considered: 1) lost to follow-up (LTFU); 2) gap in care; and 3) the attainment of the blood pressure goal (SBP $<$ 140 mmHg or DBP $<$ 90 mmHg). A patient who had an initial clinic visit but had not returned for at least 6 months was considered to be LTFU. A patient who was not LTFU 12 months after enrollment but had any window of 6 months without a clinic visit (within the first 12 months) was considered to have a gap in care. A patient who was not LTFU at 12 months was considered to have achieved a BP treatment goal if their BP values at their clinic visit closest to their 12-month milestone were less than 140/90 mmHg in non-diabetic patients and less than 130/80 mmHg in patients with a comorbidity of diabetes.

Data were analyzed using Stata v14 (Stata Corp, College Station, TX, USA). Categorical variables were compared using Fisher's exact test at $\alpha = 0.05$ significance level. Continuous variables were compared using the Wilcoxon rank-sum test at $\alpha = 0.05$ significance level. A multivariable logistic regression analysis was used to compare patients' outcomes between HCs and DHs, controlling for possible demographic and clinical confounders. Two adjusted analyses were completed, the first not adjusting for distance from the health care facility and the second adjusting for distance from facility, to assess how distance may affect the association between facility type and outcomes.

Ethics approval

As the study was completed using de-identified routinely collected program data, no patient consent was required. Ethics approval was obtained from the Rwanda National Ethics Committee, Kigali, Rwanda, and the PIH Institutional Review Board at Brigham and Women's Hospital in Boston, MA, USA. The study met the Médecins Sans Frontières Ethics Review Board, Geneva, Switzerland, approved criteria for studies of routinely collected data and was also approved by the Ethics Advisory Group of the International Union Against Tuberculosis and Lung Disease, Paris, France.

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Conflicts of interest: none declared.

TABLE 1 Features of decentralized NCD clinics at the health center and district hospital in rural Rwanda

Feature	Health center	District hospital
Staffing	Two NCD and HIV-trained nurses split duties between NCD and HIV clinics	Two NCD trained senior nurses provide only specialty care for severe NCDs
Schedule	NCD clinic operates 1–2 times per week providing care to all NCD patients on clinic days	NCD clinic operates 5 days per week on a day-disease specific schedule; patients are scheduled according to primary diagnosis
Patients	Intermittent and mild–moderate persistent asthma, stage 1 and 2 hypertension, non-insulin dependent diabetes	All patients that could be served at a health center but who do not fall in the catchment area of one of the seven health centers with an NCD clinic. In addition, more severe patients from all catchment areas with chronic respiratory diseases, including severe persistent asthma, stage 3 hypertension, type 1 and 2 diabetes, including insulin dependent patients, and heart failure
Mentorship	A weekly mentorship visit is provided by the district hospital NCD specialist nurse mentor	Daily support by a general physician is available; specialist doctors from referral hospitals provide monthly outreach visits

NCD = non-communicable disease; HIV = human immunodeficiency virus.

TABLE 2 Staging for hypertension at time of the decentralization of NCD program in rural Rwanda

Stage	Systolic blood pressure (mmHg)	Diastolic blood pressure (mmHg)
Normal	<120	<80
Pre-hypertension	120–139	80–89
Stage 1	140–159	90–99
Stage 2	160–179	100–109
Stage 3	⩾180	⩾110

NCD = non-communicable disease.

RESULTS

Of patients enrolled in the NCD hypertension program between 1 January 2013 and 30 June 2014, 162 were included in our analysis, of which 36.4% (n = 59) were enrolled at HCs (Table 3). The median patient age was 60 years for both the HCs (interquartile range [IQR] 49–71) and the DHs (IQR 45–70, P = 0.5), and 80.2% (n = 130) of all the patients were female. Patients at the DHs were more likely to be from outside of the districts' catchment area compared to patients at the HCs (11.6% compared to 0.0%, respectively, $P < 0.01$). The median distance to the health facility was significantly longer for patients who were treated at the DHs

TABLE 3 Demographic characteristics of enrolled hypertension patients among seven rural health centers (n = 59) and three district hospitals (n = 103) in Rwanda

Characteristic	Health centers n (%)	District hospitals n (%)	P value
Age, years, median [IQR]	60 [49–71]	60 [45–70]	0.48*
Sex			
Female	48 (81.4)	82 (79.6)	0.84†
Male	11 (18.6)	21 (20.4)	
Within districts' catchment area			
Yes	59 (100.0)	91 (88.4)	<0.01†
No	0	12 (11.6)	
Distance to facility, km			
<5	47 (79.7)	19 (18.4)	<0.01†
5–10	10 (16.9)	30 (29.1)	
>10	2 (3.4)	54 (52.4)	
Median [IQR]	2.9 [1.5–4.7]	10.4 [5.6–19.3]	<0.01*
Body mass index, kg/m^2 (n = 111)	n = 48	n = 63	
Median [IQR]	23.4 [21.0–26.7]	22.9 [20.3–25.4]	0.32*
Alcohol history (n = 137)	n = 42	n = 95	
Current	5 (11.9)	18 (18.9)	0.22†
Past	13 (30.9)	38 (40.0)	
Never	24 (57.1)	39 (41.1)	
Smoking history (n = 142)	n = 45	n = 97	
Current	2 (4.4)	6 (6.2)	0.63†
Past	9 (20.0)	27 (27.8)	
Never	34 (75.6)	64 (66.0)	
Blood pressure, mmHg, median [IQR]			
Systolic	149 [137–165]	160 [150–167]	0.05*
Diastolic	85 [79–97]	86 [80–90]	0.58*
Hypertension stage			
Stage 1	21 (35.6)	34 (33.0)	<0.01†
Stage 2	21 (35.6)	59 (57.3)	
Uncategorized‡	17 (28.8)	10 (9.7)	
Comorbidity at enrollment			
Yes	20 (33.9)	20 (20.4)	0.06†
No	39 (66.1)	82 (79.6)	
Type of comorbidity§			
Diabetes	2 (3.4)	0 (0.0)	0.13†
Heart failure	1 (1.7)	1 (0.9)	>0.99†
Chronic respiratory disease	2 (3.4)	0 (0.0)	0.13†
HIV-positive	5 (8.5)	3 (2.9)	0.14†
CKD (n = 41)¶	2	5 (26.9)	>0.99†

*Wilcoxon rank-sum test for continuous variables.
†Fisher's exact test for categorical variables.
‡Hypertension controlled (<140/90 mmHg or <130/80 mmHg if diabetic) before enrollment without reporting stage at diagnosis.
§As patients can have more than one comorbidity, the total number of comorbidities is greater than number of patients with comorbidity.
¶CKD patients with serum creatinine clearance <60 ml/min at enrollment.
IQR = interquartile range; HIV = human immunodeficiency virus; CKD = chronic kidney disease.

TABLE 4 Twelve months follow-up and clinical outcomes of enrolled hypertension patients among seven rural health centers and three district hospitals in Rwanda

Variable	Health centers *n* (%)	District hospitals *n* (%)	*P* value
Follow-up outcome at 12 months (*n* = 162)	*n* = 59	*n* = 103	
Alive and in care	57 (96.6)	72 (69.9)	0.01*
Died	0	1 (1.0)	
Lost to follow-up	2 (3.4)	30 (29.1)	
Number of visits in the first 12 months† (*n* = 129)	*n* = 57	*n* = 72	
Median [IQR]	6 [5 to 8]	6 [4 to 7]	0.05‡
Six-month gap in care in first year†§ (*n* = 129)	*n* = 57	*n* = 72	
Yes	7 (12.3)	10 (13.9)	>0.99*
No	50 (87.7)	62 (86.1)	
Patients with blood pressure at goal, *n*/*N* (%)#			
At enrollment	15/59 (25.4)	9/103 (8.7)	<0.01*
At 12 months¶	20/50 (40.0)	20/62 (32.3)	0.43*
Changes in blood pressure, mmHg, median [IQR]¶	*n* = 50	*n* = 62	
SBP at baseline	151 [139 to 165]	160 [140 to 160]	0.79‡
SBP at 12 months	132 [140 to 153]	141 [130 to 156]	0.93‡
Change in SBP over 12 months	6.5 [–8 to 27]	6.5 [–5 to 27)	0.55‡
DBP at baseline	85.5 [79 to 97]	82 [80 to 90]	0.41‡
DBP at 12 months	85 [80 to 89]	80 [70 to 90]	0.11‡
Change in DBP over 12 months	2 [–8 to 15]	4.5 [–10 to 15]	0.65‡

*Fisher's exact test for categorical variables.
†Limited to individuals alive and in care at 12 months.
‡Wilcoxon rank-sum test for continuous variables.
§Patients missed follow up appointments for >6 months, but <12 months.
#Target for non-diabetics <140/90 mmHg; target for diabetics <130/80 mmHg.
¶Limited to individuals who were alive and in care at 12 months and have blood pressures measured at 12 months (±3 months).
IQR = interquartile range; SBP = systolic blood pressure; DBP = diastolic blood pressure.

than those treated at HCs (10.4 km compared to 2.9 km, respectively, $P < 0.01$). At enrollment, patients at the DHs had a higher median baseline SBP than patients at the HCs (160 mmHg, IQR 150–167 vs. 149 mmHg, IQR 137–165; $P = 0.05$); however, there was no significant difference in median baseline DBP measurements (86 mmHg, IQR 80–90 vs. 85 mmHg, IQR 79–97; $P = 0.58$). Patients at the DHs were more likely to have stage 2 disease (n = 59, 57.3%) than patients at the HCs (n = 21, 35.6%; $P < 0.01$). Overall, 12.9% (n = 40) of patients had at least one recorded comorbidity; there was no significant difference in the presence of comorbidities between patients at the DHs and HCs ($P = 0.06$).

Table 4 describes patient outcomes after 12 months of follow-up care. More patients were LTFU at the DHs than at the HCs (29.1% vs. 3.4%; $P = 0.01$). Among those completing 12 months or more of follow-up, the median number of clinic visits during the first year of treatment was similar at both types of facility (HCs: 6 visits, IQR 5–8; DHs: 6 visits, IQR 4–7; $P = 0.05$); there were no significant differences in gaps in care (12.3% for HCs vs. 13.9% for DHs; $P > 0.99$). Of patients followed 12 months or longer, 84.2% had follow-up SBP and DBP measurements recorded at this 1-year milestone. Median Month 12 reduction in SBP from enrollment was 6.5 mmHg for both HCs and DHs ($P = 0.55$); this was respectively 2.0 mmHg and 4.5 mmHg for median DBP reduction ($P = 0.65$). The proportion of patients who reached BP outcome targets (<140/90 mmHg or <130/80 mmHg if diabetic) after 12 months was 40.0% among those treated at HCs and 32.3% among those treated at DHs ($P = 0.43$).

In the first multivariable logistic regression model (Table 5), controlling for sex, age, body mass index, smoking history, alcohol history, hypertension stage at enrollment and presence of comorbidities at enrollment, patients enrolled at the DH were significantly less likely to be alive and in care at 12 months (odds ratio [OR] 0.11, 95% confidence interval [CI] 0.02–0.62). However, when also controlling for distance, while patients at DHs were still less likely to be alive and in care, the effect was no longer significant (OR 0.18, 95%CI 0.02–1.38). Patients enrolled at the DH were less likely to have had a 6-month gap in care when adjusting for distance; however, the effect was not significant (OR 0.96, 95% CI 0.22–4.24). When adjusting for distance, patients enrolled at the DH were more likely to have gaps in care, but the effect was not significant (OR 1.10, 95% CI 0.17–7.10). For achieving BP targets at 12 months, there was no statistical significance for patients enrolled at DHs in either multivariable model (OR 0.69, 95% CI 0.26–1.79 and OR 1.31, 95% CI 0.39–4.75).

DISCUSSION

To our knowledge, this study is the first to compare decentralized, nurse-led, HC-based hypertension care with DH-based, nurse-delivered care in rural sub-Saharan Africa. It offers a unique look at task-shifting and long-term nurse-to-nurse mentorship in a rural HC setting and the impact that incorporating these components into health care delivery systems have on patient outcomes. The findings suggest that the quality of care provided at HCs and DHs for stage 1 and 2 hypertension are similar, as evidenced by improved BP outcomes in patients retained in the program, but the proportion of patients LTFU is higher when patients have to travel further for care. While we acknowledge that this study did not include potentially significant variables such as medication dispensing and prescription patterns, these findings suggest that this decentralized model of care may be one approach to improve both access to hypertension management and retention.

TABLE 5 Crude and adjusted 12-month outcomes of enrolled hypertension patients among seven rural health centers and three district hospitals in Rwanda

			Crude			Adjusted Model 1*			Adjusted Model 2†		
Variable	*N*	*n* (%)	OR	95% CI	*P* value	OR	95% CI	*P* value	OR	95% CI	*P* value
Alive and in-care											
Health center	59	57 (96.6)	1			1			1		
Hospital	103	72 (69.9)	0.08	0.02–0.35	<0.01	0.11	0.02–0.62	0.01	0.18	0.02–1.38	0.10
Six-month gap in care in first year‡											
Health center	57	7 (15.2)	1			1			1		
Hospital	72	10 (37.7)	1.15	0.41–3.24	0.79	0.96	0.22–4.24	0.95	1.10	0.17–7.10	0.91
BP target at 12 months											
Health center	50	20 (40.0)	1			1			1		
Hospital	62	20 (32.2)	0.71	0.33–0.27	0.40	0.69	0.26–1.79	0.44	1.31	0.38–4.47	0.67

*Adjusted for sex, age category, BMI category, smoking history, alcohol history, hypertension stage at enrollment, any comorbidities at enrollment.
†Adjusted for sex, age category, BMI category, smoking history, alcohol history, hypertension stage at enrollment, any comorbidities at enrollment and distance category.
‡Patients missed follow-up appointments for >6 months, but <12 months.
OR = odds ratio, CI = confidence interval; BMI = body mass index.

Not surprisingly, the distance required to travel to the care facility was considerably shorter for those receiving treatment at the HCs than for those treated at the DHs. While there was a striking difference in loss to follow-up rates between rural HCs (3.4%) compared with centralized DHs (29.1%) that was statistically significant in the first multivariable regression model, this difference was no longer statistically significant when controlling for distance. This suggests that closer distance is a large contributor to higher retention rates for patients seeking care at HCs, which is consistent with evidence from other studies in rural sub-Saharan Africa.[6]

At 12 months, there were no significant differences in BP measures between patients still alive and in care at HCs vs. DHs. These findings suggest that HCs can perform as well as DHs in uncomplicated hypertension management. However, we also acknowledge the shortcoming in having patients achieve BP control targets within 12 months. In this study, only 40% of our HC patients and 32.3% of DH patients achieved this target. This finding is consistent with similar challenges reported among African-American hypertensive patients in the United States.[24] While our study indicates that many patients did not reach Month 12 BP target outcomes, the reduction in both systolic and diastolic readings is noteworthy. Longer-term outcomes may inform program design and provide a stronger evidence base for decentralization of services locally and in similar settings.

The limitations of this study include the methodology of using retrospective, routinely collected data from an EMR. In LMICs, data quality from EMRs is often poor due to challenges of missing data and inaccuracies.[25,26] In addition, our results should be interpreted with caution due to the small sample size, the unique characteristics of the PIH/Rwanda-supported MOH NCD program and the differential loss to follow up when comparing patients at the HC and DHs that may have potentially biased the study findings. Furthermore, as the study did not include a control group, it is difficult to know if the outcomes were merely due to regression to the mean. However, while we cannot confirm that the hospital or HC programs per se were the reason for change, the most important finding is that these changes were the same in both settings. Other limitations include missing data on self-reported medicine use, educational level and socio-economic status. However, our experience provides evidence of an innovative demonstration that nurses at HCs are capable of providing quality hypertension care, similar to that at DHs, and that decentralization can be used to address the NCD burden in rural areas. Future analyses that include a larger sample size and longer outcome periods may provide more insights that will inform program improvements and scale-up. Finally, some patients may have been diagnosed at other facilities before enrollment into the hypertension program. Reliable data are unfortunately not available to describe any potential medical treatment, changes in BP between diagnosis and enrollment, or reasons for the BP level at registration.

CONCLUSION

Our findings suggest that the decentralization of nurse-led hypertension care to HCs is a potential solution to increasing effective coverage of hypertension care in rural LMIC areas. Specifically, reducing the distance to care may improve patient retention. This model provides a potential strategy to address the burden of CVD in rural areas of LMICs.

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Contexte : Trois hôpitaux de district (DH) et sept centres de santé (HC) dans le Rwanda rural.
Objectif : Décrire le suivi et les résultats du traitement de patients atteints d'hypertension de stade 1 et 2 soignés dans des HC proches de leur domicile en comparaison des patients soignés plus loin de leur domicile dans des DH.
Schéma : Etude rétrospective descriptive de cohorte à partir de données recueillies en routine, impliquant des patients adultes (>18 ans) soignés dans des services de maladies chroniques non transmissibles et recevant un traitement contre l'hypertension dans des DH et des HC entre le 1e janvier 2013 et le 30 juin 2014.
Résultats : Sur 162 patients inclus dans l'analyse, 36,4% étaient suivis dans des HC. Les patients suivis dans les DH parcouraient des trajets significativement plus longs pour être soignés (10,4 km contre 2,9 km pour les HC, $P < 0,01$). Les chances d'être retenus en soins ont été significativement plus faibles pour les patients des DH sans ajuster sur la distance (OR 0,11 ; $P = 0,01$). Cet effet de rétention a été régulier mais n'est pas resté significatif après ajustement sur la distance (OR 0,18 ; $P = 0,10$). Pour les patients retenus, il n'y a pas eu de différence significative d'atteinte des objectifs de tension artérielle entre les DH et les HC.
Conclusion : En supprimant la contrainte de la distance, décentraliser la prise en charge de l'hypertension vers les HC pourrait améliorer la rétention à long terme des patients et pourrait aboutir aux mêmes résultats en matière d'hypertension que dans les DH.

Marco de referencia: Tres hospitales de distrito (DH) y siete centros de salud (HC) en una zona rural de Rwanda.
Objetivo: Describir el seguimiento y los desenlaces terapéuticos de los pacientes con hipertensión estadio 1 y 2 que recibieron atención cerca de su hogar en HC, comparados con pacientes atendidos más lejos del domicilio, en DH.
Método: Fue este un estudio de cohortes retrospectivo a partir de los datos corrientes de pacientes adultos de 18 años y más, atendidos en consultorios de enfermedades crónicas no transmisibles y que recibieron tratamiento por hipertensión arterial en DH y en HC del 1 de enero del 2013 al 30 de junio del 2014.
Resultados: De los 162 pacientes incluidos en el análisis, el 36,4% acudió a los DH. Estos pacientes debían recorrer una distancia hasta el centro de atención que era notablemente mayor que la distancia recorrida por los pacientes atendidos en los HC (10,4 km contra 2,9 km; $P < 0,01$). La probabilidad de retención en la atención fue significativamente inferior en los pacientes tratados en los hospitales, cuando no se corrigió el dato con respecto a la distancia (OR 0,11; $P = 0,01$). El efecto de retención persistía, pero perdió su significación estadística cuando se ajustó la distancia (OR 0,18; $P = 0,10$). En los pacientes que permanecieron en la atención, no se observaron diferencias significativas con respecto al logro de la meta del tratamiento antihipertensor entre los pacientes que acudieron a los DH o a los HC.
Conclusión: La descentralización de la atención de la hipertensión arterial hacia los HC, al eliminar el obstáculo de la distancia, puede mejorar la retención de los pacientes a largo plazo y lograr desenlaces terapéuticos equivalentes a los resultados de la atención prestada en los DH.

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