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ORIGINAL ARTICLE

Diabetes and hypertension care among male prisoners in Mexico City: exploring transition of care and the equivalence principle

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Abstract
Objectives To document the performance of diabetes and hypertension care in two large male prisons in Mexico City.
Methods We analyzed data from a cross-sectional study carried out during July–September 2010, including 496 prisoners with hypertension or diabetes in Mexico City. Bivariate and multivariable logistic regressions were used to assess process-of-care indicators and disease control status.
Results Hypertension and diabetes prevalence were estimated on 2.1 and 1.4 %, respectively. Among prisoners with diabetes 22.7 % ($n = 62$) had hypertension as comorbidity. Low achievement of process-of-care indicators—follow-up visits, blood pressure and laboratory assessments—were observed during incarceration compared to the same prisoners in the year prior to incarceration. In contrast to nonimprisoned diabetes population from Mexico City and from the lowest quintile of socioeconomic status at the national level, prisoners with diabetes had the lowest performance on process-of-care indicators.
Conclusions Continuity of care for chronic diseases, coupled with the equivalence of care principle, should provide the basis for designing chronic disease health policy for prisoners, with the goal of consistent transition of care from community to prison and vice versa.

Keywords Prisoners · Diabetes · Hypertension · Health care · Mexico City

Introduction

The overwhelming burdens of type 2 diabetes and hypertension have been documented in Mexico. Findings from the last National Health and Nutrition Survey 2012 (Gutiérrez et al. 2012) revealed that the prevalence of self-reported medical diagnoses of hypertension and diabetes were 31.5 and 9.2 %, respectively. Thus, diabetes and cardiovascular disease are the two leading causes of death within the country (IHME 2013).

Despite the development of clinical guidelines and the use of official guidelines for diabetes and hypertension care in Mexico (IMSS 2014; SSa 2010), low performance of quality of care for type 2 diabetes patients has been documented (Jiménez-Corona et al. 2013). Although a high percentage of diabetes patients receive medical treatment (85.5 %), adherence to recommended preventive actions (annual clinical assessment, referrals) and process of care (laboratory assessment) remain low (Jiménez-Corona et al. 2013).

As prisoners are typically not included in National Health Surveys (Binswanger et al. 2009), their health status is not well understood, even though they represent a potential burden to health systems when they return to society with untreated or uncontrolled chronic illnesses. Statistics on type 2 diabetes and hypertension among prisoners are not common in low and middle-income

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countries, particularly for prison populations in Latin America and the Caribbean. In 2010, there were 40,123 prisoners housed in prisons in Mexico City, with an estimated incarceration rate of 453/100,000 inhabitants. These prisoners are housed in precarious conditions, with poor access to health care (CDHDF 2005). Based on the principle of equivalence of care, this unequal access calls for better delivery of healthcare to prisoners by confronting the healthcare inequalities imposed on them by their legal status (Niveau 2007).

Findings from a 2010 health survey of prisoners in four Mexico City prisons showed that prisoners exhibited a lower prevalence of non-communicable chronic diseases (NCDs)—including hypertension, diabetes and obesity—when compared to corresponding national estimates (Bautista-Arredondo et al. 2015). Also higher NCDs prevalence was observed in female prisoners when compared to male prisoners (hypertension 14.8 vs 2.5 % and diabetes 4.6 vs 1.8 %, respectively). However, an increase in prevalence of diabetes in the imprisoned population is anticipated in coming years, due to an ageing prison population and early onset of this disease (ADA 2014a).

People living with NCDs who are exposed to the prison system might confront changes in health care quality and availability (Binswanger et al. 2011). Transitioning from community to prison or between prison facilities during incarceration, prisoners face barriers to continuity in healthcare, including access to pharmacological treatment, which promotes uncontrolled disease. In middle-income countries like Mexico, these barriers arise from a mixture of unfavorable conditions, vulnerable background conditions, and a series of resource-constrained scenarios involving care delivery to a population with a high-risk disease profile, all-unfolding in a stressful environment.

Founded within this prefatory context, this study will document the performance of healthcare procedures for diabetes and hypertension in two large men prisons from Mexico City. This study was based in two conceptual frameworks: the principle of equivalence of care (WHO 2007) which encourages the delivery of a quality of prisoner health services equivalent to that provided to the general population in the same country, and transitions of care (Snow et al. 2009), which addresses transitions between inpatient and outpatient settings.

Based on the aforementioned frameworks, we compared process-of-care indicators received by prisoners during incarceration with those received in the year prior to incarceration. Then, we identified characteristics associated to uncontrolled blood pressure and blood glucose. Finally, we compared the features of diabetes process-of care delivered to prisoners with those self-reported by a non-imprisoned diabetes population in Mexico City, and from the lowest socioeconomic quintile nationally. We hypothesized that prisoners will have low achievement of process-of-care indicators and this performance will be lower than indicators achieved by the same prisoners in the year prior to incarceration and compared to non-imprisoned diabetes population.

Methods

Settings

We analyzed data from a cross-sectional study from two large male prisons (North and South) in Mexico City's Penitentiary System between July and September 2010. The survey components and measurements are detailed elsewhere (Bautista-Arredondo et al. 2015). Prisoners with self-reported medical diagnoses of hypertension or diabetes were identified and invited to answer a brief questionnaire. Prisoners who agreed to participate in the study underwent a blood sample testing for fasting blood glucose and lipid profile. Trained field workers from the National Institute of Public Health (INSP), Mexico, performed anthropometric measurement and blood pressure assessment. A written consent form was obtained from participants, and prisoners were asked to keep a fasting period of 8 h prior to the blood sample testing. The Committees of Research, Biosecurity and Ethics of the INSP approved this study (Protocol ID number: 821).

Among 607 prisoners who reported a diagnosis of diabetes and/or hypertension, 496 provided complete information on current age, current medication, and anthropometric and blood pressure assessments (Fig. 1). This sample of prisoners also provided complete information on pre-incarceration and incarceration process-of-care indicators, which include: follow-up visits (number and frequency), laboratory assessments, blood pressure assessments, physical activity prescriptions for disease control, and reception of a special diet. Imprisonment indicators include length of incarceration, prison facility and age at admission to the prison. Twenty-nine percent ($n = 144$) of these 496 prisoners included in the analysis did not have blood sample testing.

In order to assess a potential selection bias, we performed a difference of means (or proportions) analysis between the selected sample of prisoners and those not included in the final sample. We compared the two samples in terms of current age, healthcare indicators (prior to and during incarceration), co-morbidities, family background, lifestyle and health indicators, The sample of prisoners not included in the final analysis had a higher median length of incarceration than prisoners from the sample analyzed.

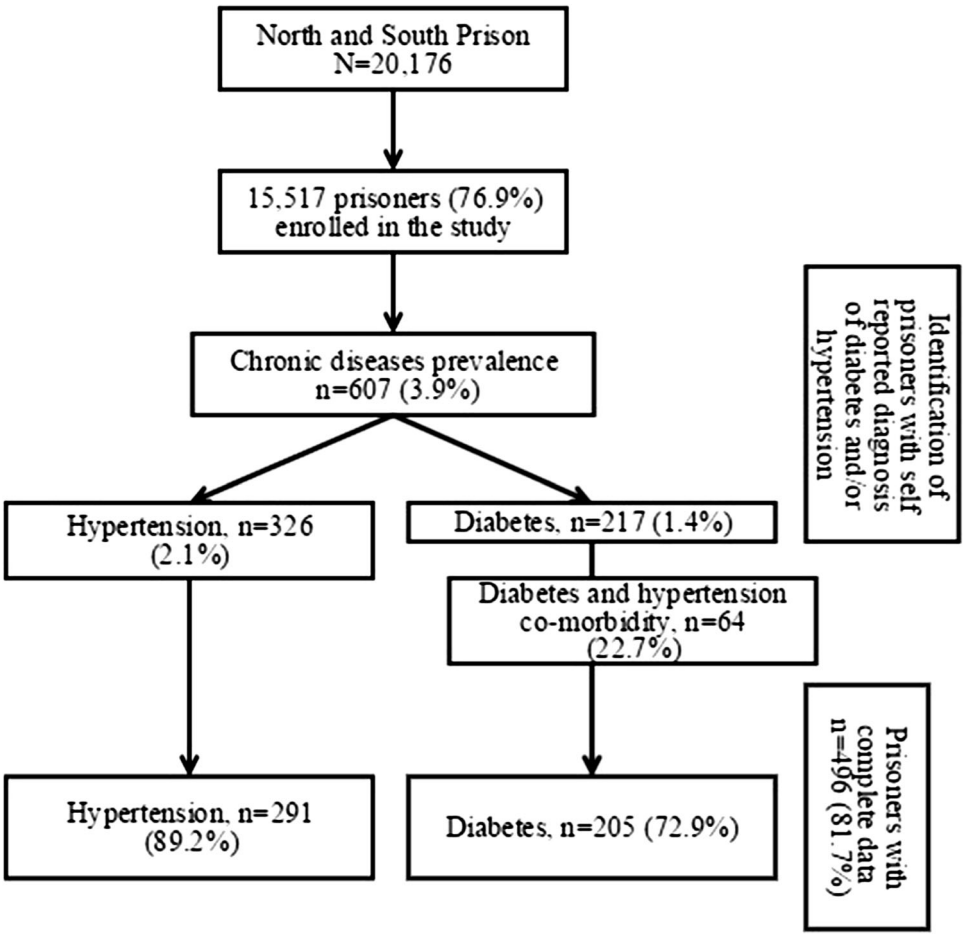

Fig. 1 Analytic sample. North and South prisons, Mexico City, Mexico 2010

Implications of this finding will be addressed in the "Discussion" section.

Variables

Self-reported medical diagnosis was categorized as hypertension without diabetes, and diabetes with or without hypertension. In addition, prisoners were classified according to whether or not they reported currently being on medical treatment. Following international guidelines, uncontrolled blood pressure was defined according to the diagnosis: first, prisoners with hypertension and no diabetes blood pressure (BP) cut-off point was ≥140/90 mmHg (The Task force for the Management of Arterial Hypertension of the ESH and the ESC 2007). Second, cut-off points for prisoners with diabetes with hypertension was BP ≥140/80 mmHg and diabetic prisoners without previous diagnosis of hypertension BP ≥130/80 mmHg. Third, uncontrolled blood glucose was defined by fasting blood glucose ≥130 mg/dl (ADA 2014b) among those prisoners with diabetes.

Process-of-care was evaluated using structured interviews. Self-reported diabetes care for the year prior to and during imprisonment include the following indicators: at least one follow-up visit, one blood glucose laboratory assessment, one blood pressure assessment, a special diet for disease control, and physical activity for disease control (IDF 2005; PAHO 2006). A composite process-of-care indicator was defined by the full compliance of the aforementioned indicators.

Transition of care and the principle of equivalence of care, were studied by comparing 1 year prior to incarceration vs during incarceration per year (transition); and processes-of-care among prisoners vs non-imprisoned diabetes population from Mexico City and from the lowest quintile of socioeconomic status at the national level (equivalence).

Data on physical activity was gathered with the interview questions, "Do you usually perform some exercise?", and "Do you perform at least 30 min of exercise daily?" Consumption of fruits and vegetables was measured by the question, "How frequently do you consume fruits and vegetables?" Dyslipidemia was defined by self-reported diagnoses of elevated blood cholesterol or elevated blood triglycerides. Obesity was defined by a body mass index (BMI) ≥30 (Bailey and Ferro-Luzzi 1995). Abdominal

obesity was defined by a waist circumference (WC) ≥102 cm (NCEP-ATP III 2002).

Other variables analyzed were the current age; prison background variables were age at admission to the prison, length of incarceration (years), and prison facility (North and South). We also included two indicators to explore the difficulty of prisoners to access drugs and laboratory assessments for disease control during incarceration.

Statistical analysis

Descriptive analysis presents the median and inter-quartile range values for continuous variables and percentage and a 95 % confidence interval for the categorical variables. Difference of medians (or proportions) tests were assessed using the Mann–Whitney test; categorical variables used the χ^2 test. Multivariate logistic regressions were used to assess the factors related to uncontrolled blood pressure and blood glucose. Adjusted odds ratios (aOR) and their 95 % confidence intervals (CIs) were estimated.

Data derived from the process-of-care indicators for type 2 prisoners with diabetes were contrasted to that of a non-imprisoned diabetes population collected from the last National Health and Nutrition Survey (ENSANUT 2012). This survey is representative at the national level. It was designed to collect data on different health and nutrition conditions, hospital care services, and the utilization of outpatient care. ENSANUT 2012 was applied to 194,923 individuals in 50,528 households. The specific details on the sampling approach of ENSANUT 2012 were published elsewhere (Romero-Martínez et al. 2013) [data available in http://ensanut.insp.mx/]. For this comparison, we selected a diabetes population in Mexico City and that from the lowest quintile of socioeconomic status at the national level. We particularly examined the indicators of follow-up visits and laboratory assessments as mentioned earlier, and we used a more rigorous cut-off point (≥4 follow-up visits and ≥4 laboratory assessment per year). Analyses were performed using Stata v13.1 (College Station, TX: StataCorp LP 2013).

Results

Hypertension prevalence was 2.1 % ($n = 326$) and diabetes 1.4 % ($n = 217$); among those prisoners with diabetes, 62 (22.7 %) had hypertension as a co-morbidity (Fig. 1). Transition of care from community to prison is presented in Fig. 2 by self-reported medical diagnosis. Lower performance of all care indicators was evident during incarceration compared to the year prior to incarceration in prisoners with hypertension and diabetes, except for the physical activity indicator among prisoners with hypertension (Panel A). A larger gap in process-of-care indicators was observed in prisoners with hypertension compared to prisoners with diabetes. Despite the absence of statistical differences in physical activity, there was an increase in the percentage of achievement during incarceration among prisoners with hypertension when compared to the prior-to-incarceration data for this indicator.

Prisoners with diabetes (Panel B) had higher achievement in process-of-care indicators compared to prisoners with hypertension in both periods studied (prior to and during incarceration). The indicator on special diet for disease control was the only one that showed a significant decrease during the transition from community to prison. Full compliance of the composite process-of-care indicator was very low in hypertensive prisoners in both periods (prior to incarceration 6.52 % and during incarceration 2.06 %). A significant reduction in this composite indicator was observed in prisoners with diabetes (25 % prior to incarceration to less than 7 % during incarceration).

Compared to prisoners with less than one follow-up visit per year during incarceration (Table 1), prisoners with at least one follow-up visit per year during incarceration were older, had entered prison at an older age; a higher percentage was under treatment and received at least one follow-up visit the year prior to incarceration. However, this group also showed worse health status: they had a larger prevalence of dyslipidemia (27.3 vs 19.9 %), uncontrolled blood pressure (43.9 vs 34.3 %) and uncontrolled blood glucose (51.3 vs 40.4). Prisoners that received at least one follow-up visit had better process-of-care indicators compared to the group with less than one follow-up visit. The process-of-care indicators for laboratory and blood pressure assessment showed a similar difference: the group with one follow-up visit was 18 times and 6.6 times higher, respectively. Perceptions of the difficulty to access drugs for controlling the disease were similar in both groups; but it was perceived more difficult to access laboratory assessment in the group with less than one follow-up visit per year during incarceration.

Obese prisoners were 3.84 times more likely to have uncontrolled blood pressure (95 % CI 2.37, 6.24) compared to non-obese prisoners (Table 2). Furthermore, there was a 13 % higher possibility of uncontrolled blood pressure for each year spent in prison (aOR 1.13; 95 % CI 1.06, 1.21) and 9 % higher possibility of uncontrolled blood pressure for each increase of 1 year of age at admission to the prison (aOR 1.09; 95 % CI 1.06, 1.11). However, prisoners with a dyslipidemia diagnosis had lower odds of uncontrolled blood pressure compared to those without dyslipidemia (aOR 0.47, 95 % CI 0.28, 0.79). Prisoners housed in the South prison also had lower odds of uncontrolled blood pressure compared to prisoners housed in the North prison (aOR 0.56; 95 % CI 0.36, 0.87). No association was observed for

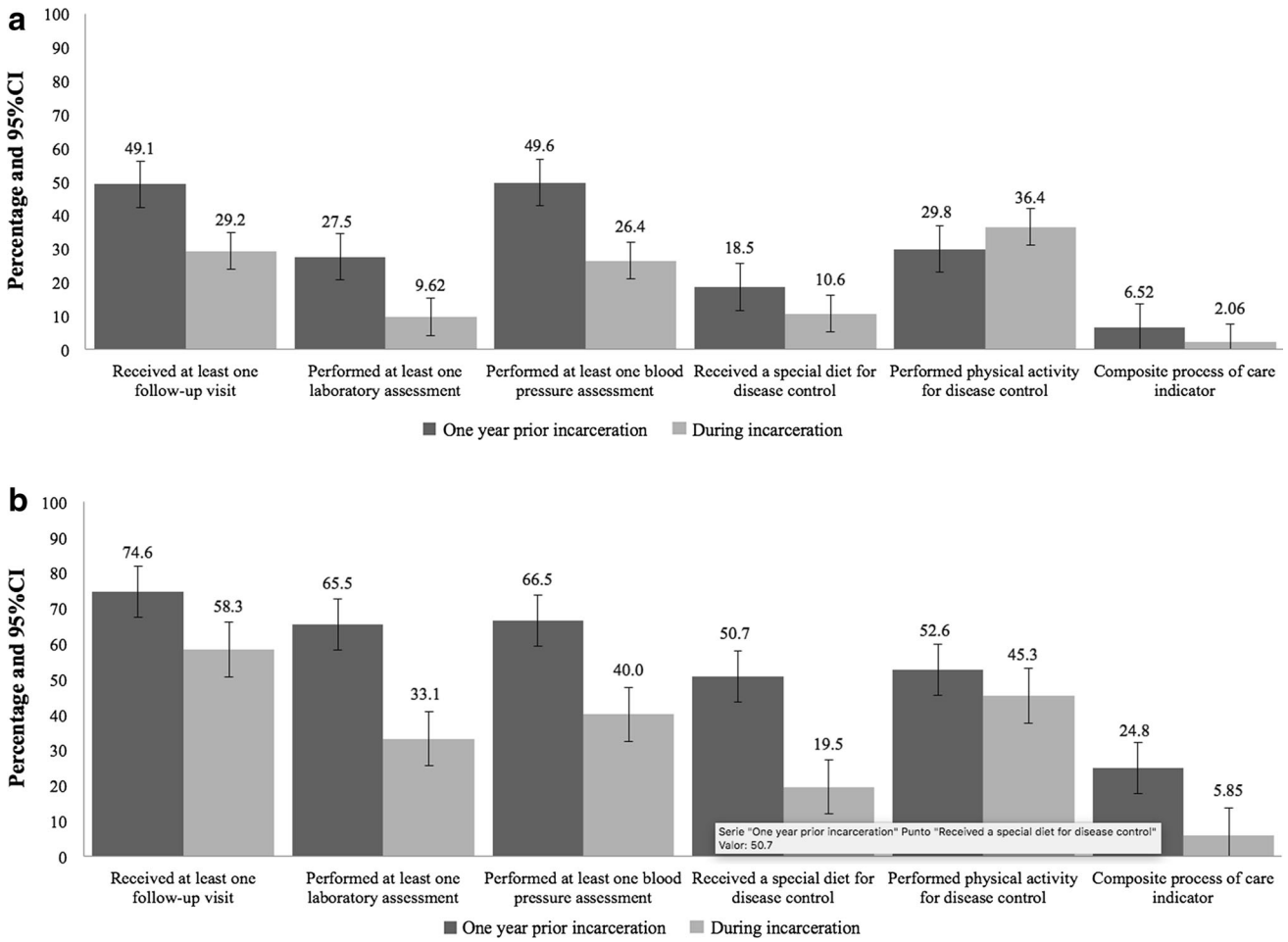

Fig. 2 Quality of care features comparing prior to incarceration vs during incarceration by diagnoses. North and South prisons, Mexico City, Mexico 2010. **a** Prisoners diagnosed with hypertension. **b** Prisoners diagnosed with diabetes. *CI* confidence interval. Follow-up visits, laboratory and blood pressure assessment indicators are annual

prisoners receiving at least one follow-up visit, prior either to incarceration or during imprisonment. Related to uncontrolled blood glucose, prisoners with a dyslipidemia diagnosis were twice as likely to have uncontrolled blood glucose (aOR 2.01; 95 % CI 1.14, 3.54) compared to prisoners without the dyslipidemia diagnosis. No other variable in our model was associated with this outcome.

Figure 3 shows that compared to the non-imprisoned diabetes population from Mexico City and to the national diabetes population at the lowest quintile of socioeconomic status, prisoners with diabetes showed worse performance, in terms of receiving treatment, and fewer follow-up visits per year. There was no significant difference between prisoners with diabetes and the non-incarcerated population at the lowest socioeconomic status quintile on achieving either one or four laboratory assessments per year.

Discussion

Based in the principle of equivalence of care and transitions of care conceptual frameworks, our original results showed how healthcare was delivered to male prisoners with hypertension and diabetes in two large Mexico City prisons. We provided insight into the care transition from community to prison that affect these prisoners as part of the routine procedures of incarceration. We compared the performance of process-of-care indicators between prisoners and a sector of the general population (people living in Mexico City, and people with a high degree of poverty at the national level). We also examined the associated characteristics for uncontrolled blood pressure or uncontrolled blood glucose during incarceration.

Table 1 Prisoner's background; health, treatment and process-of-care indicators by follow-up visit status

N (%)	Follow-up visits per year during incarceration		Diff. test *p* value
	Less than one 291 (58.6) Median [IQR] or %	At least one 205 (41.3)	
Current age	40.0 [32.0, 48.0]	47.0 [38.0, 52.0]	<0.01
Imprisonment indicators			
Length of incarceration	2.03 [0.54, 4.84]	1.75 [0.81, 4.12]	0.72
Age at admission to the prison	36.9 [28.4, 44.8]	43.6 [35.3, 50.1]	<0.01
Prison facility			
North	57.7	60.4	0.53
South	42.2	39.5	
Health care and treatment indicators			
Under treatment	41.5	79.5	<0.01
Received at least one follow-up visit the year prior to incarceration	52.2	70.2	<0.01
Lifestyle indicators			
Perform at least 30 min of physical activity daily	53.2	49.7	0.44
Daily consumption of fruits and vegetables	18.5	15.6	0.39
Co-morbidities			
Obesity	24.7	26.8	0.60
Abdominal obesity	25.7	27.8	0.61
Dyslipidemia	19.9	27.3	0.05
Uncontrolled blood pressure[a]	34.3	43.9	0.03
Uncontrolled blood glucose[b]	40.4	51.3	0.07
Process-of-care indicators			
Performed at least one laboratory assessment[c]	2.41	43.4	<0.01
Performed at least one blood pressure assessment[c]	9.62	63.9	<0.01
Received a special diet for disease control	11.0	19.0	0.01
Performed physical activity for disease control	33.3	49.7	<0.01
Belong to a support group for disease control	0.69	ncr	–
Level of difficulty to get drugs for disease control[d]			
More difficult	76.3	67.6	0.13
Less difficult	10.5	14.6	
Equally difficult	13.1	17.6	
Level of difficulty to performed laboratory assessment for disease[d]			
More difficult	77.1	66.8	0.05
Less difficult	10.3	14.0	
Equally difficult	12.5	19.1	

North and South prisons, Mexico City, Mexico 2010

NA not available, *IQR* interquartile range, *ncr* no cases reported

[a] Defined by blood pressure (BP) cut-off point ≥140/90 mmHg for hypertension group. Prisoners with diabetes may have or not have hypertension. Diabetes prisoners with hypertension had uncontrolled blood pressure if BP cut-off point was ≥140/80 mmHg; otherwise, diabetes without hypertension BP cut-off point was ≥130/80 mmHg

[b] Defined by fasting blood glucose ≥130 mg/dl

[c] Per year during the imprisonment

[d] Since incarceration

Despite the low prevalence of hypertension and diabetes in this imprisoned population, there is still a fundamental need for continuity of hypertension and diabetes care across the transition of individuals from community to prison. We found a significant reduction in the performance of process-of-care indicators during this transition,

Table 2 Multivariable logistic regression models for uncontrolled blood pressure and uncontrolled blood glucose

Variable	Uncontrolled blood pressure			Uncontrolled blood glucose		
	Odds ratio	CI 95 %		Odds ratio	CI 95 %	
Diagnoses [REF: hypertension]	1.00					
Diabetes	1.50	0.89	2.54			
Imprisonment indicators						
Length of incarceration	1.13	1.06	1.21	1.00	0.92	1.09
Age at admission to the prison	1.09	1.06	1.11	1.01	0.99	1.04
Prison facility [Ref North prison]	1.00					
South prison	0.56	0.36	0.87	1.04	0.61	1.77
Health care and treatment indicators						
Under treatment	1.52	0.88	2.62	1.66	0.66	4.15
Lifestyle indicators						
Perform at least 30 min of physical activity daily	1.13	0.75	1.72	1.04	0.64	1.71
Daily consumption of fruits and vegetables	0.84	0.48	1.49	0.92	0.47	1.79
Co-morbidities						
Obesity	3.84	2.37	6.24	0.93	0.54	1.61
Dyslipidemia	0.47	0.28	0.79	2.01	1.14	3.54
Process-of-care indicators						
At least one follow-up visit per year during incarceration	0.90	0.57	1.42	1.33	0.80	2.21
At least one follow-up visit during the prior year before incarceration	0.84	0.53	1.34	1.67	0.96	2.88
N	496			276		

North and South prisons, Mexico City, Mexico 2010

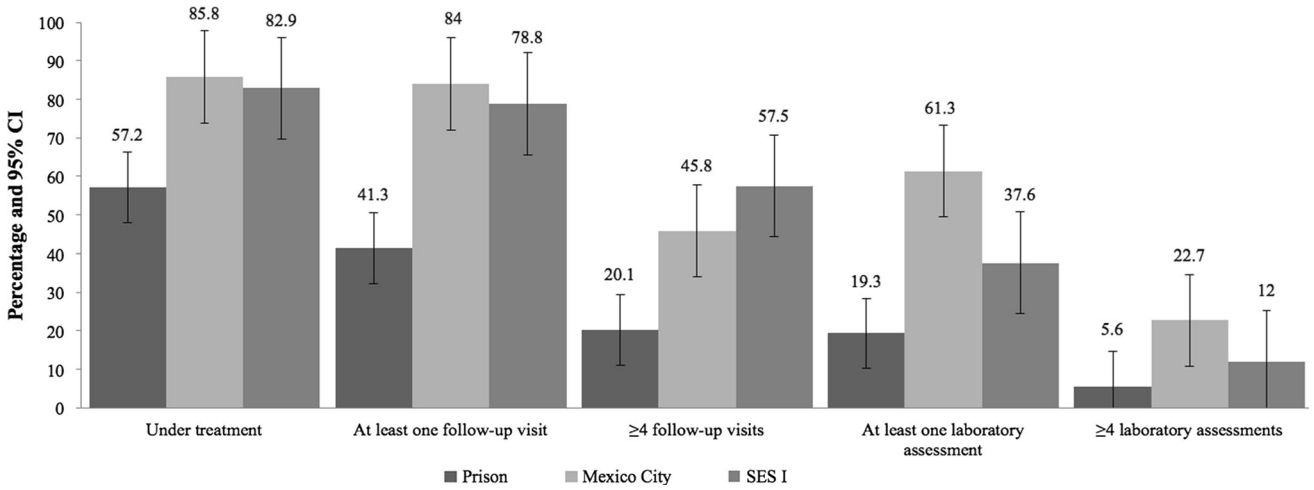

Fig. 3 Process-of-care indicators comparing prisoners with non-imprisoned population from Mexico City and quintile I of socioeconomic status at national level. Mexico 2010. *CI* confidence interval. Follow-up visits and laboratory assessment indicators during incarceration are annual. *SES* socioeconomic status

especially when we analyzed a composite indicator (6.52–2.06 % in hypertensive prisoners and 24.8–5.85 % in prisoners with diabetes). Typically, research on care transitions is focused on prison-to-community transition, with particular focus on maintaining healthcare for HIV infected prisoners (Baillargeon et al. 2010; Springer et al. 2011). These studies were conducted in high-income prison countries where prisoners had health care guaranteed

during incarceration. Our results highlight need to study health care delivery for chronic conditions in prisons in low- and middle-income countries.

Additionally, there is limited evidence on the performance of quality of care features in prisons; we identify one study conducted in the San Francisco county jail (Clark et al. 2006), showing that it is possible to achieve a high level of care indicators. The results of this study contrast with our findings on the underperformance of process-of-care indicators in Mexico City's prison system, even with respect to the same individual prisoners before and after incarceration. Furthermore, compared to treatment and follow-up indicators of the non-imprisoned population, these indicators were markedly lower among prisoners, whereas the laboratory-assessment indicator we measured differed only with that of the diabetes population from Mexico City, which is the source population of prisoners under study.

As expected, prisoners who received at least one follow-up visit per year during incarceration experienced better access to the other process-of-care indicators (laboratory and blood pressure assessment, special diet for disease control and performed physical activity), when compared to those prisoners who received fewer than one follow-up visits per year during incarceration. However, in the multivariable analysis, none of these indicators were associated with good results in intermediate outcomes as blood pressure and blood glucose level control.

Being in prison may provide the first contact with the health system for some vulnerable populations (Dumont et al. 2012), particularly for those with a chronic disease. Due to the restricted aspect of the prison environment, prisoners may actually improve their disease control. A study of Japanese women prisoners showed improved metabolic profiles for pre- and post-menopausal women prisoners (Nara and Igarashi 1998), where the prison intervention included increased physical labor activities, restricted nutrition, and abstinence of smoking and alcohol consumption.

Our study has several limitations. The cross-sectional design has limited causal inference. There is a potential reverse causality with regard to the association of uncontrolled blood pressure and uncontrolled blood glucose with process-of-care indicators. Lack of data on disease onset prevents understanding of the disease progression and its relation with process-of-care indicators. We have not collected information on disease complications. Our lifestyle indicators were part of a diabetes-screening questionnaire, so these indicators may not precisely reflect prisoners' lifestyles. Finally, given that length of incarceration was higher among prisoners excluded from the analysis than among prisoners included in the analysis, there is a potential bias introduced by underrepresenting prisoners with longer sentences and therefore with worst health status (Silverman-Retana et al. 2015).

The transition assessment is based on prisoners' self-report process-of-care indicators for the year prior to incarceration, which may be subject to recall bias among prisoners with longer time of incarceration. However, our finding of lower achievement of process-of-care indicators among prisoners vs non-imprisoned diabetes population, even among the lower socioeconomic status, supports the hypothesis that this transition towards lower quality of diabetes care is real, and not explained only by the potential bias. This finding points out the lack of fulfillment of the principle of equivalence of care among prisoners living with a chronic disease. Additional analysis (data not shown) exploring differences between prisoners with diabetes and prisoners with diabetes and co-morbid hypertension showed that the latter reported higher laboratory and blood pressure assessment during imprisonment. However, despite better follow-up, this group of prisoners had higher obesity rates and higher rates of uncontrolled blood pressure compared to prisoners with diabetes without co-morbid hypertension.

In conclusion, continuity of care for chronic diseases, coupled with the equivalence of care principle, should provide the basis for designing chronic disease health policy for prisoners, with the goal of consistent transition of care from community to prison and vice versa. Prospective studies based on either prisoner's health registries or administrative records would improve our knowledge of how care to chronic disease prisoners is delivered.

Compliances with ethical standards

Conflict of interest The authors declare that they have no competing interests.

References

American Diabetes Association (ADA) (2014a) Diabetes management in correctional institutions. Diabetes Care 37(Suppl 1):S104–S111. doi:10.2337/dc14-S104

American Diabetes Association (ADA) (2014b) Standards of medical care in diabetes-2014. Diabetes Care 37(Suppl 1):S14–S80. doi:10.2337/dc14-S014

Bailey KV, Ferro-Luzzi A (1995) Use of body mass index of adults in assessing individual and community nutritional status. Bull World Health Organ 73(5):673–80. http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2486816&tool=pmcentrez&rendertype=abstract

Baillargeon J, Giordano TP, Rich JD, Helen Z, Wells K, Pollock BH, Paar DP (2010) Accessing antiretroviral therapy following release from prison. JAMA 301(8):848–857. doi:10.1001/jama.2009.202.Accessing

Bautista-Arredondo S, González A, Servan-Mori E, Beynon F, Juarez-Figueroa L, Conde-Glez CJ, Gras N, Sierra-Madero J, Lopez-Ridaura R, Volkow P, Bertozzi SM (2015) A cross-sectional study of prisoners in Mexico City comparing prevalence of transmissible infections and chronic diseases with that

in the general population. PLoS One 10(7):e0131718. doi:10.1371/journal.pone.0131718

Binswanger IA, Krueger PM, Steiner JF (2009) Prevalence of chronic medical conditions among jail and prison inmates in the USA compared with the general population. J Epidemiol Community Health 63(11):912–919. doi:10.1136/jech.2009.090662

Binswanger IA, Redmond N, Steiner JF, Hicks LS (2011) Health disparities and the criminal justice system: an agenda for further research and action. J Urban Health 89(1):98–107. doi:10.1007/s11524-011-9614-1

Clark BC, Grossman E, White MC, Goldenson J, Tulsky JP (2006) Diabetes care in the San Francisco County jail. Am J Public Health 96(9):1571–1574. doi:10.2105/AJPH.2004.056119

Comisión de Derechos Humanos del Distrito Federal (CDHDF) (2005) Informe especial sobre la situación de los centros de reclusión del Distrito Federal (1a ed). Comisión de Derechos Humanos del Distrito Federal, México

Dumont DM, Brockmann B, Dickman S, Alexander N, Rich JD (2012) Public health and the epidemic of incarceration. Annu Rev Public Health 33:325–339. doi:10.1146/annurev-publhealth-031811-124614

Gutiérrez JP, Rivera-Dommarco J, Shamah-Levy T, Villalpando-Hernández S, Franco A, Cuevas-Nasu L, Romero Martínez M, Hernández-Ávila M (2012) Encuesta Nacional de Salud y Nutrición 2012. Resultados Nacionales. Instituto Nacional de Salud Pública (MX), Cuernavaca, México

Institute for Health Metrics and Evaluation (IHME) (2013) Global Burden of Disease. Country Profile, Mexico. http://www.healthdata.org/mexico. Accessed 29 Mar 2016

Instituto Mexicano del Seguro Social (IMSS) (2014) Tratamiento de la Diabetes Mellitus tipo 2 en el primer nivel de Atención. Instituto Mexicano del Seguro Social, México

International Diabetes Federation (IDF) (2005) IDF Clinical Guidelines Task Force. Global Guideline for Type 2 Diabetes. International Diabetes Federation, Brussels

Jiménez-Corona A, Aguilar-Salinas CA, Rojas-Martínez R, Hernández-Ávila M (2013) Diabetes mellitus tipo 2 y frecuencia de acciones para su prevención y control. Salud Pública de México 55(suppl 2):S137–S143. http://search.ebscohost.com/login.aspx?direct=true&profile=ehost&scope=site&authtype=crawler&jrnl=00363634&AN=89675675&h=Np3bFD3rXrv2qIV/pAyMaAEL0jFj1j4OrJ/zPxbz1p3c5SEEjvI8BeF+to/R2m44QEHxEUP5sqhcStLM4SB/zg==&crl=c

Nara K, Igarashi M (1998) Relationship of prison life style to blood pressure, serum lipids and obesity in women prisoners in Japan. Ind Health 36:1–7

Niveau G (2007) Relevance and limits of the principle of "equivalence of care" in prison medicine. J Med Ethics 33(10):610–613. doi:10.1136/jme.2006.018077

Pan American Health Organization (PAHO) (2006) Guías ALAD 2006 de diagnóstico, control y tratamiento de la Diabetes Mellitus Tipo 2. Pan American Health Organization

Romero-Martínez M, Shamah-Levy T, Franco-Núñez A, Villalpando S, Cuevas-Nasu L, Gutiérrez JP, Rivera-Dommarco JÁ (2013) Encuesta Nacional de Salud y Nutrición 2012: diseño y cobertura. Salud Publica de Mexico 55(supl 2):S332–S340

Secretaria de Salud (SSa) (2010) NORMA Oficial Mexicana NOM-015-SSA2-2010, Para la prevención, tratamiento y control de la diabetes mellitus. Diario Oficial de la Federación, México, DF. 5 de Agosto de 2010

Silverman-Retana O, Lopez-Ridaura R, Servan-Mori E, Bautista-Arredondo S, Bertozzi SM (2015) Cross-sectional association between length of incarceration and selected risk factors for non-communicable chronic diseases in two male prisons of Mexico City. PLoS One 10(9):e0138063. doi:10.1371/journal.pone.0138063

Snow V, Beck D, Budnitz T, Miller DC, Potter J, Wears RL, Weiss KB, Williams MV (2009) Transitions of Care Consensus policy statement: American College of Physicians, Society of General Internal Medicine, Society of Hospital Medicine, American Geriatrics Society, American College of Emergency Physicians, and Society for Academic Emergency M. J Hosp Med (Online) 4(6):364–370. doi:10.1002/jhm.510

Springer SA, Spaulding AC, Meyer JP, Altice FL (2011) Public health implications for adequate transitional care for HIV-infected prisoners: five essential components. Clin Infect Dis 53(5):469–479. doi:10.1093/cid/cir446

StataCorp LP (2013) Stata: Release 13. Statistical software. Stata Press, College Station

The Task force for the Management of Arterial Hypertension of the European Society of Hypertension (ESH) and the European Society of Cardiology (ESC) (2007) 2007 ESH-ESC Guidelines for the management of arterial hypertension: the task force for the management of arterial hypertension of the European Society of Hypertension (ESH) and of the European Society of Cardiology (ESC). J Hypertens 25(6):1105–1187. doi:10.1080/08037050701461084

National Institutes of Health. National Heart, Lung and Blood Institutes (2002) Third Report of the National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III) final report (2002). U.S. Department of Health and Human Services

World Health Organization (WHO) (2007) Health in Prisons. A WHO guide to the essentials in prison health. WHO Regional Office for Europe. doi:10.1016/S0140-6736(01)00242-2