



CLÍNICA

Construct validity of an instrument to assess patient adherence to antihypertensive treatment

Validez de constructo de un instrumento de enfermería para evaluar adherencia al tratamiento antihipertensivo

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Keywords: adherence treatment, hypertension, validation studies, nursing. (Source: DeCS, BIREME)

Palabras clave: adherencia; hipertensión; estudios de validación; enfermería. (Fuente: DeCS, BIREME)

ABSTRACT

Introduction: In nursing, art and science of caring, is important to the use of the nursing process using a standardized language. Therefore, having valid nursing results labels, applied pre and post intervention, allows the professional to evaluate and demonstrate the impact of such interventions. Especially in the management of common problems in the adult population such as high blood pressure.

Objective: Determine the construct validity of the result of nursing "therapeutic conduct: illness or injury" (classification of result NOC 1609) to measure adherence to treatment.

Methodology: Study of evaluation of diagnostic technologies nested in cross-sectional population study, carried out in the year 2010. 166 People with hypertension of stratum two and three of Bucaramanga were assessed. The construct validity of the result of nursing "therapeutic conduct: illness or injury" (NOC 1609) to measure adherence to treatment both pharmacological and non-pharmacological was determined using Rasch analysis.

Results: The nursing outcome is one-dimensional, it assesses the construct 'adherence'; the five original answers options regrouped in three, to achieve adequate differentiation in the options of

answers, thus reaching a good reliability (0.99) and separation of the items (8.90); In addition, data adjusted to the Rasch model (values infit and outfit: > 0.6 and <1.4) and there was no differential behavior by sex ($P > 0.05$).

Conclusion: The result of nursing evaluated is an appropriate instrument to measure the adherence because it has construct validity.

RESUMEN

Introducción: En enfermería, arte y ciencia de cuidar, es importante el uso del proceso de enfermería a través de un lenguaje estandarizado. Por lo tanto, contar con etiquetas de resultados de enfermería válidas, aplicadas pre y post intervención, permite al profesional evaluar y demostrar el impacto de dichas intervenciones. Especialmente, en el manejo de problemas frecuentes en la población adulta como lo es la hipertensión arterial.

Objetivo: Determinar la validez de constructo del resultado de enfermería "conducta terapéutica: enfermedad o lesión" (clasificación de resultado CRE 1609) para medir adherencia al tratamiento.

Metodología: Se realizó un estudio de evaluación de tecnologías diagnósticas anidado en un estudio de corte transversal poblacional, realizado en el año 2010. Se evaluaron 166 personas con hipertensión arterial de estrato dos y tres de Bucaramanga. Mediante el análisis Rasch, se determinó la validez de constructo del resultado de enfermería "conducta terapéutica: enfermedad o lesión" (CRE 1609) para medir adherencia al tratamiento, tanto farmacológico como no farmacológico.

Resultados: El resultado de enfermería es unidimensional, evalúa el constructo "adherencia"; las cinco opciones de respuestas originales se reagruparon en tres, para lograr una adecuada diferenciación en las opciones de respuestas, alcanzando así una buena confiabilidad (0.99) y separación de los ítems (8.90); además, los datos se ajustaron al modelo Rasch (valores infit y outfit: >0.6 y <1.4) y los ítems no presentaron comportamiento diferencial por sexo (valor de $p > 0,05$).

Conclusión: El resultado de enfermería evaluado es un instrumento apropiado para medir la adherencia pues cuenta con validez de constructo.

INTRODUCTION

For the art of caring for it is vital to have a standardized, by this language, the nursing profession has the "nursing process", defined as a logical and systematic method consisting of five stages interrelated, in order to provide a holistic care to the person, family or groups ⁽¹⁾. The first stage of the nursing process involves the assessment, where gather, analyze, and validate data from the individual, the family and the Community ⁽¹⁾. Based on this information and scientific knowledge, is the second stage, the diagnosis nurse, which is defined as a judgment on an individual, family or community response to health problems, real or potential, according to the North American Nursing Diagnosis Association (NANDA) ^(2,3); then develops the stage of planning, establishing the goal or result expected together with the individual and the planning of interventions and activities according to the classification of interventions.

For the art of caring is vital to have a standardized language, therefore, the nursing profession has the "nursing process" defined as a logical and systematic method, consisting of five interrelated stages, in order to provide holistic care to the person, family or groups ⁽¹⁾.

The first stage of the nursing process is an assessment, where it is gather, analyze and validate data from individual, family and community ⁽¹⁾. Based on this

information and scientific knowledge, the second step is performed, the nursing diagnosis, which is defined as a judgment on the response of an individual, family or community to real or potential health problems. According to the North American Nursing diagnosis Association (NANDA) ^(2,3); now the planning stage is developed, establishing the goal or expected result together with the individual and the planning of interventions and activities according to the Nursing Interventions Classification (NIC), then, the step that runs the plan of care is developed ⁽⁴⁾.

Finally, the evaluation phase seeks to measure the changes of the person in each of the interventions carried out, for this purpose, nursing has the Nursing Outcome Classification (NOC).

In the 90s, researchers at the University of IOWA developed the NOC, by 280 compendiums of nursing outcomes, each outcome has a definition and indicators, supported bibliographically, validated according Fehring method, applied in clinical practice and updated periodically ⁽⁵⁾.

The nursing outcome is defined as "a state, behavior or perception changeable of the person or caregiver, dependent on nursing interventions and conceptualization in levels of abstraction"; at the same time, indicator is defined as "a state, behavior or perception changeable of the person or caregiver, dependent on nursing interventions and used to determine a result of the person". The ranked results have 17 Likert measurement scales previously validated, each of 5-points that provide different options of variability in the state, behavior, or perception of the person ⁽⁵⁾.

Otherwise, the formation process of a construct between diagnoses, interventions and nursing outcomes with measurable ranges projected continuous care by developing a common language between the clinical, research and educational component; progressively strengthening nursing science ⁽⁶⁻⁸⁾. Thus, the future of nursing depends on the efforts to create scientific instrument, valid and reproducible that giving identity and autonomy to the profession in the field of health ^(7, 8). However, is pending the development of the operationalization of the outcomes nursing indicators in a valid and reproducible way.

When there is no an acceptable reference proof to assess the validity of the measurement, is frequently used to evaluate the construct validity, it develops a scientific theory relating the structure and showing that the theoretical relationships are appropriate ⁽⁹⁾.

The nursing outcome "Therapeutic conduct. Illness or injury" (NOC code: 1609) is defined as personal actions to mitigate or eliminate pathology. This nursing instrument evaluates the adherence to a treatment. This research considers the compliance of therapeutic recommendations given for specific treatment to people with arterial hypertension, considering that this therapeutic treatment includes both pharmacological and non-pharmacological management ⁽⁵⁾. Adherence to regimen or therapeutic treatment involves making the recommendations given by health personal. Non-pharmacological treatment mainly involves changes in lifestyle in terms of diet, exercise, weight control, stress management, cigarette consumption, alcohol consumption, attendance at medical appointments for monitoring and control of arterial hypertension as established treatment, and monitoring changes in the state of health, disease and treatment side effects.

Compliance with drug treatment is mainly taking drugs following the prescription given by: number of medications, dose, time and care in making prescription drugs^(10, 11). The following are the nursing outcome indicators: Therapeutic Behavior: illness or injury (NOC 1609), previously operationalized by Orozco⁽¹¹⁾ and modified for this study:

Table 1. Outcome indicators nursing: Therapeutic Behavior: illness or injury, code 1609.

Number	Indicator (NOC)
1	Compliance with pharmacological treatment
2	Compliance with physical activity
3	Diet indications.
4	Behaviors that increase hypertension
5	Assistance to control appointment for hypertension
6	Monitoring of therapeutic effects and disease changes
7	Monitoring of hypertension side effects
8	Monitoring of treatment side effects

The measurement scale is Likert kind where 1 is never, 2 rarely, 3 sometimes, 4 frequently and 5 always.

Additionally, this instrument has been evaluated in hypertensive population of Bucaramanga, in some psychometric issues such as reproducibility and concordance, the first reported an intraclass correlation coefficient (ICC) of 0.93 with 95% CI: 0.91 to 0.95, that means an almost perfect reproducibility and as for the second, a good agreement by an average difference of 0.016, and limits of agreement of Bland and Altman of 95% between -0.54 and 0.55 was found⁽¹²⁾.

Considering the above, this research evaluated the construct validity of adherence on the outcome of nursing "therapeutic behavior: illness or injury."

METHODS AND MATERIALS

Analysis to assess the construct validity study nested in a population based cross-sectional, conducted in 2010 was made⁽¹³⁾. The sample consisted of 166 hypertensive individuals, contacted between March 18 and June 17, 2010. Double entry and data validation in EPI DATA 3.0⁽¹⁴⁾ was performed, the descriptive analysis was done using STATA 11.0⁽¹⁵⁾ and the analysis of the construct validity by Rasch methodology was implemented in WINSTEPS⁽¹⁶⁾.

RESULTS

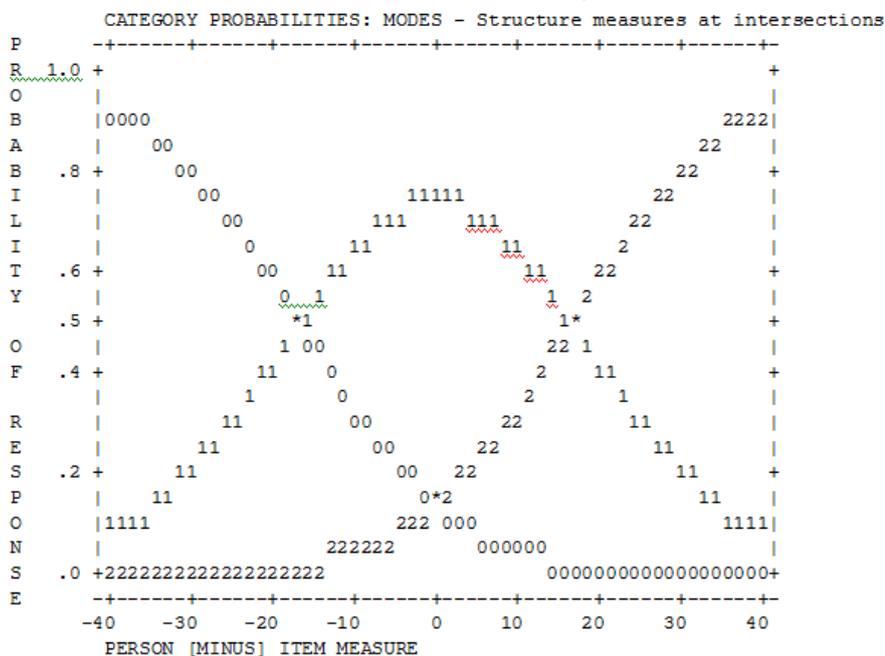
The sample consisted of 166 participants, of whom 28.3% were male and 71.7% female, the average age of participants was 59.2 years, ranging over a range of 54 to 66 years; in the level of schooling, 6.6 % no course some degree, 51.8% reached elementary school, 35.5% secondary and 6% technological or university level, in socioeconomic status, 8.4% belonged to stratum one, 34.9% to stratum two, 51% to stratum three, 4.8% to stratum four or higher. 60% of participants belong to the contributory system, 31.3% of the subsidized system, 3% special regime and 4.8% to none, 53% of participants live with the couple and the remaining 47% live alone.

Adherence to antihypertensive treatment

The evaluation of antihypertensive treatment, concept that involves pharmacological and non-pharmacological treatment, was performed by label or therapeutic outcome of nursing behavior: illness or injury; this result has appropriate reproducibility and agreement ⁽¹²⁾; therefore assessed the dimensionality of the construct validity or "adherence" on the outcome of nursing by Rasch methodology. This methodology was chosen because in addition to assessing construct validity, allows a linear scale measuring adherence through the probability of item response, depending on the skill of the person and item difficulty ^(12, 15) the Rasch analysis was performed with the Winsteps software ⁽¹⁶⁾.

In this way it was found that nursing outcome with Likert scale with 5 levels had good reliability (0.98) and separation (7.24) of the items, however, presented poor differentiation at these levels, as some are intertwined and are not sequentially ordered, showing that levels 1 and 2 are similar, there is confusion in levels 3 and 4 and apparently level 5 is defined, therefore, it was necessary to transform these rating levels to 3 answer choices grouping categories. Thus, different choices of the scale or level of response is proposed to evaluate their reliability and separation values, for individuals and for the items being selected the response level that showed higher reliability and separation, grouping categories 1 and 2 as 0, categories 3 and 4 as 1 and last category 5 as 2, in this way, for the items, the reliability of the instrument was 0.99 and the separation 8.90. Also, these three response levels showed good differentiation in all items, as can be observed in the example of Figure 1 (level of response in the first item).

Figure 1 Differentiation of three levels of response in the first item

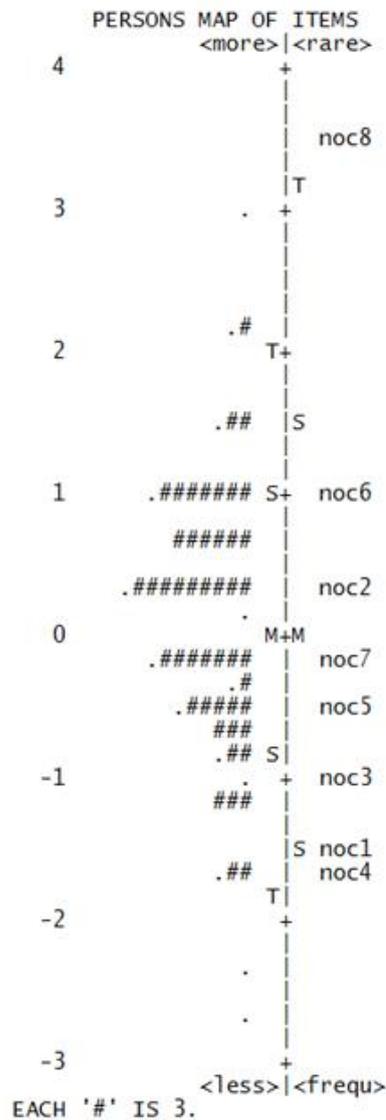


After defining the appropriate level of response, the logit scale of measurement that relates to the raw score or the sum of the items of the outcome of nursing was obtained, where the 0 logit value is reached with 7 and 8 scores.

In Figure 2 is presented the map with the ability degree of the people and the difficulty degree of the items in logit, for the latter, it can be seen that the highest value item was the eighth with 3.5 logit and the lowest was the fourth with -1.80

logit; also, most items are concentrated around an average level of difficulty and a few items of lesser and greater complexity is appreciated. Also is shown on the left side of the figure that the level of ability of most persons is between 0 and 1 logit.

Figure 2 Map of ability of people and difficulty of item in logit.



Abbreviations: Noc 1 Compliance of pharmacotherapy. Noc 2 Compliance with physical activity. Noc 3 Diet indications. Noc 4 behaviors that promote hypertension. Noc 5 Dating Assistance to control hypertension. Noc 6 Monitoring of therapeutic effects and changes in disease. Noc 7 Monitoring of the side effects of the disease. Noc 8 Monitoring of the side effects of treatment. The # symbol represents three participants.

Moreover, the unidimensionality of the construct adherence was evaluated using residual analysis (infit/outfit) and variance analysis, the mean square of infit and outfit values was taken, due to its stability⁽¹⁷⁾. In general, it was observed that both infit as outfit values are greater than 0.6 and less than 1.4 as shown in Table I. Also, the measures explained that 52.4 % of the variance and the value of the first contrast is less than 2, with a value of 1.7; considering the above it was concluded that the scale is unidimensional and that the data conform to the methodology Rasch.

Table I. Setting items.

INDICATOR	INDEX OF DIFFICULTY	MEASURES OF SETTING			
		INFIT		OUTFIT	
		MNS Q	ZSTD	MNS Q	ZSTD
Noc 1	-1.42	0.83	-1.2	0.67	-1.8
Noc 2	0.35	0.81	-2.3	0.79	-2
Noc 3	-1.06	0.89	-1.1	0.88	-1
Noc 4	-1.70	0.93	-0.7	0.92	-0.7
Noc 5	-0.48	1.14	1.4	1.17	1.4
Noc 6	1.00	0.95	-0.5	0.93	-0.6
Noc 7	-0.19	1.32	2.9	1.33	3
Noc 8	3.50	1.06	0.3	1.35	0.8
AVERAGE	0.00	0.99	-0.1	1.01	-0.1
STANDARD DEVIATION	1.57	0.16	1.5	0.23	1.6

Abbreviations: Noc 1 Compliance with pharmacotherapy. Noc 2 Compliance with physical activity. Noc 3 Diet indications. Noc 4 Behaviors that promote hypertension. Noc 5 Dating Assistance to control hypertension. Noc 6 Monitoring of therapeutic effects and changes in disease. Noc 7 Monitoring of the side effects of the disease. Noc 8 Monitoring of the side effects of treatment.

Respect to differential item functioning, the difference between men and women was calculated on the difficulty of each item as shown in Table II. The obtained differences are within the reference values (-0.4 to 0.4), that is, the items do not have a differential behavior, although item 5 reported a statistically significant difference ($p < 0.05$) this is negligible with only -0.39, as evidenced in Figure 3.

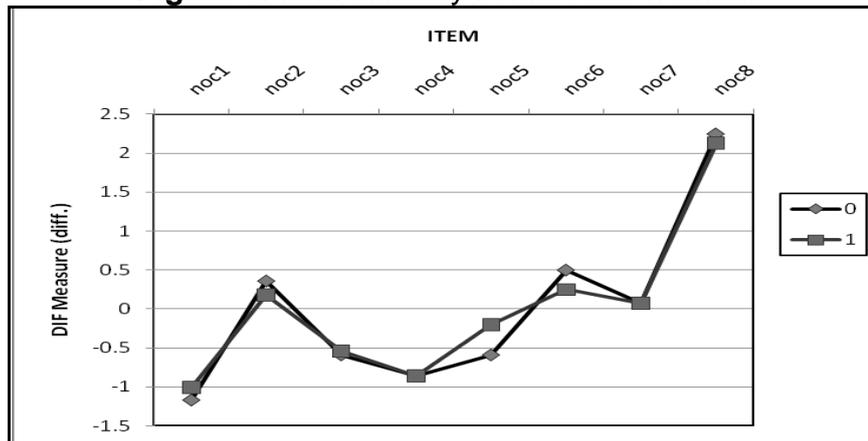
Table II. Item difficulty in men and women.

INDICATOR	WOMEN	MEN	DIFFERENC E	VALUE OF P WELCH	VALUE OF P M-H
Noc1	-1.17	-1.01	-0.16	0.4917	0.5911
Noc 2	0.36	0.18	0.18	0.1819	0.3092
Noc 3	-0.59	-0.54	-0.05	0.8112	0.2284
Noc 4	-0.86	-0.86	0	1	0.9166
Noc 5	-0.59	-0.2	-0.39	0.0134	0.1797
Noc 6	0.5	0.25	0.25	0.135	0.0595
Noc 7	0.07	0.07	0	1	0.6778
Noc 8	2.25	2.13	0.12	0.6983	0.6631

Abbreviations: Noc 1 Compliance of pharmacotherapy. Noc 2 Compliance with physical activity. Noc 3 Diet indications. Noc 4 behaviors that promote hypertension. Noc 5 Dating Assistance to control hypertension. Noc 6 Monitoring of therapeutic effects and changes in disease. Noc 7 Monitoring of the side effects of the disease. Noc 8 Monitoring of the side effects of treatment.

The difference in scores between men and women (0-1), p Welch is the p value of the test Welch, MH p is the p value of the Mantel-Hanzel test.

Figure 3. Item difficulty in men and women.



Abbreviations: Noc 1 Compliance with pharmacotherapy. Noc 2 Compliance with physical activity. Noc 3 Diet indications. Noc 4 behaviors that promote hypertension. Noc 5 Dating Assistance to control hypertension. Noc 6 Monitoring of therapeutic effects and changes in disease. Noc 7 Monitoring of the side effects of the disease. Noc 8 Monitoring of the side effects of treatment. Gender: 0.Women 1. Man.

DISCUSSION

Hypertension is a pathology that affects about 20 % of adults around the world, is a chronic and silent disease which can cause cardiovascular complications, disability and even death ⁽¹³⁾. Adherence has been associated with increased of hypertensive control and reducing of hypertensive complications, it involves both pharmacological and non-pharmacological aspects ⁽¹⁹⁾; the questionnaires, instruments and methods developed in the world to evaluate the adherence are diverse; however, these have limitations in some psychometric aspects ⁽¹⁰⁾. Moreover, each of these offers a different way of measuring and results, hindering evaluation, measurement and comparison in people with hypertension, both in the area of investigation and practice, especially in primary health care ⁽²⁰⁻²⁴⁾.

Therefore, is important to make a proper measurement of the adherence variable using a validated instrument that has adequate operating values, thus it was necessary to advance the Rasch analysis and evaluate the construct validity of the label or nursing outcome "therapeutic behavior : illness or injury" (NOC 1609); instrument previously used in a controlled hypertensive Bucaramanga test, where it was shown that the instrument has adequate reproducibility (ICC : 0.93 with 95% CI: 0.91 to 0.95) and agreement (limits of Bland and Altman of 95%: -0.54 to 0.55)⁽¹²⁾. So, in this study, a logit scale of measurement was obtained as the nursing outcome " therapeutic behavior: illness or injury" with the following characteristics:

- Is unidimensional, ergo it corresponds to a single construct "adherence".
- When grouping the five options of original responses in three, appropriate differentiation was achieved in the answer choices, reaching good reliability (0.99) and separation of the items (8.90).
- Data adjusted to the Rasch model (infit and outfit values: > 0.6 and < 1.4).
- Items not show differential behavior by gender (p value > 0.05).

CONCLUSION

The result of nursing "therapeutic behavior: illness or injury" is an appropriate tool to evaluate adherence to antihypertensive treatment, it showed appropriate psychometric characteristics in terms of construct validity through Rasch analysis. Therefore, this provides scientific evidence that supports its application in practice, in the discipline of nursing, and allows progress in the development of an own language of nursing standardized.

Recommendation

Is recommended make a study to evaluate the criterion validity of the nursing outcome "therapeutic behavior: illness or injury" (NOC 1609), in order to test the ability of discrimination of this result for the assessment of treatment antihypertensive adherence and strengthen the development of a standardized nursing language.

It is also recommended make experimental studies, especially controlled clinical trials, using as instrument the result of nursing evaluated, because it has proved the appropriate reproducibility and validity, for this, it would assess the adherence to antihypertensive treatment pre and post intervention, in order to evaluate the effectiveness of nursing interventions, its productivity, contribute to the development and visibility of the profession.

REFERENCES

1. Alfaro R. Aplicación del proceso de enfermería. 4ª edición. Barcelona, España: 1999.
2. Carpenito LJ. Diagnósticos de enfermería. 5ª edición. Philadelphia: McGraw-Hill Interamericana; 1995.
3. North American Nursing Diagnosis Association (NANDA) Diagnósticos Enfermeros de la NANDA. Definiciones y clasificaciones 2003-2004. Madrid: editorial Harcourt; 2003.
4. Sarmiento LV, Ibañez LE. El proceso de enfermería. Bucaramanga: Publicaciones UIS; 2002.
5. Johnson M, Maas M, Moorhead S. Clasificación de resultados de enfermería. 2ª edición. IOWA: Harcourt; 2001.
6. Moorhead S, Head B, Johnson M, Maas M. The nursing outcomes taxonomy: development and coding. Journal Of Nursing Care Quality. Proquest Medical Library; Agosto 1998.
7. Foster RL. Who is responsible for measuring nursing outcomes. J Soc Pediatr Nurs. 2001 Jul-Sep;6(3):107-8.
8. Maas M, Reed D, Reeder K.M, Kerr P, Specht J, Johnson M, Moorhead S. Nursing outcomes classification: a preliminary report of field testing Outcomes Management. 2002 [citado 12 Ago 2002];6(3):112-119. Disponible en: http://works.bepress.com/janet_specht/70
9. Polit H. Investigación científica ciencias de la salud. 6ª edición: Mac Graw Hill; 2002. p. 399-406.
10. Gil V, Pineda M, Martínez JL, Belda J, Santos ML, Merino J. Validez de 6 métodos indirectos para valorar el cumplimiento terapéutico en hipertensión arterial. Med Clin (Barc). 1994;102: 532-536.

11. Orozco LC, Cáceres. FM. Operacionalización del resultado de enfermería conducta terapéutica: enfermedad o lesión. Bucaramanga: Escuela de Enfermería, Universidad Industrial de Santander; 2010.
12. Orozco L. Medición en Salud. Diagnóstico y Evaluación de resultados. Un manual crítico más allá de lo básico. Bucaramanga: Publicaciones UIS; 2010
13. López N, Oróstegui M, Páez AN, Caballero LP, Valencia LI. Manual de control de calidad del proyecto “Control de la Hipertensión” Bucaramanga: Universidad Industrial de Santander; 2010
14. Lauritsen JM, Bruus M, Myatt MA. An extended tool for validated data entry and documentation of data. The EpiData Association. (v3.1) versión traducida al español por Pedro Arias y Juan Carlos Fernández Merino. Odense Denmark: 2001
15. STATA CORP LP. Stata SE. V11.0. Circle System Inc. Seattle WA: 2007
16. Linacre J. winsteps®- Ministep. Rasch model computer programs 3.68.0. 2009
17. Bond GT. Applying the Rasch model: fundamental measurement in the human sciences. New Jersey: Lawrence Erlbaum Associates Inc; 2007.
18. Chobanian AV. The National High Blood Pressure Education Program Coordinating Committee. The seventh report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. Hypertension. 2003;42:1206 –1252.
19. Sabate E. World Health Organization. Adherence Meeting Report. Geneva: World Health Organization; 2001.
20. Ingaramo RA, Vita N, Bendersky M, Arnolt M, Bellido C, Piskorz D, et al. Estudio nacional sobre adherencia al tratamiento (ENSAT). Rev FED ARG CARDIOL. 2005;34:104-111.
21. Márquez E, Casado JJ, De la Figuera M. Gil V, Martell N. El incumplimiento terapéutico en el tratamiento de la hipertensión arterial en España. Análisis de los estudios publicados entre 1984 y 2001. Hipertensión. 2002;19(1):12-6.
22. Wetzels GE, Nelemans P, Schouten JS, Prins MH. Facts and fiction of poor compliance as a cause of inadequate blood pressure control: a systematic review. Journal of Hypertension. 2004;22(10):1849-1855.
23. Dosse C, Cesarino CB, Martin JFV, Castedo MCA. Factors associated to patients' noncompliance with hypertension treatment. Rev Latino-am enfermagem. 2009;17(2):201-6.
24. Quintana C, Fernandez-Britto JE. Adherencia terapéutica farmacológica antihipertensiva en adultos de atención primaria y factores relacionados con su incumplimiento. Revista cubana de investigaciones biomédicas. 2009: 28(2)

ISSN 1695-6141

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