## Nursing & Primary Care

# Linking Manager's, Health Provider's and Patient's Assessment of Chronic Illness Care in Primary and Secondary Level of Care in Brazil

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## ABSTRACT

**Background:** Twenty years after the first publication of the landmark Chronic Care Model by Wagner and collaborators, it still guides interventions and evaluation aiming to improve patient chronic disease outcomes. Chronic care can be influenced by stakeholders who are user of the collected data, but health providers and patient have also a major impact on the success or failure of intervention aiming to improve quality of care. The Assessment of Chronic Illness Care (ACIC) and Patient Assessment of Chronic Illness Care (PACIC) are tools that have been used with success to evaluate care for a number of chronic diseases from the point of view of providers and patients respectively. In Brazil, chronic diseases are the leading cause of mortality accounting for more than 70% of deaths. Diabetes and cardiovascular diseases accounted for 13% and 5% of discounted disability-adjusted life years (DALYs) in 2007.

**Aim:** The objective of this study was to evaluate care for diabetes and hypertension from the point of view of the patient, providers, and managers in primary and secondary care clinics of the city of Juiz de For a, Minas Gerais, Brazil.

**Material and Methods:** Three different tools were used to evaluate care, named the Assessment of Chronic Illness Care (ACIC) and the Patient Assessment of Chronic Illness Care (PACIC) both designed and tested by the MacColl Institute for Health Improvement as well as the questionnaire Chronic Care Structure Survey designed by the Pan American Health Organization and based on the Physician Practice Connection and Readiness Survey (PPC-RS). In the evaluation participated 1,664 patients with diabetes or hypertension, as well as 323 health providers from public primary and secondary care clinics. Patients and providers were interviewed using ACIC and PACIC; and the CCSS was completed by medical managers from each clinic. Clinical data from patients were abstracted from electronic records.

**Results:** Scores for all the three questionnaires were scaled to 100 percentage points. The evaluation of the structure for chronic care scored 49 and 94 percentage points for primary and secondary care respectively. All PACIC and ACIC scores for primary care clinics were lower than scores for the secondary care clinic. Patients and providers rated care at 45 and 48, and 73 and 68 percentage points for primary and secondary care clinics. The secondary care clinic was evaluated with very high scores by patients and providers. Among the activities explored by the PACIC questionnaire, patient considered the lowest score for activation, followed by care coordination for both primary and secondary care clinics; while providers considered that the weakest aspects were the Health Care Organization. This research showed that using the PACIC, ACIC and CCSS were helpful understanding capacity and identifying chronic care areas for improvement in primary and secondary care settings. The capacity and clinic outcomes of the secondary care clinic proved to be better than the one exhibited by the primary care clinics for the management of diabetes and hypertension.

## Introduction
Twenty years after the first publication of the landmark Chronic Care Model by Wagner and collaborators, it still guides interventions and evaluation aiming to improve patient chronic disease outcomes [1,2]. Chronic care can be influenced by stakeholders who are user of the collected data, but health providers and patient have also a major role to play, on the success or failure of intervention aiming to improve quality of care. The Assessment of Chronic Illness Care (ACIC) [3] and Patient Assessment of Chronic Illness Care (PACIC) [4,5] are tools that have been used with success to evaluate care for a number of chronic diseases from the point of view of providers and patients respectively. In Brazil, chronic diseases are the leading cause of mortality accounting for more than 70% of deaths. Diabetes and cardiovascular diseases accounted for 13% and 5% of discounted disability-adjusted life years (DALYs) in 2007 [6]. Research has demonstrated that diabetes care in Brasil is suboptimal, with a great proportion of patient not receiving adequate eye or foot care [7].

The objective of this study was to evaluate care for diabetes, or hypertension from the point of view of the patient, providers, and managers in primary and secondary care clinics of the city of Juiz de Fora, Minas Gerais, Brazil.

## Methods
Three different tools were used to evaluate care, named the Assessment of Chronic Illness Care (ACIC) and the Patient Assessment of Chronic Illness Care (PACIC) both designed and tested by the MacColl Institute for Health Improvement as well as the questionnaire Chronic Care Structure Survey (CCSS) designed by the Pan American Health Organization and based on the Physician Practice Connection and Readiness Survey (PPC-RS) [8]. CCSS was validated by Amaral et al, at the University of Pelotas [9] and it is shown in Annex 1.

In the evaluation participated 1,664 patients with diabetes ans/ or hypertension, as well as 323 health providers from public primary and secondary care clinics. Patients and providers were interviewed using ACIC and PACIC; and the CCSS was completed by medical managers from each clinic. Clinical data from patients were abstracted from electronic records.

Overall, the study covered a population of 123,650. A total of 1,664 patients were interviewed using the questionnaire Patient Assessment of Chronic Illness Care (PACIC) [10]. The questionnaire Assessment of Chronic Illness Care (PACIC) [3] was completed by at least 3 professionals from each clinic, including one physician, one nurse and one community agent. In addition, the questionnaire Chronic Care Structure Survey (CCSS) was completed by the clinical manager of each clinic. Clinical data from patients were abstracted from electronic medical records.

A total of 13 clinics were selected. Twelve of them were primary care clinics while 1 clinic provided secondary care. Clinics were selected following criteria of regional scope and frequency of referral for secondary care. Thus, we selected one clinic that referred the most and one clinic that referred the least users to a secondary care center of the network, in each of the seven administrative regions of the municipality of Juiz de Fora (north, northeast, central, southeast, south, west and east). It is noteworthy that 1 unit previously selected from the west region was not included due to the lack of interest of the Unit manager to participate in the study. This unit was replaced by another unit in the east region of the city. Patients with hypertension and/or diabetes followed at least for six months were selected in the aforementioned health unit. The individuals were approached in the waiting room while awaiting consultation of the physician/nurse of the unit.

All instruments were applied by trained medical students or three nurses. Patients and health providers gave written consent to participate in the study. The study was approved by the Research Ethics Committee of the University Hospital of the Federal University of Juiz de Fora, Minas Gerais, Brazil, under protocol number 638,335 on April 28, 2014.

**Table 1:** Human resources and population in 13 clinics in Juiz de for a, Minas Gerais, Brazil.

| Centers | General Practitioner | Specialist | Nurses | Other Professionals | Community Agents | Population |
|---|---|---|---|---|---|---|
| 1 | 4 | 0 | 4 | 1 | 20 | 20,000 |
| 2 | 3 | 1 | 3 | 0 | 14 | 10,670 |
| 3 | 1 | 4 | 4 | 1 | 18 | 8,614 |
| 4 | 4 | 0 | 3 | 0 | 15 | 12,000 |
| 5 | 3 | 0 | 3 | 0 | 14 | 9,322 |
| 6 | 3 | 0 | 3 | 0 | 14 | 9,023 |
| 7 | 1 | 0 | 2 | 0 | 7 | 5,099 |
| 8 | 2 | 0 | 2 | 0 | 11 | 5,526 |
| 9 | 2 | 2 | 1 | 0 | 0 | 13,560 |
| 10 | 5 | 0 | 5 | 0 | 28 | 9,027 |
| 11 | 2 | 0 | 2 | 0 | 14 | 5,436 |
| 12 | 2 | 2 | 2 | 1 | 10 | 7,373 |
| 13 | 1 | 22 | 10 | 8 | 0 | 8,000 |

## Results

**Table 2:** Practice size, population and questionnaires scores.

|  | MEAN | MIN | MAX |
|---|---|---|---|
| Practice Size | 9 | 3 | 41 |
| Population | 9,512 | 5,099 | 20,000 |
| Questionnaire Scores |  |  |  |
| Structure for Chronic Care | 52 | 28 | 93 |
| Assessment of Chronic Illness Care | 50 | 22 | 74 |
| Patient Assessment of Chronic Illness Care | 49 | 44 | 58 |
| **TOTAL** | 51 | 32 | 75 |

A total of 1,663 patients attending 13 clinics were included in the study. Most patients were women and 60 years of age or older. Overall 91.3% of the sampled population had both diabetes and hypertension. Most patients attended primary care clinics (73.3%). Almost all patients had recorded blood pressure. Hemoglobin A1c was recorded for 21% and 92.6% of those attending primary and secondary care clinics (p<0.001) respectively. Results indicated that patients attending primary care clinics showed better control of diabetes (p<0.001) and hypertension (p=0.067).

**Table 3:** Patient characteristics.

| Characteristic | Male | Female | Both |
|---|---|---|---|
| Total (n) | 592 | 1,071 | 1,663 |
| Age Group (%) |  |  |  |
| <40 | 5.0 | 5.5 | 5.3 |
| 40-59 | 35.2 | 38.6 | 37.4 |
| 60-69 | 32.0 | 30.5 | 31.0 |
| 70+ | 27.8 | 25.5 | 26.3 |
| With diabetes | 88.9 | 92.1 | 90.9 |
| With hypertension | 42.7 | 40.6 | 41.4 |
| With hypertension & diabetes | 89.5 | 92.3 | 91.3 |
| Attending primary care clinics (n) | 417 | 802 | 1,219 |
| With recorded blood pressure | 100.0 | 99.9 | 99.9 |
| With recorded A1c | 18.5 | 22.6 | 21.2 |
| Appropriate Control diabetes [μ] | 63.6 | 63.5 | 63.6 |
| Appropriate Control hypertension [α] | 57.6 | 61.0 | 59.9 |
| Attending secondary care clinics (n) | 175 | 269 | 444 |
| With recorded blood pressure | 100.0 | 100.0 | 100.0 |
| With recorded A1c | 93.2 | 92.3 | 92.6 |
| Appropriate control diabetes [μ] | 55.4 | 42.5 | 47.6 |
| Appropriate control hypertension [α] | 58.9 | 53.5 | 55.6 |

Numbers are % unless otherwise specified
[α] Blood pressure <140/90/ [μ] A1c <7% for those less than 60 years of age;
<8% for those ≥60 years of age.

The evaluation of the structure for chronic care scored 49 and 94 percentage points for primary and secondary care respectively. All PACIC and ACIC scores for primary care clinics were lower than scores for the secondary care clinic. Patients and providers rated care at 45 and 48, and 73 and 68 percentage points for primary and secondary care clinics. The secondary care clinic was evaluated with very high scores by patients and providers. Among the activities explored by the PACIC questionnaire, patient considered the lowest score for activation, followed by care coordination for both primary and secondary care clinics; while providers considered that the weakest aspects was the Health Care Organization.

| Center | CCSS | PACIC | TOTAL |
|---|---|---|---|
| 1 | C | C | C |
| 2 | B | C | B |
| 3 | C | C | C |
| 4 | B | C | B |
| 5 | C | B | C |
| 6 | A | C | B |
| 7 | B | B | B |
| 8 | C | C | C |
| 9 | C | C | C |
| 10 | B | C | B |
| 11 | C | C | C |
| 12 | C | C | C |
| 13 | A | B | A |
| Legend: |  |  |  |
| From | To | Class | Interpretation |
| 0 | 25 | D | Limited |
| 26 | 50 | C | Basic |
| 51 | 75 | B | Reasonable |
| 76 | 100 | A | Fully developed |
| - | - | N/A | N/A |

**Figure 1:** Classification of centers using the CCSS, ACIC and PACIC questionnaires.

**Table 3:** Appropriate control of glycemia [μ] and blood pressure [α] by clinic.

| Center | No. Total | Hypertension[α] No. | Hypertension[α] Appropriate Control | Diabetes[μ] No. | Diabetes[μ] Appropriate Control |
|---|---|---|---|---|---|
| 1 | 36 | 2 |  | 36 | 61.7 (38.2-80.8) |
| 2 | 193 | 56 | 61.4 (52.9-69.2) | 186 | 74.8 (46.6-91.0) |
| 3 | 50 | 9 |  | 48 |  |
| 4 | 314 | 66 | 58.5 (51.3-65.4) | 300 | 51.6 (36.3-66.6) |
| 5 | 75 | 8 |  | 75 | 62.1 (40.2-80.0) |
| 6 | 83 | 26 | 46.2 (34.7-58.1) | 82 | 45.4 (21.9-71.1) |
| 7 | 85 | 22 | 54.5 (41.6-66.8) | 83 | 71.8 (46.2-88.4) |
| 8 | 80 | 18 | 42.8 (31.0-55.5) | 71 | 80.0 (57.5-92.2) |
| 9 | 53 | 22 | 75.6 (60.4-86.3) | 52 | 44.5 (23.0-68.3) |
| 10 | 40 | 1 |  | 39 | 61.7 (38.2-80.8) |
| 11 | 79 | 20 | 51.1 (38.4-63.6) | 77 | 18.6 (5.0-49.5) |
| 12 | 132 | 37 | 42.1 (32.7-52.2) | 124 | 39.6 (20.2-62.9) |
| 13 | 444 | 401 | 63.1 (49.7-74.7) | 340 | 61.7 (38.2-80.8) |
| All | 1,664 | 688 | 58.9 (56.5-61.2) | 1,513 | 58.4 (53.2-63.4) |

*Adjusted by age, gender, level of care and center practice size.
[α] Blood pressure <140/90/ [μ] A1c <7% for those less than 60 years of age;
<8% for those ≥60 years of age.

Proportion for centers with less than 10 patients with hypertension were omitted but included in the overall proportion.

Overall, 58.9% and 58.4% of patients had appropriate control of glycemia and blood pressure respectively. The proportion of patient with appropriate control of glycemia and blood pressure

varied from 42.1% to 75.6% and 18.6% to 80.0% respectively. High total scores for the three questionnaires (CCSS, ACIC & PACIC) did not translate in better control of hypertension and diabetes.

**Table 4:** Appropriate control (%)$^\alpha$ of blood pressure (<140/90) by component of the Chronic Care Model as per the application of the questionnaires ACIC and ECC.

| CCM Component | ACIC | | | CCSS | | |
|---|---|---|---|---|---|---|
| | Percentile | | | Percentile | | |
| | 1-2 | 3-4 | OR (95%-CI) | 1-2 | 3-4 | OR (95%-CI) |
| Health Care Organization | 56.1 | 61.4 | 1.2 (1.0-1.6) | 55.3 | 62.0 | 1.3 (1.0-1.7)* |
| Community Linkages | 58.2 | 60.4 | 0.9 (0.7-1.2) | | | |
| Self-management Support | 56.7 | 60.7 | 1.2 (0.9-1.5) | 62.9 | 52.6 | 0.7 (0.5-0.9)$^\beta$ |
| Decision Support | 58.3 | 61.6 | 1.1 (0.8-1.7) | 54.6 | 59.8 | 1.2 (0.9-1.6) |
| Delivery System Design | 49.2 | 61.2 | 1.6 (1.2-2.2)* | 47.7 | 59.4 | 1.6 (1.0-2.5)* |
| Clinical Information System | 60.4 | 58.6 | 0.9 (0.7-1.2) | 54.6 | 61.7 | 1.3 (1.1-1.7)* |
| Integration | 59.5 | 59.4 | 1.0 (0.7-1.3) | | | |
| Total | 58.6 | 58.9 | 1.0 (0.8-1.3) | 58.0 | 59.2 | 1.0 (0.8-1.3) |

$\alpha$ Adjusted by age, gender, level of care and practice size
*p<0.05; $\beta$ undesired outcome

The proportion of patients with Appropriate control of blood pressure was significantly higher for clinics reporting scores of 3-4 percentile for the Delivery System Design section of the ACIC questionnaires; while it was significantly higher for clinics with 3-4 percentiles of three CCSS questionnaire (Health Care Organization, Delivery System Design and Clinical Information System).

**Table 5:** Appropriate control of glycemia (%)$^\mu$ by component of the Chronic Care Model as per the application of the questionnaires ACIC and CCSS.

| CCM Component | ACIC | | | CCSS | | |
|---|---|---|---|---|---|---|
| | Percentile | | | Percentile | | |
| | 1-2 | 3-4 | OR (95%-CI) | 1-2 | 3-4 | OR (95%-CI) |
| Health Care Organization | 54.3 | 55.9 | 1.1 (0.6-1.9) | 61.8 | 54.3 | 0.7 (0.4-1.3) |
| Community Linkages | 56.5 | 52.4 | 0.8 (0.5-1.5) | | | |
| Self-management Support | 45.1 | 60.5 | 1.9 (1.0-3.3)* | 46.9 | 58.3 | 1.6 (0.6-4.5) |
| Decision Support | 48.2 | 66.7 | 0.1 (0.9-5.4) | 56.4 | 58.4 | 1.1 (0.6-1.9) |
| Delivery System Design | 43.1 | 57.4 | 1.8 (0.9-3.6) | 41.0 | 62.1 | 2.3 (1.3-4.3)* |
| Clinical Information System | 57.8 | 52.0 | 0.8 (0.4-1.6) | 55.4 | 61.0 | 1.3 (0.6-2.6) |
| Integration | 51.8 | 60.5 | 1.4 (0.6-3.3) | | | |
| Total | 50.7 | 60.7 | 1.5 (0.9-2.6) | 55.1 | 59.3 | 1.2 (0.7-2.1) |

$\alpha$ Adjusted by age, gender, level of care and practice size. $^\mu$A1c <7% for those less than 60 years of age; <8% for those $\geq$60 years of age.
*p<0.05/$\beta$ Opposite effect

The proportion of patients with appropriate control of glycemia was significantly higher for clinics with score classification of 3-4 percentile for the Self-management Support section of the ACIC questionnaires; while it was significantly higher for clinics classified with 3-4 percentiles of the Delivery System Design of

the CCSS questionnaire than clinics classified with lower scores.

**Table 6:** Appropriate control of blood pressure (<140/90) and glycemia (A1c<7-8%) by section of the PACIC questionnaire.

| PACIC Component | Appropriate Control of Hypertension $^\alpha$ | | | Appropriate Control of Diabetes $^\alpha$ | | |
|---|---|---|---|---|---|---|
| | Percentile | | OR (95%-CI) | Percentile | | OR (95%-CI) |
| | 1-2 | 3+ | | 1-2 | 3+ | |
| Patient Activation | 55.6 | 60.7 | 1.2 (1.0-1.6) | 46.5 | 63.9 | 2.0 (1.1-3.5)* |
| Delivery System Design/ Decision Support | 52.3 | 65.8 | 1.7 (1.2-2.5)* | 49.9 | 62.3 | 1.7 (1.0-2.9) |
| Goal Setting | 55.4 | 61.6 | 1.3 (1.0-1.7) | 51.2 | 61.3 | 1.5 (0.9-2.6) |
| Problem Solving/ Contextual Counseling | 51.7 | 66.4 | 1.8 (1.4-2.4)* | 49.0 | 66.7 | 2.1 (1.1-3.9)* |
| Follow-up / Coordination | 55.4 | 61.6 | 1.3 (1.0-1.7)* | 51.2 | 61.3 | 1.5 (0.9-2.6) |
| Total | 54.6 | 61.2 | 1.3 (1.0-1.7)* | 47.1 | 62.5 | 1.9 (1.1-3.2)* |

$\alpha$ Adjusted by age, gender, level of care and practice size
*p<0.05

Overall clinics with higher PACIC scores indicated better control of both hypertension and diabetes, as well as Patient Activation and Problem Solving/ Contextual Counseling. Clinics with better scores for Follow-up / Coordination had better results for hypertension control.

## Discussion

This research showed that using the PACIC, ACIC and CCSS were helpful understanding capacity and identifying chronic care areas for improvement in primary and secondary care settings. More than 50% of health provider teams overrated the quality of services as compared to patient evaluation. The CCSS and the ACIC coincided 80% of times when evaluating capacity and provided services respectively. The classification of care classes by the PACIC and the CCSS coincided in half of the clinics.

Clinics with high scores for the ACIC questionnaire sections delivery design and self-management support had a significantly higher proportion of patients with good control of diabetes and hypertension respectively. Three components of CCSS questionnaire (health care organization, delivery system design and clinical information system) and one component (delivery system design) significantly identified clinics with higher proportion of appropriate control of hypertension and diabetes respectively. Centers obtaining better scores for the PACIC questionnaire and some of its sections showed higher proportion of patients with appropriate control of diabetes and hypertension.

More than 40% of patients with diabetes or hypertension did not achieve appropriate control of diabetes, demonstrated that there are opportunities for improving by applying services that are promoted by CCM [1]. Brazil has developed evidence-based protocols to treat patients with diabetes and hypertension [11]. The comparison of the government provided services for chronic diseases has been proved to be sub optimal when compared to the private sector care [12].

Previous analysis of these data showed that the ACIC questionnaire was related to some clinical outcomes among patients with diabetes and hypertension [13-16]. Furthermore a recent review identified that a number of studies used the PACIC questionnaire to evaluate patient outcomes and its relation to the CCM [17].

Among the limitation of this study was that was mostly based on the evaluation of health providers for the ACIC questionnaire, and the patient opinion about the care they received for the PACIC questionnaire. However, huge gaps in the provided care indicated that the evaluation was done with some objectivity since in very few cases, the maximus scores were achieved for any practice. The CCSS introduced here and validated against the other two, well know and broadly used questionnaire, had more objective questions since it asked for the presence or absent of services and materials which were not based on the opinion of the health providers.

The secondary care system in Brazil followed a concentration of high risk patient with chronic diseases, such as diabetes and hypertension [18] as compared to low risk patients followed by public health system [19] Many published analyses of the health care system have shown inadequate care outcomes for patients with diabetes and hypertension [20]. However, our results indicated that in the opinion of health providers and patients, as well the availability of resources, were superior in the secondary care clinic. Outcomes were also better for patients with diabetes and hypertension followed by the secondary care clinic as compared to primary care clinics.

In summary, despite having the greatest concentration of high-risk patients, the secondary care system was better prepared and obtained better patient outcomes than primary care system clinics.

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## Annex 1
## CHRONIC CARE STRUCTURE Survey
**General Description**

**Introduction:** This is a plan of generic instrument that it is being checked and validated in several countries. It contains:

**Guide for the Columns**

| Column | Description |
|---|---|
| Number | This number of references of the question has the purpose to help identify the area related to the components of the model of chronic care. |
| Question | The respondent should read carefully the question. |
| Response | This column lists the available response options that the participant will mark with one . |
| Scoring | Each question is evaluated with 1 point if the response is Present. Each section is averaged to 20 points. The maximum of points to obtain is of 100. |
| Code | This column has the purpose to cause that the data of the instrument coincide with the utility of input, the syntax of the datum analysis, the book of data and the descriptive note. |
| Adaptation | The questionnaire was translated and adapted from **Wong K, Boulanger L, Smalarz A, Wu N, Fraser K, Wogen J. Impact of care management processes and integration of care on blood pressure control in diabetes. Family Practice 2013;14:30.** http:/www.ncbi.nlm.nih.gov/ pmc/articles/PMC3599005/ pdf/1471-2296-14-30.pdf |
| Original | Original questionnaire of National Committee for Quality Assurance (NCQA) of the United States. |

## CHRONIC CARE STRUCTURE SURVEY
**Information on the survey**

| Place and date | | Response | Code |
|---|---|---|---|
| 1 | Country | | I1 |
| 2 | Name of the City | | I2 |
| 3 | Name of the center/ hospital/ outpatient clinic | | I3 |
| 4 | Fill date | └─┴─┘ └─┴─┘ └─┴─┴──┘ <br> dd mm year | I4 |

| | | Number of ident. of the participant └─┴─┴─┴─┴─┴─┘ | |
|---|---|---|---|
| **Data of whom provided the data** | | **Response** | **Code** |
| 5 | Surname | | I5 |
| 6 | Name | | I6 |
| 7 | Position/Position | | I7 |
| **Additional information that can be useful** | | | |
| 8 | Contact telephone number | | I8 |
| 9 | Address | | I9 |

| **Organization of Health Care** | | | |
|---|---|---|---|
| **Question** | **Response** | **Code** | |
| 1. - In your health facility | | | |
| 1st | Physicians' performance is systematically measured | Present 1 Absent 2 | O1a |
| 1b | Nurses' performance is systematically measured | Present 1 Absent 2 | O1b |
| 1c | Other professionals' performance is systematically measured | Present 1 Absent 2 | O1c |
| 1d | There is an incentive system to stimulate good practices | Present 1 Absent 2 | |
| 2. - In your health facility you (or a person designated by you) systematically report to the clinical personnel | | | |
| 2a | Proportion of patients with diabetes and A1c>7% or Fasting Blood Glucose >130 md/dl | Present 1 Absent 2 | O2a |
| 2b | Proportion of patients with hypertension and PAS>140 mm Hg or PAD>90 mm Hg | Present 1 Absent 2 | O2b |
| 2c | Proportion of patients with asthma without a severity assessment done at last contact | Present 1 Absent 2 | O2c |
| 3d | Proportion of patients with pap smear tests with non-useful results | Present 1 Absent 2 | O2d |

| | | | |
|---|---|---|---|
| 3. - In your health facility there are systematic continuous medical education activities aiming to | | | |
| 3a | Improving clinical practice | Present 1 Absent 2 | O3a |
| 3b | Improving diabetes control | Present 1 Absent 2 | O3b |
| 3c | Improving control of blood pressure | Present 1 Absent 2 | S3c |

**(Re)Design of the Delivery System**

| Question | Response | Code | |
|---|---|---|---|
| 4. - In your health facility exists | | | |
| 4a | A system that allows establishing appointments in advance of a week or more | Present 1 Absent 2 | D4a |
| 4b | An appointment system allowing patient to consult the physician or nurse of his/her choice | Present 1 Absent 2 | D4b |
| 4c | A system that classify or stratifies patients by risk allowing the most qualified clinical personnel to dedicate more time to those patients with the most complex diseases | Present 1 Absent 2 | |
| 5. - The clinical personnel in your health facility | | | |
| 5a | Is organized in multidisciplinary teams | Present 1 Absent 2 | D5a |
| 5b | Is organized in teams that includes at least one physician | Present 1 Absent 2 | D5b |
| 5c | Is organized in teams that includes at least one nurse | Present 1 Absent 2 | D5c |
| 5d | Is organized in teams that includes at least one nutritionist | Present 1 Absent 2 | D5d |
| 5e | Is organized in teams that includes at least one social worker | Present 1 Absent 2 | D5e |
| 5f | Is organized in teams that includes at least one professional nonmedical educator | Present 1 Absent 2 | D5f |
| 6. - In your health facility | | | |
| 6a | There is a clinical record system in place | Present 1 Absent 2 | D6a |
| 6b | The health care personnel reviews clinical records before seen patients | Present 1 Absent 2 | D6b |
| 6c | Clinicians plan patient visit beforehand | Present 1 Absent 2 | D6c |
| 6d | Patient care results are reviewed after the consultation | Present 1 Absent 2 | D6d |
| 6e | A list of patients missing appointment is systematically prepared | Present 1 Absent 2 | D6e |
| 6f | Patients missing routineappointment are contacted | Present 1 Absent 2 | D6f |

**Clinical Information System**

| Question | | Response | Code |
|---|---|---|---|
| 7. - In your health facility is available | | | |
| 7a | A list of patients with diabetes | Present 1 Absent 2 | C7a |
| 7b | A list of patients with hypertension | Present 1 Absent 2 | C7b |
| 7c | A list of patients with asthma | Present 1 Absent 2 | C7c |
| 7d | A list of patients with cervical cancer | Present 1 Absent 2 | C7d |
| 7e | A list of patients with prostate cancer | Present 1 Absent 2 | C7e |
| 7f | A list of patients with depression | Present 1 Absent 2 | C7f |
| 8. - In your health facility is available a list of problems that can be presented while providing care to | | | |
| 8a | Patients with diabetes | Present 1 Absent 2 | C8a |
| 8b | Patients with hypertension | Present 1 Absent 2 | C8b |
| 8c | Patients with asthma | Present 1 Absent 2 | C8c |
| 8d | Patients with depression | Present 1 Absent 2 | C8d |
| 9. - In your health facility is available a list of medicines that are used for | | | |
| 9a | Diabetes | Present 1 Absent 2 | C9a |
| 9b | Hypertension | Present 1 Absent 2 | C9b |
| 9c | Asthma | Present 1 Absent 2 | C9c |
| 9d | Depression | Present 1 Absent 2 | C9d |
| 10. - In your health facility are available algorithms or flow charts for providing care to | | | |
| 10a | Patients with diabetes | Present 1 Absent 2 | C10a |
| 10b | Patients with hypertension | Present 1 Absent 2 | C10b |
| 10c | Patients with asthma | Present 1 Absent 2 | C10c |
| 10d | Patients at risk for cervical cancer | Present 1 Absent 2 | C10d |
| 10e | Patients at risk for prostate cancer | Present 1 Absent 2 | C10e |

| 10f | Patients with depression | Present 1 Absent 2 | C10f |
|---|---|---|---|
| 11. - In your health facility is available a list of interventions to improve care for | | | |
| 11a | Patients with diabetes | Present 1 Absent 2 | C11a |
| 11b | Patients with hypertension | Present 1 Absent 2 | C11b |
| 11c | Patients with asthma | Present 1 Absent 2 | C11c |
| 11e | Patients with depression | Present 1 Absent 2 | C11e |
| 12. - In your health facility is available a | | | |
| 12a | Mechanism for monitoring results of laboratory tests | Present 1 Absent 2 | C12a |
| 12b | Mechanism for monitoring results of Rx | Present 1 Absent 2 | C12b |
| 12c | Mechanism for monitoring results of EKG | Present 1 Absent 2 | C12c |
| 12d | Mechanism for monitoring results of referrals | Present 1 Absent 2 | C12d |
| 12e | Clinical electronic records (with or without printed forms) | Present 1 Absent 2 | C12e |

| Decision Support | | | |
|---|---|---|---|
| Question | | Response | Code |
| 13. - In your health facility are available guidelines of clinical practice for | | | |
| 13a | Diabetes | Present 1 Absent 2 | A13a |
| 13b | Hypertension | Present 1 Absent 2 | A13b |
| 13c | Asthma | Present 1 Absent 2 | A13c |
| 13d | Depression | Present 1 Absent 2 | A13d |
| 13e | Preventive services according to age | Present 1 Absent 2 | A13e |
| 14. - In your health facility is available a reminder system for clinical personnel related to | | | |
| 14a | Diabetes | Present 1 Absent 2 | A14a |
| 14b | Hypertension | Present 1 Absent 2 | A14b |
| 15. - In your health facility is available a mechanism or protocol of alert of abnormal laboratory results for clinical personnel related to | | | |
| 15a | Diabetes | Present 1 Absent 2 | A15a |
| 15b | Hypertension | Present 1 Absent 2 | A15b |
| 15c | Cervical cancer | Present 1 Absent 2 | A15c |
| 16. - In your health facility is available a mechanism or protocol of alert of abnormal test results for patients with | | | |
| 16a | Diabetes | Present 1 Absent 2 | A16a |
| 16b | Hypertension | Present 1 Absent 2 | A16b |
| 16c | Cervical Cancer screening | Present 1 Absent 2 | A16c |

| Support for the automanejo | | | |
|---|---|---|---|
| Question | | Response | Code |
| 17. - In your health facility are available reminders for patients with | | | |
| 17a | Diabetes | Present 1 Absent 2 | A17a |
| 17b | Hypertension | Present 1 Absent 2 | A17b |
| 17c | Preventive services according to age | Present 1 Absent 2 | A17c |
| 18. - In your health facility is available a self-management program for patients with | | | |
| 18a | Diabetes | Present 1 Absent 2 | A18a |
| 18b | Hypertension | Present 1 Absent 2 | A18b |
| 18c | Asthma | Present 1 Absent 2 | A18c |
| 18d | Depression | Present 1 Absent 2 | A18d |
| 18. - In your health facility are available printed material for patients on | | | |
| 18a | Diabetes | Present 1 Absent 2 | A18a |
| 18b | Hypertension | Present 1 Absent 2 | A18b |
| 18c | Asthma | Present 1 Absent 2 | A18c |
| 18d | Cancer | Present 1 Absent 2 | A18d |
| 18e | Smoking | Present 1 Absent 2 | |
| 18f | Alcohol use | Present 1 Absent 2 | |
| 18g | Physical Activity | Present 1 Absent 2 | |
| 18h | Healthy eating | Present 1 Absent 2 | |
| 18i | Depression | Present 1 Absent 2 | A18e |
| 19. - In your health facility are available electronic material for patients on | | | |
| 19a | Diabetes | Present 1 Absent 2 | A19a |
| 19b | Hypertension | Present 1 Absent 2 | A19b |
| 19c | Asthma | Present 1 Absent 2 | A19c |
| 19d | Cancer | Present 1 Absent 2 | A19d |

| | | | |
|---|---|---|---|
| 16e | Depression | Present 1 Absent 2 | A19e |
| 20. - In your health facility is carried out systematic screening for | | | |
| 20a | Diabetes | Present 1 Absent 2 | A20a |
| 20b | Hypertension | Present 1 Absent 2 | A20b |
| 20c | Cervical cancer | Present 1 Absent 2 | A20c |
| 20d | Prostate cancer | Present 1 Absent 2 | A20d |
| 20e | Colorectal cancer | Present 1 Absent 2 | |
| 20f | Breast cancer | Present 1 Absent 2 | |
| 20g | Dyslipidemia | Present 1 Absent 2 | |
| 20h | smoking | Present 1 Absent 2 | |
| 20i | Alcohol abuse or dependency | Present 1 Absent 2 | |
| 20j | Depression | Present 1 Absent 2 | A20e |