Assessing the impact of clinical coordination interventions on the continuity of care for patients with chronic conditions: participatory action research in five Latin American countries

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Highlights

- PAR interventions for cross-level care coordination also improve care continuity.
- Improvements in care continuity related to interventions differ across settings.
- The right context and process factors are needed to improve care continuity.
Ethical approval: Ethical approval was obtained from ethics committees in the participating countries. All interviewees participated on a voluntary basis after signing an informed consent. The right to refuse to participate or withdraw from the survey, anonymity, confidentiality and protection of data were all guaranteed.

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ABSTRACT

Although fragmentation in the provision of services is considered an obstacle to effective health care, there is scant evidence on the impact of interventions to improve care coordination between primary care and secondary care in terms of continuity of care—i.e. from the patient perspective—particularly in Latin America (LA). Within the framework of the Equity-LA II project, interventions to improve coordination across care levels were implemented in five LA countries (Brazil, Chile, Colombia, Mexico and Uruguay) through a participatory action research (PAR) process. This paper analyses the impact of these PAR interventions on the cross-level continuity of care of chronic patients in public healthcare networks. A quasi-experimental study was performed with measurements based on two surveys of a sample of patients with chronic conditions (392 per network; 800 per country). Both the baseline (2015) and evaluation (2017) surveys were conducted using the CCAENA questionnaire. In each country, two comparable public healthcare networks were selected, one intervention and one control. Outcomes were cross-level continuity of information and of clinical management. Descriptive analyses were conducted and Poisson regression models with robust variance fitted to estimate changes. With differences between countries, the results showed improvements in cross-level continuity of clinical information (transfer of clinical information) and of clinical management (care coherence). These results are consistent with those of previous studies on the effectiveness of the interventions implemented in each country in improving care coordination in Brazil, Chile, and Colombia. Differences between countries are probably related to particular contextual factors and events that occurred during the implementation process. This supports the notion that certain context and process factors are needed to improve continuity of care. The results provide evidence that, although the
Interventions were designed to enhance care coordination and aimed at health professionals, patients report improvements in continuity of care.
1. INTRODUCTION

Achieving care coordination and, hence, continuity of care (CC) poses a challenge for many Latin American health systems, which are characterized by healthcare fragmentation. It is of growing concern (Mac Adam, 2008) due to demographic and epidemiological transitions, with an increase in the aging population and chronic conditions (Pan American Health Organization, 2010) requiring the coordination of multiple health professionals and care settings (Nolte and McKee, 2008). Despite the relevance of CC in terms of improving treatment adherence, reducing hospital admissions (Chen et al., 2013), increasing quality of life (Plate et al., 2018) and reducing mortality rates (Pereira Gray et al., 2018), significant discontinuities between primary care (PC) and secondary care (SC) for patients with chronic conditions have been identified in many Latin American countries (Vargas et al., 2017; Ollé-Espluga et al., 2020). These problems have been associated in part to the poor performance of PC in its role as coordinator of patient care (Dobova et al., 2016) and other organizational factors (Macinko et al., 2016; Ollé-Espluga et al., 2020).

 Whilst care coordination refers to the perspective of providers, CC implies the result of care coordination from the patients’ perspective. CC is defined as the degree to which patients experience care over time as coherent and linked (Reid et al., 2002). Three interrelated types of CC have been described: (i) continuity of information, patients’ perception that information on past events and personal circumstances is shared and used by different providers; (ii) continuity of clinical management, patients’ perception of receiving different services in a coherent way; (iii) relational continuity, patients’ perception of an ongoing therapeutic relationship with one or more providers. Continuity of information and clinical management can be analysed within or across levels of care referring to the interaction between providers, from the patient’s viewpoint, whereas relational continuity can only be analysed in each care level separately, as it refers to patient-provider interaction (Reid et al., 2002; Vargas et al., 2017).
A number of interventions are being implemented to improve care coordination, which generally introduce different ways of organising healthcare provision (such as care-management models or coordination mechanisms) that are expected to improve CC. However, evidence on the effectiveness of those interventions in improving CC is relatively limited. It comes predominantly from Europe (King et al., 2009; Tammes et al., 2019) and high-income countries (Skrutkowski et al., 2008; Aubin et al., 2012; Gabitova and Burke, 2014; Tremblay et al., 2017), focuses on patients with a specific chronic condition (Uijen et al., 2012), mainly cancer (Skrutkowski et al., 2008; King et al., 2009; Aubin et al., 2012; Tremblay et al., 2017), or on type of care, such as palliative care (Hudson et al., 2019) or the elderly (Barker et al., 2016; Tammes et al., 2019), and all the interventions involved are intra-level.

Moreover, although these interventions aim to improve CC, only a few studies measure their impact on continuity, and these focus on intra-level relational continuity (King et al., 2009; Tammes et al., 2019), while most studies evaluate their impact on intermediate or final health outcomes (Skrutkowski et al., 2008; King et al., 2009) or other quality indicators, such as patient satisfaction (King et al., 2009; Aubin et al., 2012) or are insufficiently described, such as patient reported experience (Tremblay et al., 2017), making it difficult to understand their actual impact on any type of CC, particularly across levels. Apart from Tremblay (Tremblay et al., 2017) and Uijen (Uijen et al., 2012), none of the researchers used specific instruments to comprehensively measure results for continuity. In addition, the potential influence of the implementation process and context on intervention outcomes (Durlak and DuPre, 2008)—for instance, in such important aspects as the adaptation of the interventions to the contexts (Barker et al., 2016; Tammes et al., 2019)—are still neglected.

Many Latin American countries have also adopted strategies to achieve care coordination and improve related cross-level CC (Vargas et al., 2015). Yet here, as elsewhere, these strategies are commonly designed top-down with little to no participation from professionals and no adaptation to the local context, and thus are likely to be less effective in terms of adoption and
sustainability over time (Blevins et al., 2010). While in Latin America there is a long tradition of participatory action research (PAR) in the field of community health, its application in healthcare services is very limited (Mercado-Martínez et al., 2018) and its potential to improve healthcare quality attributes, such as care coordination and CC, is yet unexplored.

This study is part of a wider research project, Equity-LA II (Vázquez et al., 2015), aimed at evaluating the effectiveness of interventions, developed through a PAR process, in improving cross-level clinical coordination in health services networks of Brazil, Chile, Colombia, Mexico and Uruguay. The improvements in cross-level care coordination (primary results) were expected to influence the CC experienced by patients. The impact of the interventions on care coordination (Vargas et al., 2020a; Vázquez et al., 2020) and the implementation process (Vargas et al., 2020b) have been comprehensively assessed from the health professionals’ perspective and are complemented here by the analysis of CC from the patient perspective.

The objective is to analyse the impact of PAR interventions to improve care coordination on continuity of care for chronic patients in public healthcare networks of Latin America.

2. METHODS

Study design

A quasi-experimental (controlled before-and-after) design, described elsewhere (Vázquez et al., 2015), was adopted to evaluate the impact of PAR-based care coordination interventions on cross-level CC in the selected healthcare networks (HNs). Baseline and evaluation measures of CC were performed by means of a survey of chronic patients using the CCAENA questionnaire (Garcia-Subirats et al., 2015; Ollé-Espluga et al., 2020).

Study setting and intervention

Two comparable public healthcare networks were selected in each country based on the following criteria: a) provision of a continuum of services, including at least PC and SC, to a defined population; b) mainly in urban areas of low or medium-low socioeconomic status; and
c) willingness to participate. One network became the intervention (IN), and the other the control (CN). The selected HNs were: Brazil, district III and VII in Recife and the urban area of Caruarú; Chile, southern and northern area of Santiago, encompassing three districts; Colombia, south-western and southern district networks of Bogotá; Mexico, municipal networks of Xalapa and Veracruz; and Uruguay, two networks of the western region, encompassing seven districts (Vázquez et al., 2015).

In each country, the PAR process began with the establishment of a local steering committee to lead the design and implementation process, comprising relevant stakeholders, with the participation of a platform (working group) of professionals. The PAR process consisted of several phases: analysis of care coordination and CC problems in the network; selection of problems to address (limited cross-level communication and clinical agreement) and interventions to implement; design and implementation (Vargas et al., 2020a, 2020b).

While the problems identified were similar, the implemented interventions differed slightly between countries (Vargas et al., 2020a). The interventions were: 1) joint meetings between PC and SC doctors to discuss clinical cases and/or for ongoing training, in person in Brazil (mental health), Colombia (chronic diseases) and Mexico (maternal care and chronic diseases) and online in Chile; 2) offline virtual consultations between PC and SC doctors, via email in Brazil, and via a digital platform in Mexico (chronic diseases); 3) in Brazil, the design (in cross-level joint meetings) and implementation of shared care guidelines for diabetes; 4) in Uruguay, a strategy to promote the use of referral and reply letters; and 5) in Chile, an induction program developed to promote a common identity and shared vision in the healthcare network. The duration of the implementation varied according to each intervention. The interventions implemented in the study networks are summarized in Box 1.

Box 1 near here
**Study population and sample**

The study population were residents of the study areas, aged over 18, who suffered at least one chronic condition and had used two care levels (PC and SC or emergency services) in the six months prior to survey for the same health condition. The survey was conducted in PC centres and patients were selected by simple random sampling. The sample size was calculated taking into account the controlled before-and-after design of the study. A sample size of 392 patients per network (784 per country and year) was estimated to ensure detection of a 10% variation in patients’ perception of CC, between years and networks. It was calculated based on 80% statistical power (β = 0.20) and 95% confidence level (α = 0.05) in a bilateral contrast.

**Questionnaire**

The CCAENA questionnaire® [**Cuestionario de Continuidad Asistencial Entre Niveles de Atención** in Spanish] was used to establish baseline and evaluation measures. This validated tool (available on www.equity-la.eu) was adapted to each context and translated into Portuguese in Brazil. Detailed information on the design, adaptation and validation of the questionnaire has already been published (Aller et al., 2013; Garcia-Subirats et al., 2015; Ollé-Espluga et al., 2020). The questionnaire is divided into eleven sections: 1) patients’ health conditions; from 2) to 5) most recent experience of CC in transitions between PC and outpatient SC or emergency services; 6) accessibility across care levels; 7) perception of cross-level CC of information (3 items) and of clinical management (6 items); 8) perception of relational continuity with PC and with SC doctors (3 items each). The final sections refer to sociodemographic and insurance characteristics.

**Data collection**

Data was collected by specifically trained interviewers by means of face-to-face interviews in each country. Baseline data was collected from May to December 2015 and evaluation data from November 2017 to January 2018. Strategies to ensure the quality and consistency of data
included supervision of interviewers in the field, review of all questionnaires, re-interviewing of 20% of randomly selected participants, and double-entry method to control inconsistencies during data entry. As patient registers were unavailable in some of the networks studied, all patients waiting in doctors’ waiting rooms, reception and clinical laboratory areas of the networks’ PC centres were approached. Only patients meeting the inclusion criteria were interviewed.

Variables
The selected outcome variables were those items related to patients’ experience and perception of cross-level care continuity in which changes could be expected as a consequence of the interventions (Table 2):

- **Continuity of clinical information**: experience of transfer of clinical information in every transition between PC and outpatient SC (five questions on the most recent experience) and perception of continuity of information (three items).

- **Clinical management continuity**: care coherence across levels of care (four questions), and perception of clinical management continuity (4 items).

The explanatory variables were those potentially associated with changes in continuity across levels of care and that were not susceptible to being affected by the interventions (Table 1): a) sociodemographic: sex, age, level of education; b) morbidity: number of chronic diseases according to O’Halloran’s classification (O’Halloran et al., 2004); c) use of out-of-network services; and d) consistency of personnel in PC and SC.

Analysis
Firstly, a descriptive analysis stratified by country, network and year was carried out. Bivariate analyses using the Chi-squared test were conducted to identify significant differences in outcomes and explanatory variables between baseline (2015) and evaluation (2017) results in the IN and CN of each country. Secondly, to analyse the impact of the interventions, prevalence ratios (PR) with 95% confidence intervals (CI95%) were estimated through Poisson
regression models with robust variance to compare changes in the outcome variables between 2015 and 2017 in each network, and also to compare the results of the IN with the CN at baseline and evaluation. To control for possible changes that were not related to the interventions, models were adjusted for all the explanatory variables. All analyses were performed using Data Analysis and Statistical Software (STATA), version 15 (StataCorp LLC, 2017).

Ethical considerations

Ethical approval was obtained from ethics committees in the participating countries. All interviewees participated on a voluntary basis after signing an informed consent. The right to refuse to participate or withdraw from the survey, anonymity, confidentiality and protection of data were all guaranteed.

3. RESULTS

In this section, to facilitate description, country names are used to refer to the IN results in 2017; unless the CN or baseline study, (2015) are specified.

3.1 Sample characteristics

In the INs in 2017, the majority of participants were women (66.6% in Chile to 81.8% in Colombia). The most common age bracket was 40-64 years in Brazil (59.5%), Mexico (55.0%) and Uruguay (55.1%), and over 65 in Chile (56.6%), while in Colombia there was a more even distribution across these age groups. In all countries, the education level of the sample was low, with the majority having no studies/incomplete primary or primary education, except for Chile where there was a more even distribution across levels of education. In terms of morbidity, the majority suffered from two or more chronic diseases (73.8% in Colombia to 85.2% in Brazil). The majority, despite differences across countries, made no use of out-of-network services (58.3% in Mexico to 93.7% in Uruguay), and reported consistency of doctors...
in PC (53.7% in Chile to 91.4% in Brazil) and in SC (Chile, 58.4%, to 93.4% in Uruguay), except for Colombia (38.8%) (Table 1).

**Table 1 near here**

There were some differences between the 2015 and 2017 samples. In Uruguay, the proportion of female patients, of age groups 18-39 and 40-64 years, and with primary education were higher in 2017. The proportion of patients suffering two or more chronic conditions increased in Brazil (66.2% in 2015 to 85.2% in 2017) and Colombia (60.6% in 2015 to 73.8% in 2017), and decreased in Uruguay (48.9% in 2015 to 39.7% in 2017). Moreover, the percentage of patients that made use of out-of-network services increased in Colombia (5.6% in 2015 to 27.0% in 2017) and decreased in Mexico (55.1% in 2015 to 41.7% in 2017). An increase in the reported consistency of SC doctors was observed in Chile (52.8% in 2015 to 58.4% in 2017) and Mexico (54.9% in 2015 to 79.1% in 2017) but it decreased in Brazil (65.9% in 2015 to 62.4% in 2017) and Colombia (48.2% in 2015 to 38.8% in 2017).

3.2 Changes in perception and experience of cross-level continuity of care

3.2.1 Continuity of clinical information

Continuity of information regarding the exchange of clinical information between PC and SC doctors increased in Brazil, Chile, Mexico, and Colombia in comparison with the CN, with differences across countries, Brazil being the country that showed most improvement (Table 2). With regard to perceptions of information transfer, Brazil showed an increase in patients reporting PC doctors’ awareness of the diagnosis, treatment and recommendations given by the specialists (aPR= 1.4; 95% CI: 1.2-1.6), and Mexico in specialists’ awareness of the diagnosis, treatment and recommendations given by the PC doctor (aPR= 1.3; 95% CI: 1.1-1.6). In Mexico, however, when compared to the CN these differences were also observed in the control network and they were similar to the baseline (Table 2).

**Table 2 near here**
With regard to experience of information exchange in transitions across care levels, in Brazil there was an increase in the proportion of patients reporting that their PC doctor was aware of the instructions given by the specialists before explaining it to them (aPR= 1.5; 95% CI: 1.2-1.9), and that the specialists were aware of their clinical records with the PC doctor (aPR= 2.0; 95% CI: 1.4-3.0), and of the reason why the PC doctor referred the patient for consultation before explaining it (aPR= 2.1; 95% CI: 1.5-3.0). Likewise, in Chile there was an increase in patients reporting that the specialist delivered a clinical report for the PC doctor (aPR= 1.3; 95% CI: 1.1-1.7) (Table 2). Compared with the CN, a higher proportion of patients in the IN in Colombia reported the PC doctor’s delivery of a clinical report for the SC doctor (aPR=1.2; 95% CI: 1.1-1.4), in contrast to the baseline, where no differences were observed (Table 3).

Table 3 near here

### 3.2.2 Continuity of clinical management: care coherence across levels

Care coherence-related improvements in the perception and experience of clinical management continuity occurred in Brazil, Chile and Uruguay. Changes in perception were observed only in Chile, where there was an increase in patients reporting that the specialists were in agreement with the diagnosis, treatments and recommendations given by the PC doctor (aPR= 1.3; 95% CI:1.2-1.4).

In terms of experience of care coherence, Brazil showed an increase in patients who reported being referred to the specialist by the PC doctor (aPR= 1.2; 95% CI: 1.1-1.3) and vice versa, in those who reported being referred to the PC doctor by the specialist (aPR= 1.9; 95% CI: 1.4-2.8). In Chile, compared with the CN, the proportion of patients that reported being counter-referred to the PC doctor by the specialist was higher (aPR= 1.4; 95% CI: 1.1-1.7), unlike the baseline, where there were no differences (Table 3). Finally, in Uruguay, the proportion of patients reporting that PC doctors did not repeat medical exams already carried out by the specialists increased (aPR= 1.2; 95% CI: 1.1-1.4) (Table 2).
4. DISCUSSION

Tackling healthcare fragmentation is a priority for LA health systems, yet evidence on the extent to which improving care coordination can account for patients experiencing better CC, particularly cross-level continuity, is inexistent to the best of our knowledge. The limited evidence available on care coordination interventions expected to improve continuity evaluates their impact on intermediate or final outcomes (Skrutkowski et al., 2008; King et al., 2009; Aubin et al., 2012), and very few studies (Uijen et al., 2012; Tremblay et al., 2017) measure any type of continuity from the patient’s perspective using a comprehensive instrument. This study conducts a comprehensive comparative analysis using a validated and adapted tool (CCAENA questionnaire) to provide evidence on the impact of PAR interventions to enhance care coordination on cross-level CC from the chronic patient’s perspective.

In all five IN, patients reported improvements in cross-level CC after implementation of the PAR interventions which are consistent with the improvements in care coordination identified and attributed to the interventions by doctors (Vázquez et al., 2020) and other participants (Vargas et al., 2020a, 2020b), albeit with differences across countries. The most noteworthy changes occurred in continuity of information in Brazil, followed by the improvements in Chile, and to a lesser extent in Mexico and Colombia, and clinical management continuity increased in Brazil, Chile and Uruguay. Both are important improvements on the discontinuities previously observed in these countries (Ollé-Espluga et al., 2020). As part of a larger study, these results add evidence to support the analysis of the effectiveness of the implemented PAR interventions on care coordination (Vargas et al., 2020a; Vázquez et al., 2020).

Impressments in cross-level CC: the connection with care coordination enhancement and PAR interventions.

In all countries, patients reported improvements in cross-level CC and these were consistent with those reported by doctors in their experience of cross-level coordination, both for clinical information exchange and clinical management coordination and for influencing factors. The
results are also in keeping with the implemented interventions based on joint clinical meetings, which aimed to improve communication and clinical agreement between PC and SC doctors, the main problems cited by doctors (Vázquez et al., 2017) and perceived by patients (Ollé-Esplugà et al., 2020) at baseline.

Regarding cross-level continuity of information, the reported exchange of clinical information between PC and SC doctors increased in all countries except Uruguay (in the case of Colombia, only in comparison with the CN). Patients’ perception of better transfer of clinical information, mainly in Brazil and Chile, is consistent with the enhanced cross-level exchange of clinical information reported by doctors (Vázquez et al., 2020) and improved communication between PC and SC doctors due to joint meetings (Vargas et al., 2020a).

The increase in patients’ perceptions of care coherence across levels in Chile with regard to the SC doctor’s agreement with the diagnosis, treatments and recommendations given by the PC doctor and being referred by the SC doctor back to the PC doctors when necessary, is also in keeping with doctors’ reported improvements in clinical management coordination, particularly in terms of the adequacy of patient follow-up (Vázquez et al., 2020), and also with the improved clinical agreement between doctors and appropriateness of referrals to SC as a result of the joint meetings (Vargas et al., 2020a). According to informants in the qualitative evaluation of the interventions in the Chile IN, virtual joint meetings enhanced agreement on the management of complex clinical cases, waiting lists and referral criteria, and reduced unnecessary referrals to SC as PC’s capacity to resolve cases was strengthened. In Uruguay, patients’ reports that medical exams already done by the specialist were not repeated in PC are in line with doctors reporting lower test repetition (although not statistically significant) and increased agreement over treatments prescribed by the other care level (Vázquez et al., 2020).

Another noteworthy finding was that improvements in CC reported by patients are consistent with the expected impact of the interventions implemented in each network, particularly with
the joint meetings. Although the current evidence on the effectiveness of care coordination interventions in improving CC is limited and difficult to compare with our results, it does however corroborate that continuity of clinical information is improved when care coordination strategies include spaces in which professionals can share patients’ clinical information (Tremblay et al., 2017). In line with this, a qualitative study analysing CC in healthcare networks in Spain found that patients perceived that face-to-face meetings of professionals of both care levels led to mutual knowledge, thus improving consistency of care (e.g. facilitating referrals to SC) (Waibel et al., 2016).

**Differences with regard to doctors’ experiences and across countries: the role of time, content, context and process for interventions to improve care coordination.**

While not all improvements perceived by patients could be associated with improvements reported by doctors, the contrary is also true: not all improvements reported by doctors were reflected from the patient’s perspective. Whereas only patients in Chile reported improvement in specialists agreeing with the PC doctor, doctors from Brazil, Colombia and Uruguay did experience an enhancement in this attribute while patients did not. One possible explanation is that the level of agreement on treatments perceived by patients was already high at the baseline (Ollé-Espluga et al., 2020), and thus it was more difficult to perceive an increase. In fact, baseline results were worse (disagreement was greater) in Chile, precisely in the network in which an improvement was reported by patients. Likewise, while results from the qualitative evaluation reported an increased willingness to collaborate and find joint care strategies among participants (Vargas et al., 2020a), patients’ perception that doctors from both care levels collaborated to solve their health problems showed no changes. Perhaps these differences between patients’ and doctors’ perceptions are reflecting quality gaps related to poor care coordination yet to be tackled, as patients are more susceptible to detecting these types of problems in their care (Maeng et al., 2012; Ollé-Espluga et al., 2020).
There are other potential explanations for these results. Given that the interventions were aimed at doctors, and reached only a part of the doctors in the networks, it is possible that the interventions simply needed more time and greater network penetration for a higher proportion of patients to perceive changes in their care management. Furthermore, the lower participation rates of SC doctors in all countries but Chile may have limited potential improvements in cross-level continuity of clinical management (Vargas et al., 2020b).

In terms of differences across countries, the interventions were introduced through slightly different processes, which might have influenced the results. Moreover, certain context or process factors (political context, organizational factors and levels of institutional support) were important determinants of the implementation process, as they either hindered or favoured the uptake of the interventions. These varied across countries (Vargas et al., 2020b) and must be taken into consideration in our interpretation of the results for CC. In this regard, it is plausible that the scarcity of changes in both information and clinical management continuity reported by patients in the Colombia and Uruguay INs may in part be the result of unfavourable influencing factors. In Colombia: inadequate working conditions, slow and challenging implementation of the intervention, and reforms in the district networks introduced by the Bogotá Health Department (León-Arce et al., 2021); and in Uruguay: weak institutional support, lack of referral forms in some centres, and limited penetration of the intervention (Vargas et al., 2020a).

Limitations

This study has limitations to consider. The time window for the implementation was short (3-21 months (Vargas et al., 2020b)) in almost all countries. Given that the interventions were aimed at doctors, this may not have been long enough for patients to perceive changes in CC. Another interrelated limitation arising from the quasi-experimental design—in that the evaluation process consisted of only two measurements, baseline and post-intervention—is that the interventions could be susceptible to the effects of history (effect of external events...
on study outcomes) and maturation (effect of the passage of time on subjects) (Robson et al., 2001; Gasparrini and Lopez Bernal, 2015), which may have influenced the results observed for selected outcomes. Nevertheless, these measurements give us a sense of the pattern of variability over time between the baseline and the “after” measurement (Robson et al., 2001).

Besides, the analyses included variables potentially associated with changes in cross-level CC and not susceptible to being affected by the interventions. Moreover, this study is embedded in a more extensive research project including evaluations of the impact of the interventions and the implementation process, which enabled a more accurate interpretation of the results.

5. CONCLUSIONS

The results indicate improvements in cross-level continuity of clinical information (transfer of clinical information) and clinical management continuity (care coherence) in all countries, but with differences between them. The consistency of results across patients, doctors and other stakeholders substantiates the argument that PAR interventions to enhance care coordination aimed at health professionals, especially joint meetings, have the potential to improve the cross-level transfer of clinical information and patient follow-up, and supports the notion that they have a positive impact on CC. This experience should therefore be disseminated to more professionals in order to enhance cross-level CC.

The differences observed, in terms of the relatively limited impact of PAR interventions on CC in some of the participating countries, throw into focus certain areas for improvement that need to be explored more in depth. It is clear that the right context (working conditions, institutional support) and process factors (limited penetration of the interventions) are needed to achieve CC. Given its comprehensiveness and the consistency of the results with those that evaluate intervention effectiveness and the implementation process, this study should be of interest to both researchers and policy makers aiming to improve cross-level CC for chronic patients in any care setting.
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Table 1 Sociodemographic characteristics, morbidity, use of services and factors influencing perception of continuity in the sample of patients with chronic conditions in the intervention network, by country. CCAENA 2015 – 2017

| Variables                      | Brazil 2015 | Brazil 2017 | Chile 2015 | Chile 2017 | Colombia 2015 | Colombia 2017 | Mexico 2015 | Mexico 2017 | Uruguay 2015 | Uruguay 2017 |
|--------------------------------|------------|------------|------------|------------|--------------|---------------|-------------|-------------|-------------|---------------|
|                                | (n = 396)  | (n = 420)  | (n = 445)  | (n = 449)  | (n = 396)    | (n = 400)     | (n = 392)   | (n = 393)   | (n = 448)   | (n = 396)     |
| Sex                            |            |            |            |            |              |               |             |             |             |               |
| Female                         | 328 (82.8) | 342 (81.4) | 311 (69.9) | 299 (66.6) | 308 (77.8)   | 327 (81.8)    | 297 (75.8)  | 313 (79.6)  | 322 (80.0)  | (81.2) **     |
| Male                           | 68 (17.2)  | 78 (18.6)  | 134 (30.1) | 150 (33.4) | 88 (22.2)    | 73 (18.3)     | 95 (24.2)   | 80 (20.4)   | 126 (31.2)  | (18.8) **     |
| Age                            |            |            |            |            |              |               |             |             |             |               |
| 18 – 39                         | 70 (17.7)  | 70 (16.7)  | 14 (3.2)   | 16 (3.5)   | 14 (3.5)     | 15 (3.8)      | 46 (11.7)   | 64 (16.3)   | 22 (5.6)    | 61 (15.7)     |
| 40 – 64                         | 237 (59.9) | 250 (61.7) | 183 (41.1) | 179 (39.9) | 177 (44.7)   | 187 (46.8)    | 233 (59.4)  | 216 (55.0)  | 212 (55.1)  | (51.6) **     |
| 65 or over                      | 87 (22.0)  | 97 (23.6)  | 248 (55.7) | 254 (56.6) | 205 (51.8)   | 198 (49.5)    | 113 (28.8)  | 113 (28.3)  | 212 (55.6)  | (53.4) **     |
| Level of education              |            |            |            |            |              |               |             |             |             |               |
| No studies or incomplete primary| 178 (45.0) | 208 (49.5) | 118 (26.5) | 161 (35.9) | 190 (48.0)   | 181 (45.3)    | 178 (45.4)  | 152 (38.7)  | 137 (36.5)  | (30.6) **     |
| Complete Primary                | 153 (38.6) | 145 (34.5) | 140 (31.5) | 147 (32.7) | 165 (41.7)   | 165 (41.3)    | 162 (41.4)  | 186 (48.5)  | 231 (62.8)  | (30.6) **     |
| Secondary and further           | 62 (16.2)  | 65 (16.5)  | 182 (40.9) | 139 (31.0) | 40 (9.1)     | 53 (13.3)     | 61 (16.5)   | 84 (21.4)   | 80 (21.3)   | (21.4) **     |
| Number of chronic diseases      |            |            |            |            |              |               |             |             |             |               |
| One                            | 134 (33.8) | 62 (14.8)  | 77 (17.3)  | 89 (19.8)  | 150 (39.4)   | 105 (26.3)    | 205 (51.5)  | 171 (43.5)  | 229 (59.1)  | (51.1) **     |
| Two or more                    | 262 (66.2) | 358 (85.2) | 368 (82.7) | 356 (79.3) | 240 (60.6)   | 235 (63.8)    | 219 (48.7)  | 189 (46.5)  | 219 (40.9)  | (52.3) **     |
| Use of out-of-network services  |            |            |            |            |              |               |             |             |             |               |
| Yes                            | 57 (14.4)  | 76 (18.1)  | 139 (31.2) | 123 (27.4) | 22 (5.6)     | 108 (27.0)    | 216 (55.1)  | 164 (41.7)  | 24 (6.3)    | 20 (5.1)      |
| No                             | 339 (85.6) | 344 (81.9) | 266 (68.8) | 326 (72.6) | 374 (94.4)   | 290 (72.5)    | 231 (44.9)  | 371 (58.9)  | 432 (94.4)  | (93.7) **     |
| Consistency of PC and SC doctors|            |            |            |            |              |               |             |             |             |               |
| When I make an appointment with the PC doctor, the same professional always attends to me. | 365 (92.4) | 384 (91.4) | 228 (51.2) | 241 (53.7) | 238 (60.1)   | 261 (65.3)    | 346 (88.3)  | 345 (87.8)  | 403 (90.0)  | (89.4) **     |
| When I make an appointment with the specialist, the same professional always attends to me. | 261 (68.5) | 262 (62.4) | 235 (52.8) | 262 (58.4) | 191 (48.2)   | 155 (38.8)    | 215 (54.9)  | 311 (79.1)  | 412 (92.0)  | (93.4) **     |

* p - value < 0.05; ** p - value < 0.01

The total of each variable does not coincide because of missing values. The percentages are calculated referring to the number of patients answering each question, including the missing values.
Table 2 Changes in the experiences and perceptions of continuity of care between years in the intervention and control network, by country. CCAENA 2015 - 2017.

| Variables | Brazil | Chile | Colombia | Mexico | Uruguay |
|-----------|--------|-------|----------|--------|---------|
|           | 2017/2 | 2017/2 | 2017/2 | 2017/2 | 2017/2 |
|           | 015    | 015    | 015    | 015    | 015    |
|           |        |        |        |        |        |
| Perception of continuity (scale): | aPR (CI 95%) | aPR (CI 95%) | aPR (CI 95%) | aPR (CI 95%) | aPR (CI 95%) |
| The PC doctor was aware of the diagnosis, treatment and recommendations given to me by the specialist. | 1.4 (1.1) | 1.1 (0.9) | 1.0 (0.9) | 1.1 (0.9) | 0.9 (0.8) |
| The PC doctor asked me about any appointments I’ve had with specialists. | 1.1 (0.9) | 0.9 (0.8) | 1.0 (0.9) | 1.0 (0.8) | 0.9 (0.8) |
| The specialists were aware of the diagnosis, treatment and recommendations given to me by the PC doctor. | 1.4 (1.3) | 1.1 (1.0) | 1.0 (1.0) | 1.1 (0.9) | 0.9 (0.8) |

**Transfer of clinical information across levels of care**

| Experience of continuity: transition of care at SC to PC doctor interface | aPR (CI 95%) | aPR (CI 95%) | aPR (CI 95%) | aPR (CI 95%) | aPR (CI 95%) |
|---------------------------|--------------|--------------|--------------|--------------|--------------|
| The PC doctor was aware of the instructions given to me by the specialist before I explained them to him/her. | 1.5 (1.2) | 1.2 (1.0) | 0.8 (0.7) | 0.8 (0.7) | 2.0 (1.6) |
| The specialists delivered a clinical report for the PC doctor. | 1.3 (1.1) | 1.1 (1.0) | 1.0 (1.0) | 0.8 (0.8) | 3.4 (2.3) |

**Transition of care at PC to SC doctor interface**

| Care coherence across levels of care | aPR (CI 95%) | aPR (CI 95%) | aPR (CI 95%) | aPR (CI 95%) | aPR (CI 95%) |
|-------------------------------------|--------------|--------------|--------------|--------------|--------------|
| The PC doctor was in agreement with the diagnosis, treatment and recommendations given to me by the specialist. | 1.0 (0.9) | 0.9 (0.8) | 1.0 (0.9) | 0.9 (0.8) | 1.1 (1.1) |
| The specialists were in agreement with the diagnosis, treatment and recommendations given to me by the PC doctor. | 1.0 (0.9) | 0.9 (0.8) | 1.3 (1.2) | 1.0 (1.0) | 1.2 (1.2) |
| The PC doctor sent me to the specialist whenever I needed a consultation. | 1.8 (1.5) | 2.6 (2.0) | 1.1 (1.0) | 1.1 (1.0) | 1.5 (1.5) |
| Experience of continuity: transition of care at SC to PC doctor interface | aPR (CI 95%) | aPR (CI 95%) | aPR (CI 95%) | aPR (CI 95%) | aPR (CI 95%) |
| The PC doctor referred me to the specialist. | 1.2 (1.1) | 1.0 (0.9) | 1.1 (1.0) | 1.0 (0.9) | 1.0 (0.9) |
| I visited the PC doctor because I was counter-referred by the specialist. | 1.2 (0.9) | 3.3 (2.4) | 1.1 (0.9) | 0.7 (0.6) | 1.6 (1.1) |
The specialist referred me back to the PC doctor after consultation with him/her.  

Table 3 Differences in experiences and perceptions of high levels of continuity of care between the intervention and control network, by country and year. CCAENA 2015 - 2017.

| Variables                                      | Brazil (2015-2017) | Chile (2015-2017) | Colombia (2015-2017) | Mexico (2017-2015) | Uruguay (2017-2015) |
|------------------------------------------------|--------------------|-------------------|----------------------|--------------------|--------------------|
| Transfer of clinical information across levels of care | IN vs CN 2017      | IN vs CN 2015     | IN vs CN 2017        | IN vs CN 2017      | IN vs CN 2017      |
| Perception of continuity (scale):              | aPR (CI 95%)       | aPR (CI 95%)      | aPR (CI 95%)         | aPR (CI 95%)       | aPR (CI 95%)       |
| The PC doctor was aware of the diagnosis, treatment and recommendations given to me by the specialist | 1.2 (1.1) (0.8)     | 1.1 (0.8)         | 1.2 (1.1) (0.9)      | 1.4 (1.2) (0.8)    | 0.7 (0.5) (0.3)    |
| The PC doctor asked me about any appointments I’ve had with specialists | 1.0 (1.0) (0.9)     | 1.4 (1.2) (1.0)   | 1.0 (0.8) (0.9)      | 1.1 (0.9) (0.8)    | 0.9 (0.9) (0.8)    |
| The specialists were aware of the diagnosis, treatment and recommendations given to me by the PC doctor | 0.9 (0.8) (0.7)     | 1.4 (1.2) (1.0)   | 0.9 (0.8) (0.7)      | 1.2 (1.0) (0.9)    | 0.6 (0.6) (0.9)    |
| Experience of continuity: transition of care at SC to PC doctor interface | 1.3 (1.1) (0.8)     | 1.1 (0.8)         | 1.6 (1.3) (0.8)      | 1.0 (1.0) (0.8)    | 3.2 (2.0) (0.8)    |
| The PC doctor gave me a clinical report for the PC doctor | 0.5 (0.4) (0.3)     | 1.3 (1.0)         | 0.8 (0.7) (0.6)      | 0.9 (0.7) (0.6)    | 0.7 (0.5) (0.4)    |
| Transition of care from PC to SC doctor interface | 1.1 (1.0) (0.7)     | 1.2 (1.1)         | 1.2 (1.1) (1.0)      | 1.0 (1.0) (1.0)    | 0.8 (0.6) (0.9)    |
| The specialists were aware of my clinical records with the PC doctor before I explained them to him/her | 1.2 (1.0) (1.0)     | 1.4 (1.1)         | 1.6 (1.2) (0.7)      | 1.0 (1.0) (0.7)    | 0.7 (0.6) (0.6)    |
| The specialists were aware of the reasons why the PC doctor made the referral for consultation before I explained them to him/her | 1.5 (1.2) (0.8)     | 1.2 (1.0)         | 0.9 (0.7) (0.6)      | 1.3 (1.1) (0.7)    | 0.9 (0.9) (0.6)    |

Note: aPR: adjusted prevalence ratio; Prevalence ratio of 2017 vs 2017 for each network; All models are adjusted for sex, age, level of education, number of chronic diseases and consistency of health personnel in PC and SC.

* valid n and % of respondents perceiving and experiencing high levels of continuity of care in each item.
Experience of continuity: transition of care at SC to PC doctor interface

The PC doctor repeated medical exam(s) already carried out by the specialist.
I was counter-referred by the specialist.

Transition of care at SC to PC doctor interface

The specialist referred me back to the PC doctor after consultation with him/her.

Box 1 Description of the implemented interventions in the study networks

| Network | Characteristics                                                                 | Duration | Participants                                      |
|---------|---------------------------------------------------------------------------------|----------|---------------------------------------------------|
| Brazil  | Joint discussions of clinical cases in mental health, face-to-face.               | 7 months | PC teams and psychiatrists                         |
|         | Asynchronous virtual consultation between levels in mental health via email.     | 3 months | PC doctors and psychiatrists                       |
|         | Diabetes shared care guidelines, created in 9 sessions.                          | 21 months| PC doctors, endocrinologists and other professionals|
|         | Joint virtual clinical conferences, discussion of clinical cases, referral criteria and follow-up, any condition. | 13 months| PC and SC doctors and other professionals          |
|         | Induction program for working in network, 4 cross-level visits.                  | 13 months| Professionals of both care levels, but focusing on those starting to work in the healthcare network |
| Chile   | Joint meetings for discussion of clinical cases and medical training, chronic diseases, face-to-face. | 16 months| PC and SC doctors and other healthcare professionals |
| Colombia| Joint training sessions, based on clinical cases, maternal and perinatal care and chronic diseases, face-to-face. | 6 months | PC and SC doctors                                  |
|         | Cross-level asynchronous virtual communication system for chronic diseases and maternal and perinatal care via digital platform, and clinical protocols/guidelines repository. | 14 months| PC and SC doctors                                  |
| Mexico  | Cross-level asynchronous virtual communication system for chronic diseases and maternal and perinatal care via digital platform, and clinical protocols/guidelines repository. | 14 months| PC and SC doctors                                  |
| Uruguay | Strategy to promote use of referral/counter-referral form.                       | 7 months | PC and SC doctors and other professionals          |

aPR: adjusted prevalence ratio; Prevalence ratio of intervention network vs control network; All models are adjusted for sex, age, level of education, number of chronic diseases and consistency of health personnel in PC and SC.

“Valid n and % of respondents perceiving and experiencing high levels of continuity of care in each item.”

More details on the characteristics of each intervention in: [http://www.equity-la.eu/en/publicaciones.php?t=PR](http://www.equity-la.eu/en/publicaciones.php?t=PR)