

ORIGINAL RESEARCH

Adapting the COORDENA questionnaire for measuring clinical coordination across health care levels in the public health system of Catalonia (Spain)

María-Luisa Vázquez Navarrete¹, Ingrid Vargas Lorenzo¹, Anabel Romero¹, Elvira Sánchez², Isabel Ramon³, Pere Plaja⁴, Angels AVECILLA⁵ and Rosa Morral⁶

¹Health Policy and Health Services Research Group, Health Policy Research Unit, Consortium for Health Care and Social Services of Catalonia, Barcelona, Spain

²Serveis de Salut Integrats Baix Empordà, Palamós, Spain

³Consorci Hospitalari de Vic, Vic, Spain

⁴Fundació Salut Empordà, Figueres, Spain

⁵Badalona Serveis Assistencials, Badalona, Spain

⁶Institut Català de la Salut, Barcelona, Spain

Corresponding author: Ingrid Vargas Lorenzo (email: ivargas@consorci.org)

ABSTRACT

Background: Clinical coordination across health care levels is a health policy priority for health systems worldwide, particularly in those organised around primary health care. The COORDENA questionnaire was first developed in Latin America for measuring clinical coordination across health care levels. The objective of this study is to adapt and validate the COORDENA questionnaire and its application method for use in the public health system of Catalonia (Spain).

Methods: The COORDENA questionnaire underwent a two-stage adaptation process for the context of the public health system of Catalonia: 1) literature review, expert discussions and two pre-tests to contextually adapt the language and contents of the questionnaire and produce an online version; and 2) piloting the adapted version of the questionnaire through an online survey of 161 doctors in a health care area of the public health system of Catalonia.

Results: Most of the original questions were retained. An adequate level of comprehensiveness, understanding, acceptability, sequence of themes

and questions, and length of the adapted questionnaire was observed in the pre-tests. The survey participation rate was 33.8%, with more primary care doctors participating than secondary care doctors. None of the questions presented a high no-response rate, low variability or unexpected responses. Results show that doctors report high levels of clinical information coordination and care coherence, as expected, in contrast with their limited general perception of coordination across care levels in the health care area that was analysed.

Conclusion: The COORDENA questionnaire adapted for Catalonia, COORDENA-CAT, has proved to be a valid instrument to comprehensively evaluate clinical coordination across health care levels from the perspective of primary and secondary care doctors. It is relatively easy to adapt to new contexts and can be used to monitor, evaluate and benchmark health services within and across countries and to complement evaluation with other sources of information, such as indicators or the perspectives of patients.

Keywords: HEALTH CARE, CLINICAL COORDINATION ACROSS CARE LEVELS, CLINICAL MANAGEMENT COORDINATION, CLINICAL INFORMATION COORDINATION, HEALTH SERVICES EVALUATION, QUESTIONNAIRE

BACKGROUND

Coordinating health care across different care levels poses a challenge for health systems around the world. This is particularly true for health systems in which primary health

care acts as a gate-keeper and coordinator of patient care throughout the health care continuum. Rapid technological advances, increasing specialization and new ways of organising services mean that a growing number of professionals and services are involved in the health care of patients, thus

jeopardizing its coordination; a problem which particularly affects patients with chronic conditions and multi-morbidities (1, 2). Faced with this scenario, health systems should adopt models of care provision that foster collaboration across different levels of care in order to improve care continuity, efficiency, and particularly the quality of care and health of patients (2, 3). In the public health system of Catalonia, one of the Spanish regions, as in any system based on primary care, key factors for operational effectiveness include: exchanging information; communicating fluidly across different levels of care; and making agreements between the professionals involved in the clinical management of patients, including their follow-up and appropriate access to services across different health care levels. Despite the extraordinary increase in the number of publications on care coordination in the last decade, the lack of consensus on definitions among disciplines, such as primary care, mental health, and disease management, still remains (4, 5). Many of them are limited to particular patient populations, settings, transitions or types of coordination. The broad conceptual framework adopted in this study (6) defines clinical coordination, according to Longest and Young (7), as the harmonious connection of different health services needed to provide care to a patient throughout the care continuum in order to achieve a common objective without conflicts. Following Reid et al (8), two different interrelated types of clinical coordination are distinguished (9): firstly, the coordination of clinical information, which refers to the exchange of patients' clinical information to harmonize care activities between providers, consists of the transfer of clinical information and its use; and secondly, the coordination of clinical management, which refers to the provision of care in a sequential and complementary manner by the different services and levels of care involved, consisting of the coherence of care, patient follow-up, and accessibility across different levels of care. Care coordination refers to health care services and can be analysed through service-based indicators or by taking into account the views of health personnel using qualitative methods, such as in-depth interviews, or quantitative methods, such as surveys (10). In contrast, continuity of care refers to how patients experience the coordination of services received, which can be analysed only from the users' perspective (8).

Despite the relevance attributed to care coordination across different levels of care, few studies adopt a comprehensive approach in order to include the different types and dimensions of coordination, different transitions between care levels and the general patient population (11). Most studies that measured care coordination from the perspective of health professionals focused on health care coordination for a particular type

of patient or care coordination (12–14), the evaluation of a specific care coordination mechanism (15–17), or a level of care, mainly primary health care (18). In Catalonia, previous research has analysed clinical coordination in health care networks by exploring the patients' perceptions of continuity across different care levels (19, 20) and measuring the degree of clinical coordination using service-based indicators (9, 19). However, factors influencing clinical coordination or the experiences of doctors were rarely analysed (21–23).

To the best of our knowledge (11, 24), the only comprehensive instrument to measure clinical coordination across care levels from the perspective of doctors is the COORDENA questionnaire, which was first developed and applied in six Latin American countries in 2015 (25), based on the same theoretical framework of Vázquez et al (6). It consists of three main parts: a) doctors' experiences of clinical information and clinical management coordination across care levels and the general perception of doctors of the degree of coordination in their health care network; b) doctors' knowledge and use of clinical coordination mechanisms across levels of care; and c) the factors that potentially influence care coordination (available on: www.equity-la.eu). The objective of this study is to adapt and validate an online version of the COORDENA questionnaire and its method of application for use in the public health system of Catalonia.

METHODS

The COORDENA questionnaire was adapted to the context of the public health system in Catalonia in two stages. In the first stage, the language and contents were revised and updated on the basis of a literature review, previous qualitative research results, meetings with experts and two pre-tests. In the second stage, the pre-tested online version was piloted (Fig. 1).

STAGE 1: ADAPTATION OF THE CONTENTS OF THE QUESTIONNAIRE

In order to adapt the questionnaire to the context of the public health system in Catalonia¹, two steps were taken: a revision and update of contents (face or content validity) and language; and two pre-tests.

¹ Spain has a decentralised national health system. The health competences were devolved to the 17 regions (autonomous communities). Therefore, they may differ in the way they organize and deliver health services. Adapting the questionnaire to the context in Catalonia meant to consider what specific coordination mechanisms do exist in the health services of Catalonia and which organizational factors could be of relevance.

REVISION OF CONTENTS (FACE OR CONTENT VALIDITY) AND LANGUAGE

A literature review was conducted to identify new studies that analysed clinical coordination across levels of care and associated factors – such as organisational, interactional, and work-related attitudes – as well as instruments that were available to measure care coordination. The results of qualitative studies on care coordination conducted in Catalonia and elsewhere (21–23) were also taken into consideration. The COORDENA questionnaire was translated into Catalan, terms were culturally adapted to the context^{1,2} of the health system in Catalonia, and it was then translated back into Spanish. New questions were included related to coordination mechanisms available in the health care networks of the Catalan public health system as well as additional factors potentially associated with coordination that were relevant to the context, as identified in the literature review. Some questions relating to the influencing factors were also removed. The preliminary draft of the questionnaire was discussed in two sessions with an expert group to assess face validity and a first draft was developed for pre-testing. The expert group consisted of: members of the Health Care Integration Evaluation Group, or GAIA, which consists of health services professionals who are involved in health services research or quality evaluation processes and thus have a good knowledge of the subject and the context; and researchers who created the COORDENA questionnaire.

PRE-TESTS

Two pre-tests were conducted in order to evaluate: firstly, comprehensiveness, understanding, acceptability, sequence of themes and questions, and the length of the questionnaire; and secondly, the functioning of the online version. The first pre-test was carried out through face-to-face cognitive interviews with primary care and secondary acute and long-term care doctors. The selection of doctors was based on the following survey inclusion criteria: doctors had worked for at least one year in the health care organization, doctors provided direct care to patients, and their daily practice involved contact with doctors from other care levels through, for example, the patient referral process. In the first pre-test, eight doctors participated: three from primary care, two from acute secondary care and three from long-term secondary care.

² The questionnaire was first developed in six countries of Latin America – Argentina, Brazil, Colombia, Chile, Mexico and Uruguay. In each country the contents were adapted to their use of the language. The cultural adaptation meant to ensure the choice of adequate terms or question formulation to represent the same concepts, for instance: to define the kind of work, (primary care, secondary acute and long-term care), the type of coordination mechanisms (referral, reply letters), etc.

Based on the results of the first pre-test, changes were made to the questionnaire, followed by the development of the online version in both Catalan and Spanish. Its functioning was tested first by seven members of the research team and then by six doctors, three from primary care and three from secondary care, in the three health care areas of Baix Empordà, Osona and Alt Empordà. A number of improvements were subsequently made to the online version of the instrument.

STAGE 2: PILOT STUDY

A pilot study was conducted in order to test the newly adapted version, COORDENA-CAT, and the feasibility of the online survey under real conditions.

STUDY AREA

The study area was the network of health services within the Catalan public health system located in the Southern Metropolitan Area of Barcelona and comprised: 19 primary care teams of the Servei d'atenció primària Delta del Llobregat; one acute hospital, Hospital de Viladecans; and one long-term care hospital, Hestia Duran i Reynals. The primary care teams and the acute hospital were managed by the same public entity, the Institut Català de la Salut, and the long-term care hospital was managed by a private entity, Hestia Alliance.

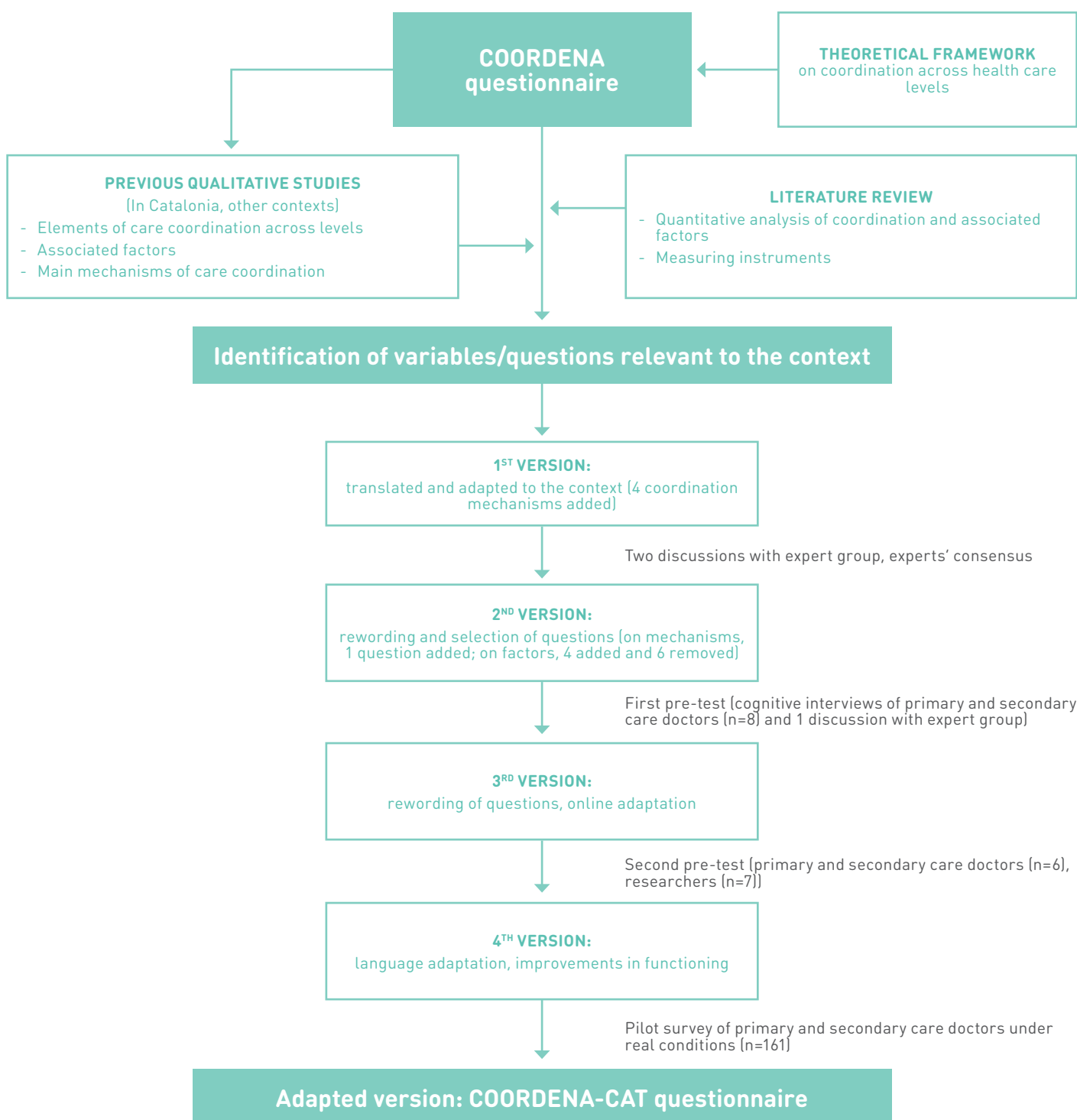
STUDY POPULATION

The study population consisted of primary care and secondary acute and long-term care doctors that had worked for at least one year in a centre of the network, provided direct care to patients, and whose daily practice involved contact with doctors from other care levels through, for example, the patient referral process.

DATA COLLECTION PROCESS

Data collection was programmed to take place over two weeks. On day one, each health care provider sent, to all doctors working in their respective institution, an email containing a personal invitation to participate and a link to access the online questionnaire. Each link was unique and randomly generated, allowing doctors to respond anonymously. Doctors could access the questionnaire at different times at their convenience and continue answering at the point where they had left off, as the previously filled in answers were automatically saved. All answers were automatically registered in an Excel database to which only the coordinator had access. After a week, a second email was sent to all invited doctors to encourage them to participate or to thank them for their participation if they had already answered.

FIG. 1. ADAPTATION PROCESS OF THE COORDENA QUESTIONNAIRE TO THE HEALTH SYSTEM IN CATALONIA



STRATEGIES FOR ENCOURAGING PARTICIPATION

A number of strategies were used to boost participation levels both before and during the survey:

- **Information sessions** for managers of participating health care centres, to publicize the project, explain the

methodology and encourage participation, commenced two weeks before the beginning of the pilot survey.

- **Posters.** A poster was designed to explain the survey's objective and online procedure, emphasizing how important it was for doctors to express their opinions in order to develop a realistic picture of care coordination in

their organization and identify elements for improvement. The posters were displayed one week before the beginning of the survey in spaces commonly used by doctors, such as meeting rooms, libraries, and canteens, in all participating centres.

- **News published on the intranet.** A short article explaining the project was published on the corporate intranet of each participating centre one week before the beginning of the survey.
- **Participation follow-up.** Over the survey's two-week period, the coordinator monitored the response rate of each centre. In those primary care centres with a low rate, specific actions to encourage participation were taken, such as extra reminders by email.

DATA ANALYSIS

In order to evaluate the way in which the survey was conducted, the following variables were analysed, both globally and for each health care level: number of responses per day, rate of access to the questionnaire, global response rate, and proportion of doctors who fully completed the questionnaire. To assess the performance of the COORDENA-CAT questionnaire, a descriptive univariate analysis was first conducted, in order to identify questions with a high no-response rate or low response variability. Secondly, a correlation analysis of questions on the same construct was performed, to identify questions that provided little added value. Finally, the open-ended question on difficulties in answering the questionnaire was analysed. All the analyses were performed using Excel.

ETHICAL CONSIDERATIONS

Approval for the study was granted by the ethics committee of Parc de Salut Mar and Bellvitge Hospital. Participation in the study was voluntary. All participants read and granted informed consent before gaining access to the questionnaire and were permitted to withdraw at any moment. The researchers had no access to any personal data of participating doctors. Anonymity was guaranteed by randomly assigning a code to each participant, not collecting names, and having an aggregated analysis of the data.

RESULTS

ADAPTATION OF THE QUESTIONNAIRE

Regarding the contents of the questionnaire, following the literature review and expert group discussion and consensus, the most important change was the addition of questions

addressing the existing clinical coordination mechanisms in the health service networks of the Catalan public health system. Furthermore, according to their contextual relevance, certain questions referring to potentially associated factors were removed, others were reworded to make more sense in the context, and some new ones were added (Fig. 1). Regarding face or content validity, the expert group found that both types of clinical coordination across levels of care – information and clinical management coordination, and their dimensions and attributes – were represented in the questionnaire. In addition, all existing mechanisms for care coordination across care levels and potentially influencing factors were included in the questionnaire.

The first pre-test showed a relatively good understanding of the questions, an adequate sequence of themes and questions, and an adequate length of approximately 15 minutes. However, a need was identified to make some modifications, including: rewording some questions to make them easier to understand, such as those regarding the shared clinical history in the area; simplifying by fusing two questions into one; adding response categories; and refining the instructions for some sections. The second pre-test, of the adapted online version, confirmed a better understanding of the revised questions and identified a few more elements requiring refinement, such as: the information given in the consent form; the layout; and problems in its online functioning, such as the lack of filters and a progress indicator, and spelling mistakes (Fig. 1).

The final version of the COORDENA-CAT questionnaire consists of seven sections (Box 1) and is very similar to the original questionnaire. Changes in contents were introduced in sections three, four, five and seven. In section three, one question was added on doctors establishing a patient care plan together. The fourth and fifth sections refer to the knowledge of doctors and their use of clinical coordination mechanisms across different health care levels. The fourth section now has an additional question regarding the perceived usefulness of the mechanisms and adds four mechanisms to the original questionnaire: shared clinical history of Catalonia, shared clinical history of the network, virtual consultations through the clinical history, and case managers. The fifth section adds two mechanisms: shared clinical records and virtual consultations through the clinical record. The seventh section now groups all questions related to factors that potentially influence clinical coordination, in contrast to their having been in different sections in the original questionnaire. Furthermore, some questions were added or removed in this section including: for organizational factors, two added and two removed; for interactional factors, two added and

one removed; for job-related attitudes, two removed; and for employment factors, one removed. Questions on demographic characteristics did not change.

BOX 1. CONTENTS OF THE COORDENA-CAT QUESTIONNAIRE¹

1. Informed consent
2. General information: experience in the health care network
 - *Level and type of care*
3. Experience of coordination between levels of care (16 items)
 - *Coordination of clinical information (exchange, use and needed information)*
 - *Coordination of clinical management*
 - *Care coherence: related to treatment, diagnostic tests and shared care plans²*
 - *Follow-up across levels of care: (back) referrals, recommendations, and consultations*
 - *Accessibility across levels of care: waiting times when (back) referred*
 - *Perception of coordination across levels of care*
4. Coordination mechanisms between levels of care in your centre
 - *Knowledge, frequency of use, and opinion on usefulness²: shared clinical history of Catalonia-HC³, shared clinical history in the centre³, joint clinical sessions, virtual consultations through the clinical history³, e-mail, telephone, referral report, discharge report, shared protocols/clinical guidelines, case managers/liaison nurses³*
5. Characteristics of use of coordination mechanisms between levels of care
 - *Available information, difficulties, reasons of use: shared clinical history³ joint clinical sessions, virtual consultations through the clinical history³, e-mail, telephone*
6. Suggestions for the improvement of clinical coordination across care levels
7. Factors related to coordination across levels of care
 - *Organizational⁴, job related attitudes⁵, interactional⁶ employment conditions⁷ demographic*

¹ The questionnaire is available at: http://www.consorci.org/coneixement/es_cataleg-de-publicacions/164/questionari-coordena-cat

² added questions

³ added coordination mechanisms

⁴ two questions added and two removed

⁵ two questions removed

⁶ two questions added and one removed

⁷ one question removed

EVALUATION OF THE METHOD AND QUESTIONNAIRE

EVALUATION OF THE METHOD

Participation was irregular over the survey period, although this increased after having sent reminders to doctors. In the first three days, 36.4% of responding doctors accessed the questionnaire, with increases to 71.6% and 88.6%, respectively, after having sent the first and second reminders. A similar pattern was observed for both primary care and secondary care doctors, with higher levels for primary care doctors. With regard to response rate, all doctors of the participating centres were invited to participate in the survey, and of these, 36.9% accessed the questionnaire and 33.8% agreed to participate (Table 1). Only two doctors provided a reason for not participating, in that they did not fulfil the inclusion criteria. From those doctors who agreed to participate, 83.9% fully completed the questionnaire. Differences in participation were observed according to health care levels: while the proportion of invited primary care doctors who participated, 40.7%, was much higher than that for the invited secondary care doctors, 19.0%, the percentage of those who completed the questionnaire was high in both groups, 81.1% and 96.6%, respectively (Table 1).

EVALUATION OF THE QUESTIONNAIRE

Sample characteristics

Most (70.4%) of the participants were women. Almost half of the sample (45.4%) were between the ages of 41 and 54 and most (88.0%) were born in Spain. Most were primary care doctors (82.0%); a majority (63.8%) had over 16 years of experience working in the same organization; and most (71.9%) had a permanent contract (Table 2).

Descriptive analysis of the questions

The descriptive analysis showed, firstly, that none of the questions presented a high no-response rate, low response variability or unexpected responses (Table 3).

Moreover, answers were generally in line with what was theoretically expected. With regard to clinical information coordination across different levels, most doctors reported that: they usually shared information on the patients they have in common (64.0%); that shared information is necessary for the care of these patients (66.9%); and that they use it (81.5%). With respect to clinical management coordination across levels and care consistency, most doctors reported that they usually

TABLE 1. DOCTORS' PARTICIPATION IN THE SURVEY ACCORDING TO HEALTH CARE LEVEL

	Invited doctors	Doctors who accessed the questionnaire*		Doctors who agreed to participate*		Doctors who fully completed the questionnaire**	
	N	N	%	N	%	N	%
Primary care	324	140	43.2	132	40.7	107	81.1
Secondary care	153	36	23.5	29	19.0	28	96.6
Acute hospital	145	29	20.0	23	15.9	22	95.7
Long-term care hospital	8	7	87.5	6	75	6	100
Total	477	176	36.9	161	33.8	135	83.9

*Calculated for the number of doctors invited

**Calculated for the number of doctors who accepted to participate

TABLE 2. SAMPLE CHARACTERISTICS

Variable		n	%
Sex (n=161)	Women	95	59.0
	Men	40	24.8
	Missing	26	16.1
Age (n=161)	30–40 years	27	16.8
	41–54 years	59	36.6
	54–65 years	44	27.3
	Missing	31	19.3
Country of birth (n=161)	Spain	117	72.7
	Other	16	9.9
	Missing	28	17.4
Health care level (n=161)	Primary care	132	82.0
	Secondary care (SC)	29	18.0
	- SC acute hospital	23	14.3
	- SC long-term care hospital	6	3.7
Experience in the organization (n=161)	< 6 years	13	8.1
	6–15 years	34	21.1
	16–25 years	41	25.5
	> 25 years	42	26.1
	Missing	31	19.3
Type of contract (n=161)	Permanent	130	80.7
	Temporary	5	3.1
	Missing	26	16.1

agree with the treatments prescribed by doctors from another care level (72.8%); and considered that contraindications and/or duplication in the treatments prescribed are rare (59.3%); as is the repetition of tests already carried out at the other level of care (66.7%). However, most doctors (86.0%) reported that they rarely establish a treatment plan for patients together with other doctors, when needed. With regards to the follow-up of patients across levels of care, most doctors (90.8%) found that the referrals of primary care doctors to secondary care doctors were generally appropriate, as were the back referrals of secondary doctors (79.1%). However, some differences according to health care level were observed regarding patient follow-up and accessibility across levels of care (Table 3). In terms of the general perception of clinical coordination across care levels, most doctors (77.6%) found that patient care was not coordinated in their area, with small differences between primary and secondary care doctors (Table 3).

Analysis of correlations

The correlation analysis performed on questions addressing the same construct, or dimension, did not identify any strongly correlated questions. Hence, all questions provided added value and were therefore considered relevant for the independent analysis.

Difficulties in use of the questionnaire

The analysis of the open question on any difficulties encountered in answering the questionnaire revealed no relevant difficulty. Out of 96 doctors who expressed their opinion, half of them (51.0%) did not encounter any problems. Among those doctors who mentioned some kind of difficulty, the most frequently cited problems were the lack of time and the length of the questionnaire (12.4%), followed by the need to further qualify some answers but having no space in which to do so (5.0%).

DISCUSSION

Despite the fact that health care coordination is a health policy priority of health systems worldwide, to the best of our knowledge, the COORDENA questionnaire is the first tool to comprehensively evaluate health care coordination across different levels of care, taking into account the different types and dimensions of clinical coordination, different transitions, and the perspective of both primary and secondary care doctors, including a variety of specialties. It provides the perspective of one of the main actors, the doctors, and will be useful to complement other sources of information, such as

indicators or the perspectives of patients. The online version was developed and piloted in the public health system of Catalonia following a systematic process, and in accordance with the conceptual framework, which guided all phases of the study. It has proven to be a valid instrument and method to evaluate clinical coordination across health care levels. Used periodically in the health system, it should allow us to: identify and address problems of health care coordination across levels and their influencing factors in a particular area; serve as a benchmark across areas; and hence help to identify interventions to improve them. Moreover, changes in its contents are minimal compared to the original version (25) and these refer mainly to the inclusion of questions on the clinical coordination mechanisms existing in the health system and on influencing factors. This means that cross-country comparisons will be possible in order to analyse levels of achievement, and to identify contextual factors that might explain different results and require appropriate interventions.

Online surveys are easier to apply, faster, and less expensive than face-to-face surveys; however, they have a lower response rate, especially among doctors (26). Although the response rates of the COORDENA questionnaire, when applied by means of face-to-face interviews in Latin American health services networks, were significantly higher (approximately 90%) (10), the response rate achieved here (33.8%) was similar to another online survey of primary care doctors in Madrid (39.4%) (26), and higher than others (27). There were significant differences in the response rate between primary care doctors (40.7%) and secondary acute care doctors (15.9%) which is probably due to the different levels of involvement of their management teams. The primary care management team was actively involved and sent additional specific emails encouraging the participation of centres with low response rates. However, in the hospital, only reminders were sent with no further actions taken. With the aim of boosting participation, two suggestions emerged from the discussion around the pilot results with the primary care and hospital management teams: firstly, health managers from all levels could be more actively involved; and secondly, more face-to-face meetings could be programmed at all levels with the organisations participating in the survey.

Regarding the contents, the results on the doctors' experiences with clinical coordination are generally in line with what was expected. For example, the relatively high level of information exchange can be attributed to measures taken to implement information coordination mechanisms, such as shared electronic medical records or virtual consultations (28). With respect to clinical management coordination across levels of care, doctors generally reported experiences of frequent

TABLE 3. EXPERIENCE OF THE DIFFERENT TYPES OF CLINICAL COORDINATION AND GENERAL PERCEPTION

			Health care level			
			Primary care	Secondary care	Total	
			N=132	N=29	N=161	
			n (%)	n (%)	n (%)	
Experience of clinical coordination						
Clinical Information coordination	Transfer and use of clinical information between levels					
	Primary and secondary care doctors share information on the care of patients we have in common (diagnosis, complementary tests, treatments) (n=136)	Frequently*	71 (65.1)	16 (59.3)	87 (64)	
		Rarely**	38 (34.9)	11 (40.7)	49 (36)	
		Do not know/ Do not answer	0 (0)	0 (0)	0 (0)	
	The information we share is as required for the care of these patients (n=136)	Frequently	72 (66.1)	19 (70.4)	91 (66.9)	
		Rarely	37 (33.9)	6 (22.2)	43 (31.6)	
		Do not know/ Do not answer	0 (0)	2 (7.4)	2 (1.5)	
	Primary and secondary care doctors use the information that we share (n=135)	Frequently	88 (81.5)	22 (81.5)	110 (81.5)	
		Rarely	18 (16.7)	3 (11.1)	21 (15.6)	
		Do not know/ Do not answer	2 (1.9)	2 (7.4)	4 (3)	
Clinical management coordination	Health care consistency between levels					
	We agree with the treatments prescribed or directions given to the patients by doctors of the other level (n=136)	Frequently	79 (72.5)	20 (74.1)	99 (72.8)	
		Rarely	27 (24.8)	6 (22.2)	33 (24.3)	
		Do not know/ Do not answer	3 (2.8)	1 (3.7)	4 (2.9)	
	There are contraindications and/or duplications in the treatments prescribed by primary and secondary care doctors (n=135)	Frequently	43 (39.8)	9 (33.3)	52 (38.5)	
		Rarely	63 (58.3)	17 (63)	80 (59.3)	
		Do not know/ Do not answer	2 (1.9)	1 (3.7)	3 (2.2)	
	Primary and secondary care doctors establish a treatment plan together for patients that require this (n=136)	Frequently	13 (11.9)	5 (18.5)	18 (13.2)	
		Rarely	96 (88.1)	21 (77.8)	117 (86)	
		Do not know/ Do not answer	0 (0)	1 (3.7)	1 (0.7)	
	We repeat the tests that doctors have already carried out at the other level (analysis, imaging) (n=135)	Frequently	33 (30.6)	10 (37)	43 (31.9)	
		Rarely	74 (68.5)	16 (59.3)	90 (66.7)	
		Do not know/ Do not answer	1 (0.9)	1 (3.7)	2 (1.5)	
	Adequate health care follow-up between levels					
	Primary care doctors refer the patients to secondary care when appropriate (n=152)	Frequently	120 (97.6)	18 (62.1)	138 (90.8)	
		Rarely	1 (0.8)	9 (31)	10 (6.6)	
		Do not know/ Do not answer	2 (1.6)	2 (6.9)	4 (2.6)	
	Secondary care doctors send the patients back to primary care for follow-up when appropriate (n=153)	Frequently	101 (81.5)	20 (69)	121 (79.1)	
		Rarely	23 (18.5)	5 (17.2)	28 (18.3)	
		Do not know/ Do not answer	0 (0)	4 (13.8)	4 (2.6)	
	Secondary care doctors make recommendations to the primary care doctor on the follow-up of patients (diagnosis, treatment, other guidelines) (n=153)	Frequently	51 (41.1)	17 (58.6)	68 (44.4)	
		Rarely	73 (58.9)	10 (34.5)	83 (54.2)	
		Do not know/ Do not answer	0 (0)	2 (6.9)	2 (1.3)	
	Primary care doctors clarify any doubts on the follow-up of patients with the secondary care doctors (n=153)	Frequently	61 (49.2)	8 (27.6)	69 (45.1)	
		Rarely	61 (49.2)	17 (58.6)	78 (51)	
		Do not know/ Do not answer	2 (1.6)	4 (13.8)	6 (3.9)	
	Primary care doctors are informed when their patients are discharged from the hospital (n=150)	Frequently	72 (59)	8 (28.6)	80 (53.3)	
		Rarely	47 (38.5)	12 (42.9)	59 (39.3)	
		Do not know/ Do not answer	3 (2.5)	8 (28.6)	11 (7.3)	
	Health care accessibility between levels					
On being referred in the normal way to secondary care, the patient has to wait a long time to be seen (n=152)	Frequently	124 (100)	20 (71.4)	144 (94.7)		
	Rarely	0 (0)	6 (21.4)	6 (3.9)		
	Do not know/ Do not answer	0 (0)	2 (7.1)	2 (1.3)		
On being referred urgently to secondary care, the patient has to wait a long time to be seen (n=152)	Frequently	106 (85.5)	10 (35.7)	116 (76.3)		
	Rarely	18 (14.5)	15 (53.6)	33 (21.7)		
	Do not know/ Do not answer	0 (0)	3 (10.7)	3 (2)		
On being sent back to primary care, the patient has to wait a long time to be seen (n=150)	Frequently	42 (34.1)	5 (18.5)	47 (31.3)		
	Rarely	81 (65.9)	6 (22.2)	87 (58)		
	Do not know/ Do not answer	0 (0)	16 (59.3)	16 (10.7)		
General perception of care coordination in the area						
I think that in this area patient care is coordinated between primary and secondary care doctors (n=152)	Frequently	25 (20.2)	5 (17.9)	30 (19.7)		
	Rarely	98 (79)	20 (71.4)	118 (77.6)		
	Do not know/ Do not answer	1 (0.8)	3 (10.7)	4 (2.6)		

*Frequently: Always/Very often

**Rarely: Rarely/Never

coordination, with two exceptions: the joint establishment of patient care plans and accessibility across levels, both of which are consistent with current practice and available indicators (29). However, these are descriptive results and further analyses of experiences and opinion are needed that take into account potential influencing factors, such as the level of care.

One of the most relevant findings emerging from the results was the contrast between doctors' generally positive experience of most attributes of clinical information and clinical management coordination across levels, and their general perception of limited coordination across care levels in their health care areas. While this gave rise to a number of potential explanations, its most important consequence was the modification of the questionnaire to include the additional open-ended question "Why?" following the item on perception in the final version of the questionnaire.

CONCLUSION

In conclusion, the adapted COORDENA-CAT questionnaire has proved to be a valid instrument for comprehensively measuring health care coordination across different health care levels in Catalonia, from the viewpoint of both primary and secondary care doctors. It can be applied by health providers and authorities to: identify coordination problems across levels of health care in a specific area of the health system; be used as a benchmark tool across areas; and, periodically, to monitor the performance of health services regarding clinical coordination across levels of care in order to address any emerging problems. The results can complement other sources, such as indicators, or perspectives, such as those of patients. By having retained most of the contents of the original questionnaire, it can also be used for comparisons across different health systems and countries. While its adaptation to different contexts is relatively easy, certain recommendations can be inferred from the results for its application in other contexts. Firstly, an appropriate adaptation of the language and contents of the questionnaire is required, for which a preliminary analysis of the existing mechanisms of coordination between levels of care in the networks/health system is useful. Secondly, to achieve a greater response rate, it is advisable to involve the management teams of participating centres, and to implement specific face-to-face actions in order to motivate doctors, especially those working in acute care hospitals, to participate. Lastly, the survey results should be used to give feedback to health professionals in order to involve them in the process of identifying problems and, more importantly, solutions.

Acknowledgements: The authors wish to thank all participating doctors for sharing their time and views. We highly appreciate the contributions to the project of the following individuals who, together with the authors of the paper, form part of the Grup d'Avaluació de la Integració Assistencial (GAIA): Lluís Colomé (Grup SAGESSA), Francesc Cots (Parc de Salut Mar), Mercè Abizanda (Parc Sanitari Pere Virgili), Jordi Coderch (Serveis Salut Integrats Baix Empordà), Elena Medarde (Consorti Sanitari de Terrassa), Marta Banquet (Consorti Sanitari de l'Anoia), and Marta Aller, Laura Esteve, Laia Ollé, Marianna Vitaloni and Andrea Miranda (Consorti de Salut i Social de Catalunya). We also gratefully acknowledge the kind collaboration and support in the pilot of the Institut Català de la Salut, particularly of Montserrat Oliveras, Meritxell Herreros, Lluís Esteve, Nacho Nieto, Montserrat Figuerola, Encarna Grifell, Jordi Trelis, Nuria Martínez, Clara Pareja, Esmeralda Martínez Morales, Maria Trinidad Fernández Romero, and Cristina Moragas Rovira.

Source of funding: This study was partially funded by Instituto Carlos III and the European Regional Development Fund (PI15/00021). The funding bodies were not involved in the study design, study execution, or writing of this manuscript.

Conflict of interests: None declared.

Disclaimer: The authors alone are responsible for the views expressed in this publication and they do not necessarily represent the decisions or policies of the World Health Organization.

REFERENCES³

1. Nolte E, Knai C, editors. Assessing chronic disease management in European health systems: country reports. Copenhagen: WHO Regional Office for Europe; 2015 (<http://www.euro.who.int/en/about-us/partners/observatory/publications/studies/assessing-chronic-disease-management-in-european-health-systems-country-reports-2015>).
2. Estrategia para el Abordaje de la Cronicidad en el Sistema Nacional de Salud.[Strategy to approach cronicity in the National Health System] Madrid: Ministerio de Sanidad Servicios Sociales e Igualdad; 2012 (https://www.mscbs.gob.es/organizacion/sns/planCalidadSNS/pdf/ESTRATEGIA_ABORDAJE_CRONICIDAD.pdf).

³ All references were accessed on 8 December 2018.

3. Øvretveit J. Does clinical coordination improve quality and save money? London: The Health Foundation; 2011 (https://www.health.org.uk/sites/health/files/DoesClinicalCoordinationImproveQualityAndSaveMoneyVol2_fullversion.pdf).
4. Schultz E, McDonald KM. What is care coordination? *International Journal of Care Coordination*. 2014;17(1-2):5-24. doi: 10.1177/2053435414540615.
5. Haggerty JL, Reid RJ, Freeman GK, Starfield BH, Adair CE, McKendry R. Continuity of care: a multidisciplinary review. *British Medical Journal*. 2003;327(7425):1219-21. doi: 10.1136/bmj.327.7425.1219.
6. Vazquez ML, Vargas I, Unger JP, De Paepe P, Mogollon-Perez AS, Samico I, et al. Evaluating the effectiveness of care integration strategies in different healthcare systems in Latin America: the EQUITY-LA II quasi-experimental study protocol. *BMJ Open*. 2015;5(7):e007037. doi:10.1136/bmjopen-2014-007037.
7. Longest BB, Young, G. Coordination and communication. In: Delmar, editor. *Health Care Management*. New York; 2000:210–43.
8. Reid R, Haggerty J, McKendry R. *Defusing the confusion: concepts and measures of continuity of healthcare*. Ottawa: Canadian Health Services Research Foundation; 2002.
9. Aller MB, Vargas I, Coderch J, Calero S, Cots F, Abizanda M, et al. Development and testing of indicators to measure coordination of clinical information and management across levels of care. *BMC Health Serv Res*. 2015;15:323. doi:10.1186/s12913-015-0968-z.
10. Vazquez ML, Vargas I, Unger JP, Mogollon A, Silva MR, Paepe P. Integrated health care networks in Latin America: toward a conceptual framework for analysis. *Rev Panam Salud Publica*. 2009;26(4):360-7.
11. Schultz EM, Pineda N, Lonhart J, Davies SM, McDonald KM. A systematic review of the care coordination measurement landscape. *BMC Health Serv Res*. 2013;13:119. doi:10.1186/1472-6963-13-119.
12. Lo C, Teede H, Ilic D, Russell G, Murphy K, Usherwood T, et al. Identifying health service barriers in the management of co-morbid diabetes and chronic kidney disease in primary care: a mixed-methods exploration. *Fam Pract*. 2016;33(5):492-7. doi:10.1093/fampra/cmw041.
13. Puchner R, Edlinger M, Mur E, Eberl G, Herold M, Kufner P, et al. Interface Management between General Practitioners and Rheumatologists – Results of a Survey Defining a Concept for Future Joint Recommendations. *PLoS One*. 2016;11(1):e0146149. doi:10.1371/journal.pone.0146149.
14. Shen MJ, Binz-Scharf M, D'Agostino T, Blakeney N, Weiss E, Michaels M, et al. A mixed-methods examination of communication between oncologists and primary care providers among primary care physicians in underserved communities. *Cancer*. 2015;121(6):908-15. doi:10.1002/cncr.29131.
15. Heidemann L, Petrilli C, Gupta A, Campbell I, Thompson M, Cinti S, et al. Improving Interdisciplinary Provider Communication Through a Unified Paging System. *South Med J*. 2016;109(6):378-82. doi:10.14423/SMJ.0000000000000464.
16. King J, Patel V, Jamoom E, DesRoches C. The role of health IT and delivery system reform in facilitating advanced care delivery. *Am J Manag Care*. 2016;22(4):258-65.
17. O'Malley AS, Reschovsky JD, Saiontz-Martinez C. Interspecialty communication supported by health information technology associated with lower hospitalization rates for ambulatory care-sensitive conditions. *J Am Board Fam Med*. 2015;28(3):404-17. doi:10.3122/jabfm.2015.03.130325.
18. 2015 Commonwealth fund international survey of primary care physicians in 10 nations. New York: The Commonwealth Fund; 2015 (<https://www.commonwealthfund.org/publications/surveys/2015/dec/2015-commonwealth-fund-international-survey-primary-care-physicians>).
19. Aller MB, Vargas I, Waibel S, Coderch J, Sanchez-Perez I, Colomes L, et al. A comprehensive analysis of patients' perceptions of continuity of care and their associated factors. *Int J Qual Health Care*. 2013;25(3):291-9. doi:10.1093/intqhc/mzt010.
20. Aller MB, Vargas I, Garcia-Subirats I, Coderch J, Colomes L, Llopart JR, et al. A tool for assessing continuity of care across care levels: an extended psychometric validation of the CCAENA questionnaire. *Int J Integr Care*. 2013;13:e050.
21. Aller MB, Vargas I, Coderch J, Vazquez ML. Doctors' opinion on the contribution of coordination mechanisms to improving clinical coordination between primary and outpatient secondary care in the Catalan national health system. *BMC Health Serv Res*. 2017;17(1):842. doi:10.1186/s12913-017-2690-5.
22. Hena Martinez D, Vazquez Navarrete ML, Vargas Lorenzo I. Factors influencing coordination among healthcare levels according to the opinion of healthcare managers and health professionals. *Gac Sanit*. 2009;23(4):280-6. doi:10.1016/j.gaceta.2008.05.001.
23. Aller MB, Vargas I, Coderch J, Calero S, Cots F, Abizanda M, et al. Doctors' opinions on clinical coordination between primary and secondary care in the Catalan healthcare system. *Gac Sanit*. 2017. doi:10.1016/j.gaceta.2017.06.001.

24. McDonald KM, Sundaram V, Bravata DM, Lewis R, Lin N, Kraft S, et al. Closing the Quality Gap: A critical Analysis of Quality Improvement Strategies. Rockville, MD: Agency for Healthcare Research and Quality; 2007 (<https://www.ahrq.gov/downloads/pub/evidence/pdf/caregap/caregap.pdf>).
25. Vazquez ML, Vargas I, Garcia-Subirats I, Unger JP, De Paepe P, Mogollon-Perez AS, et al. Doctors' experience of coordination across care levels and associated factors. A cross-sectional study in public healthcare networks of six Latin American countries. *Soc Sci Med*. 2017;182:10-9. doi:10.1016/j.socscimed.2017.04.001.
26. Aerny-Perreten N, Dominguez-Berjon MF, Esteban-Vasallo MD, Garcia-Riolobos C. Participation and factors associated with late or non-response to an online survey in primary care. *J Eval Clin Pract*. 2015;21(4):688-93. doi:10.1111/jep.12367.
27. Young JM, O'Halloran A, McAulay C, Pirota M, Forsdike K, Stacey I, et al. Unconditional and conditional incentives differentially improved general practitioners' participation in an online survey: randomized controlled trial. *J Clin Epidemiol*. 2015;68(6):693-7. doi:10.1016/j.jclinepi.2014.09.013.
28. Marimon-Sunol S, Rovira-Barbera M, Acedo-Anta M, Nozal-Baldajos MA, Guanyabens-Calvet J. Shared electronic health record in Catalonia, Spain. *Med Clin (Barc)*. 2010;134 Suppl 1:45-8. doi:10.1016/s0025-7753(10)70009-9.
29. Memòria Servei Català de la Salut 2016 [Servei Català de la Salut 2016 annual report]. Barcelona: Catalunya DdS-Gd; 2017 (http://catsalut.gencat.cat/web/.content/minisite/catsalut/coneix_catsalut/memories_activitat/memories_catsalut/2016/memoria_catsalut_2016.pdf). ■