

What are the patients' preferences for the Chronic Care Model? An application to the obstructive sleep apnoea syndrome

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Abstract

Context The Chronic Care Model (CCM) has been developed to improve the quality of medical care delivered by general practitioners to patients with multiple chronic conditions. Despite an increasing use of this model, it remains unclear to what extent the different recommendations are valued by the patients.

Objective This study aims to identify the preferences of patients with multiple chronic conditions for recommendations of the Chronic Care Model.

Methods The patients' preferences were identified with a discrete choice experiment. The hypothetical general practice cares were described using 10 recommendations of the Chronic Care Model (i.e. shared decision making; informational continuity (INF); regular follow-up; planned care; communication; collaboration with a nurse; advices on health habits; patient empowerment; psychological support; coordination). Respondents were consecutively recruited in a hospital setting during routine follow-up visits to their pulmonary specialist. The sample of respondents included 150 patients with multiple chronic conditions in addition to an obstructive sleep apnoea syndrome.

Results The INF is highly valued by the patients. At the opposite, patients do not appear to value collaboration between nurses and GPs. To a large extent, the patients' preferences for the recommendations of the CCM depend on their gender, number of chronic conditions and self-perceived health condition.

Discussion The INF appeared to be a minimal requirement to ensure high-quality general practice care. The significant interactions between the patients' socio-demographic characteristics and their preferences for the CCM highlighted the necessity to deliver personalized services.

Introduction

The health-care systems, and especially general practice (GP) care, are challenged by the increasing number of patients with chronic conditions.^{1–3} Despite substantial resources allocated to management of chronic conditions, patients do not always receive optimal care.⁴ Patients with multiple chronic conditions bring new medical needs both at the organizational and clinical levels. The management of chronic conditions often requires changes in the patients' health habits, and given the long-run of treatment, it is important that they fully understand their clinical situation to be fully compliant with medical recommendations.^{5–7}

Since the early 90's, several initiatives have been launched to improve the responsiveness of the health-care systems to specific needs of patients with chronic conditions. These initiatives range from disease management programmes (DMPs) to alternative models of medical care (ACMs). Usually DMPs consist of services provided in addition to current GP care, whereas ACMs such as the Chronic Care Model, Guided Care Model or Stanford Model are integrated approaches aiming to reorganize the current provision of medical services.^{8,9} In GP care, the latter approach is deemed more appropriate to adequately manage chronic conditions.¹⁰

The Chronic Care Model (CCM) is one of the most used ACMs, and it has been developed to help GPs making the transition from an organization based on providing acute care to one providing chronic care services.^{11–13} The ultimate goal of the CCM is to create a GP care in which '*informed and activated patients interact with prepared and proactive team of professionals*'. It has been shown that the CCM can lead to improvements in patient care and to better health outcomes.^{14,15} Patients with chronic obstructive pulmonary disease (COPD) and receiving care from their GPs, which included some CCM components, had lower rates of inpatient hospitalizations and shorter hospital length of stay.¹⁶

However, the CCM recommendations usually consist of a comprehensive but extensive list of recommendations which, for pragmatic reasons, are unlikely to be fully implemented in medical practice because of resources constraints.^{17,18} Although these different recommendations have proven their effectiveness in achieving a higher level of patient satisfaction or better health outcomes, patients may still attach different values to the different CCM recommendations. It is unclear which recommendations should be prioritized for implementation to improve the quality of medical care from the patients' perspective. Patient preferences for the CCM recommendations can provide a useful guidance to GPs, helping them to efficiently improve the quality of chronic care.

The objective of this study is to identify the patients' preferences with multiple chronic conditions for the recommendations of the Chronic Care Model. To achieve this objective, a discrete choice experiment (DCE) was run on a sample of patients with multiple chronic conditions, including obstructive sleep apnoea syndrome (OSAS) and other related conditions (e.g. diabetes mellitus, asthma, high blood pressure). A better understanding of patients' preferences for the CCM recommendations will assist decision makers, by allowing them to prioritize the most important changes for implementation, taking account of the scarce resources allocated to health care.

Methods

Sample of patients

Over a 6-month period, 150 patients with multiple chronic conditions were consecutively recruited in a French hospital setting. The OSAS was used to identify patients with multiple chronic conditions. The population of patients with OSAS was deemed especially relevant for analysing the recommendations of the CCM, because these patients usually have multiple chronic conditions (e.g. diabetes mellitus, asthma and hypertension) and require complex medical care.

OSAS affects 4% of middle-aged men and 2% of middle-aged women.¹⁹ It is characterized by the presence of repetitive upper airway obstruction during sleep. This disorder is known to be associated with high rates of morbidity and mortality, mainly due to cardiovascular diseases and traffic accidents.²⁰ Usually OSAS is treated by two mechanical options, namely continuous positive airway pressure (CPAP) and oral appliances, which are constraining lifelong treatments. In the French health-care context, OSAS is usually suspected by GPs and patients are referred to hospital-based pulmonary specialists for diagnosis and initiation of treatment. The follow-up of treatment is realized by specialists, and GPs are usually not involved in the management of this chronic condition. However, GPs are still responsible for the management of the other OSAS-related chronic conditions.

To be included in the study, the patients had to meet three eligibility criteria. First, they must have at least one chronic condition in addition to their OSAS to be considered as having multiple chronic conditions. Second, patients had to consult a GP at least once in the last 6 months. This criterion was used to ensure that respondents had a minimal experience of GP care. Third, patients had to have fully complied with her/his OSAS treatment for at least 1 year prior to enrolling in the study. This ensured a homogeneous group of patients without residual symptoms of OSAS.

The patients were consecutively recruited in a hospital setting during follow-up consultations with the specialist for their OSAS treatment. If the patients met the eligibility criteria, they were approached at the end of their consultation by a nurse who presented the study and asked them whether they wanted to participate. This study was submitted to a local ethics committee, which provided agreement for the study.

The sample size was computed according to the requirements of the DCE.²¹ Assuming a 25% choice probability, a 10% relative accuracy, eight tasks, a 95% confidence level and a 95% anticipated response rate, the minimal number of patients to be recruited was 150.

Discrete choice experiment

The DCE approach has been increasingly used in health to analyse the preferences of patients, health professionals and decision makers.^{22,23}

In a DCE, participants are asked to make choices between hypothetical alternatives. Each alternative represents a particular collection of attributes' levels describing a medical service. The alternatives are organized in choice sets of limited size. The repetition of observed choices over the tasks allows modelling the preferences for the attributes' levels. Following recommendations from the literature, a DCE should be conducted in several steps.

Step 1: Identification and selection of the relevant attributes and their levels

The attributes used in the DCE should be both comprehensive and understandable. The comprehensiveness refers to the ability of the attributes to adequately describe the medical service under investigation. The objective is to prevent a potential bias due to omission of relevant attributes. In addition, the attributes should be clear enough to be easily understood by the respondents.

In this study, these two conditions were ensured by selecting the attributes from the Patient Assessment of Care for Chronic Illnesses Conditions (PACIC) questionnaire²⁴ which is a validated questionnaire to measure the achievement of the CCM recommendations from the patients' perspective. The set of attributes derived from the PACIC was piloted on a sample of 20 patients with chronic conditions using face-to-face interviews. The final set of CCM attributes is described in Table 1.

The attributes' levels should also ensure sufficient perceptual differences between the levels and a realistic range of values. Given the qualitative and innovative nature of the attributes, it was decided to use only two extreme levels of achievement per attribute (i.e. 'achieved' vs. 'not achieved'). These levels were seen as being especially appropriate for some attributes (e.g. cooperation with nurses, planned care and empowerment of the patient) which are rarely

Table 1 List of attributes used to describe the GP care

	Attribute	Detail
COM	Ability to reach at distance	The GP gives to the patient the opportunity to reach him by phone or email
EMP	Empowerment of the patient	The GP helps the patient to manage himself his/her chronic conditions
HAB	Advices on health habits	The GP asks questions about the patients' health habits and gives advices to him
INF	Informational continuity	The GP contacts other health professional(s) consulted by the patient to know how things are going
MON	Regular follow-up	The GP checks regularly that the treatment plan is appropriated to the patients' needs and resources
NUR	Collaboration with a nurse	The GP collaborates with a nurse or other paramedical professional
PLA	Planned care	The GP organizes the treatment of the patient on the long term (number of medical courses per year, professional to contact in case of need)
RSP	Responsibility of the coordination	The GP manages the different medical services required to treat the patients' chronic conditions
SDM	Shared decision making	The GP asks the patient for his/her ideas when he recommends a treatment plan
SUP	Psychological support	The GP asks how the patients' daily life is modified by his chronic conditions and how he copes with them

GP, general practitioner.

achieved in practice and can be described as a binary event for most of patients. It was assumed that using two extreme levels of achievement would rule out potential 'interpretation/referencing' effect and attribute non-attendance (ANA) strategies.^{25,26}

Step 2: Design of the choice tasks

The design of the choice sets should find a balance between statistical considerations and respondents' ability to make choices.

For this study, it was decided to use a binary choice format with only one alternative per DCE task (i.e. *Would you accept this GP care? Yes/No*). The 10 CCM attributes were divided into two blocks using an attribute block design (ABD) to reduce cognitive difficulty of the tasks.²⁷ Each block contained four specific attributes and two common attributes. The resulting design included eight DCE tasks per block and verified the desirable properties of orthogonality and level balance (see Table 2 for a complete description of the design).

Finally, task no 2 was repeated at the end of the questionnaire to test the stability of choices. This task was also used to test the monotonicity assumption according to which individuals are assumed to prefer more to less.

Step 3: Statistical analysis of the choice data

The choices were analysed in the random utility maximization framework assuming that respondents try to maximize their utility. This utility is divided into two parts: one (V) which is observed by the researcher and described by the attributes (x); the other part (ϵ) is unobserved by the researcher and is usually assumed to be identically and independently distributed (IID) as a type I extreme value.^{21,28}

Sample preferences for the CCM recommendations. The choices were analysed using a binary logit model accounting for multiple observations per respondent. The validity of merging data from the two DCE versions was tested following the Swait & Louviere procedure.²⁹ In addition, a potential bias introduced by the ABD was investigated by comparing choices and individuals' characteristics between the two versions of the experiment.

Importance of the CCM recommendations. The influence of the attributes on the patients' choices was assessed through their statistical contribution to model log-likelihood (this approach is known as partial log-likelihood

Table 2 Design of the discrete choice experiment (DCE)

DCE version	Attribute	Tasks								
		1	2	3	4	5	6	7	8	1 bis
1 and 2	Shared decision making	Y	N	Y	N	Y	N	N	Y	Y
1 and 2	Informational continuity	N	N	Y	Y	Y	Y	N	N	N
1	Planned care	Y	N	N	Y	Y	N	Y	N	Y
2	Advices on health habits									
1	Regular follow-up	N	N	Y	Y	N	N	Y	Y	N
2	Psychological support									
1	Ability to reach at distance	Y	N	N	Y	N	Y	N	Y	Y
2	Empowerment of the patient									
1	Collaboration with a nurse	N	N	N	N	Y	Y	Y	Y	N
2	Responsibility of the coordination									

Y, yes; N, no.

analysis).³⁰ The (partial) log-likelihood values were rescaled on a 0-to-100 scale to ease the comparison of the attributes' impact.

Heterogeneity of the patients' preferences. The observed heterogeneity of patients' preferences for the CCM recommendations was analysed in a separate model including interaction terms between attributes and individuals' socio-demographic characteristics (i.e. age, gender, perceived health status, number of chronic conditions). As many interaction terms were identified, a two-step approach was used to select subset of interaction terms. First, several models including interaction terms between all the attributes and one individual characteristic at time were estimated. Second, only the interaction terms with a *P*-value less than 0.1 were included in the final model.

Step 4: Validity of the results

The *face validity* of the results was approximated by the quality of survey completion (i.e. missing values, serial non-participation), its perceived interest and difficulty. The *internal validity* of the model was checked by analysing the individuals' responses to the two consistency tests (i.e. stability and monotonicity tests). The *theoretical validity* was investigated by comparing the estimates to a set of *a priori* assumptions on the expected results. According to the literature, all the CCM recommendations were

expected to improve the quality of GP care from the patients' perspective.

Results

Sample of patients

The 150 respondents had on average 3.2 chronic conditions (SD = 1.04) (Table 3). A 94.3% response rate was approximated by counting the number of eligible patients who agreed to take part in the study. No socio-demographic characteristics were collected on the patients who refused to take part in the study.

Descriptive analysis of the patients' choices

More than 37% of the hypothetical GP cares have been accepted by the patients, and only 5% of patients refused all the hypothetical alternatives. There were no missing values regarding the DCE tasks. The respondents found the choice tasks easy and interesting. Indeed, 69% of the patients perceived the DCE tasks as being 'easy' or 'very easy' to fulfil and 93% perceived the tasks as being 'interesting' or 'very interesting'.

Regarding the *internal validity* of the choices, 96 and 88% of the respondents satisfied, respectively, the monotonicity and stability tests. No respondent failed the two consistency tests.

Table 3 Patients' characteristics (n = 150)

Characteristic	% of patients
Age	
≤60 years	35.3
Between 61 and 69 years	42.0
≥ 70 years	22.7
Gender	
Male	71.3
Female	28.7
Number of chronic conditions	
2	22.0
3	39.3
More than 3	38.7
Type of chronic conditions¹	
Hypertension	63.3
Diabetes	40.0
Cardiovascular diseases	28.7
Musculoskeletal disorders	26.0
Hypercholesterolaemia	21.3
Cancer	10.0
Psychological disorders	10.0
Self-perceived health state	
Excellent/very good/good	47.3
Satisfactory/poor	52.7
GP involvement in the management of the chronic conditions²	
Never	4.0
Rarely	8.6
Occasionally	10.6
Most of the time	18.6
Always	58.0

¹Only the types of chronic conditions represented in at least 10% of the sample are displayed.

²At least, the GP asks the patient about one of his/her chronic condition(s).

The systematic comparison of individuals' characteristics between the two DCE versions showed no significant differences (Table 4). In addition, differences in age and annual number of GP consultations were tested, and the results showed no significant differences.

Finally, the validity of merging data from the two DCE versions was tested, and the assumptions of scale parameters equality and part-worth estimates equality could not be rejected.¹

¹Further details on the testing can be obtained from the authors on request. For instance, the chi-square test of the assumption $H_{1A}: \beta_1 = \beta_2 = \beta$ was not significant (χ^2 stat = 11.6, d.f. = 8, P -value = 0.17) nor the test of the assumption $H_{1B}: \mu_1 = \mu_2 = \mu$ (χ^2 stat = 2.6, d.f. = 1, P -value = 0.107).

Table 4 Comparison of the covariates across the two versions

Covariate	No. of d.f.	χ^2 stat	P -value
Proportion of alternatives accepted	1	0.09	0.7653
Perceived difficulty of the tasks	1	0.13	0.7232
Perceived interest of the tasks	1	2.11	0.1461
Number of fails to the consistency tests	1	1.01	0.3149
Gender	1	1.60	0.2100
Number of chronic conditions	2	3.68	0.1600
Perceived health state	1	1.31	0.2500

d.f., degrees of freedom.

Patients' preferences for the CCM recommendations

Sample preferences for the CCM recommendations

The results are reported in Table 5. The 1st parameter of interest is the mean of the distribution of the intercept parameter, which can be interpreted as the overall tendency of patients to accept (or reject) the hypothetical alternatives. The estimate is significant and negative, indicating thus a tendency of the patients to reject the alternatives of GP care whatever their composition.

The 2nd parameter of interest is the version-specific constant (DCE version), which described the systematic effect of the DCE design (V1 vs. V2) on the patients' choices. The estimate was not significant, thus confirming that the ABD did not introduce a bias in the analysis.

Third, in line with *a priori* expectations, all the estimated preferences for the attributes were significant except for the collaboration between GP and a nurse (NUR). This result indicated that patients positively valued the different CCM recommendations to improve the management of their chronic conditions.

Importance of the CCM recommendations

Looking at the rescaled partial log-likelihood values (Column 4 in Table 5), the informational continuity (INF) appeared to be the most influential attribute on patients' choices. Its impact was five times higher than that for regular follow-up (MON) which was the 2nd most influential attribute. The remaining attributes could be divided into two groups

according to their impact on patients' choices. A group of attributes with a 'high' impact included the responsibility of the coordination (RSP), shared decision making (SDM), psychological support (SUP) and regular follow-up (MON). Another group of attributes with a 'moderate' impact on patients' choices included the empowerment of the patient (EMP), planned care (PLA) and ability to reach at distance (COM).

Table 5 Estimates of the preferences over the sample

Attribute	Estimate (SE)	P-value	Rescaled partial LL
Fixed effect			
Intercept (mean)	-0.99 (0.12)	<0.0001	-
DCE version	-0.09 (0.1)	0.4070	-
Informational continuity (INF)	1.26 (0.10)	<0.0001	47.3%
Regular follow-up (MON)	0.82 (0.12)	<0.0001	10.5%
Shared decision making (SDM)	0.60 (0.09)	<0.0001	9.5%
Responsibility of the coordination (RSP)	0.80 (0.12)	<0.0001	9.1%
Psychological support (SUP)	0.77 (0.12)	<0.0001	8.8%
Advices on health habits (HAB)	0.65 (0.12)	<0.0001	6.3%
Ability to reach at distance (COM)	0.52 (0.12)	<0.0001	3.9%
Planned care (PLA)	0.42 (0.12)	<0.0001	2.5%
Empowerment of the patient (EMP)	0.38 (0.12)	0.0020	2.0%
Collaboration with a nurse (NUR)	-0.04 (0.12)	0.6970	0.0%
Random effect			
Intercept (SD)	0.86 (0.12)	-	
Model fitting			
Log-likelihood	-608.6		
Number of observations	1200		

DCE, discrete choice experiment; SE, standard error; SD, standard deviation; LL, Log-likelihood.

Heterogeneity of the patients' preferences

The results are displayed in Table 6. The likelihood-ratio test showed that the model with interaction effects significantly outperformed the previous model (LR test: χ^2 stat = 40.18, d.f. = 8, *P*-value < 0.001).

The estimates of four interaction effects out of eight were significantly different from 0 at a 95% confidence level. These concerned the interaction between the patients' gender and the preferences for the INF. All things being equal, to be a male reinforced the preferences for the INF relative to female patients. In the same way, to be a male patient decreased the strength of preferences for the delivery of socio-psychological support by the GP (SUP). The number of chronic conditions seemed to also have an impact on the preferences for the INF. Compared to patients with two chronic conditions, those with more than three chronic conditions seemed to attach a higher value to the INF. Lastly, patients with a negative view on their health state had smaller preferences for receiving advice on their health habits from the GP (HAB).

The influence of the socio-demographic characteristics on patients' preferences could be approximated by the changes in the predicted probabilities of choices. For example, a GP care with the following characteristics '*not achieved*' = {regular follow-up; informational continuity; psychological support} and '*achieved*' = {responsibility of the coordination; ability to reach at distance; empowerment of the patient; planned care;

Table 6 Interaction between the preferences and the patients' characteristics

Attribute	Estimate (SE)
Fixed main effects	
Intercept (mean)	-0.98 (0.12)*
DCE version	-0.05 (0.11)
Shared decision making (SDM)	0.62 (0.10)*
Regular follow-up (MON)	0.97 (0.14)*
Responsibility of the coordination (RSP)	0.72 (0.14)*
Ability to reach at distance (COM)	0.56 (0.13)*
Informational continuity (INF)	0.79 (0.16)*
Psychological support (SUP)	0.92 (0.25)*
Empowerment of the patient (EMP)	0.36 (0.12)*
Planned care (PLA)	0.44 (0.12)*
Collaboration with a nurse (NUR)	-0.04 (0.12)
Advices on health habits (HAB)	0.92 (0.18)*
Fixed interaction effects	
Regular follow-up (MON) × Being 70 or more years old	-0.43 (0.24)**
Informational continuity (INF) × Being a male	0.51 (0.17)*
Informational continuity (INF) × Having three or more chronic conditions	0.46 (0.17)*
Advices on health habits (HAB) × Considering one's own health as bad	-0.43 (0.22)*
Psychological support (SUP) × Being a male	-0.63 (0.23)*
Psychological support (SUP) × Having three or more chronic conditions	0.41 (0.26)
Psychological support (SUP) × Considering one's own health as bad	0.29 (0.23)
Responsibility of the coordination (RSP) × Being 70 or more years old	0.36 (0.25)
Random effect	
Intercept (SD)	0.87 (0.13)
Model fitting	
Log-likelihood	-588.6
Number of observations	1200

DCE, discrete choice experiment; SE, standard error; SD, standard deviation.

**P*-value < 5%; ** *P*-value < 10%.

collaboration with a nurse; advices on health habits} had an acceptance probability of 35.7%.² After having taken into account the effect of gender on preferences for the INF, this probability increased to 48%³ for the female patients, thus indicating that females were less responsive to changes in the achievement of the INF attribute.

Discussion

To our knowledge this study is the first to measure the preferences of patients with multiple chronic conditions for the management of their conditions in primary care. Previous other studies provided interesting insights on this topic.^{31,32} Noel *et al.*³² used the focus groups approach on a sample of 60 patients with at least two chronic conditions and identified six main categories of problems related to chronic conditions. Among them, a category especially concerned with problems arising from interactions with the health-care system. The most frequently mentioned problems were related to long waits for referrals, poor continuity of care between clinics, problems in accessing non-scheduled care, multiple appointments and problems communicating with the medical care providers.

In line with the increasing use of DMPs or ACMs, studies have used a variety of instruments to evaluate these initiatives from the patients' perspective.³³ These instruments focus either on the experience or the satisfaction of patients and provide interesting insights into the quality of the current GP care. However, they provide little guidance for prioritising the changes to implement. Our results address this lack of empirical evidence.

²This probability is obtained by combining the estimated sample preferences (Table 5) and the proposed attributes' levels in the probability (logit) formulae presented in the Method section.

³This probability is obtained by combining the estimated subsample preferences (Table 6) and the proposed attributes' levels in the probability (logit) formulae presented in the Method section.

The patients have an overall tendency to refuse the hypothetical models of GP care

This result can be seen either as a *true* choice of the patients in terms of preferences for the GP care or as an artefact of the DCE method.

Indeed, patients could have rejected most of the hypothetical GP care because of an 'endowment' effect³⁴ and/or a 'regret avoidance' strategy.³⁵ In line with the 'endowment' effect, the patients attach a higher value to a particular organization of GP care only after having experienced it. Then this effect suggests that patients may prefer their current GP care over new ones, even if the new ones are of a higher quality.³⁶ Although in this study the participants were explicitly informed that the proposed hypothetical GP care must not be seen as a replacement to their current GP care, we cannot preclude that the attractiveness of each hypothetical GP care was still evaluated relative to the current situation of the patients. According to the 'regret avoidance' strategy, patients may base their choices not only on the utility procured by hypothetical GP care but also in regard to the expected regret associated with the choice of a new model of GP care. Then the patients could have used a conservative strategy of regret minimization to make their choices, leading thus to the rejection of most of the hypothetical GP care.

The patients do not value the collaboration between the GP and a nurse

This might be due to a medical experience effect of the patients.³⁷ Compared to other European countries such as the Netherlands or England, the involvement of nurses in the management of chronic conditions in ambulatory care is somewhat new in France; as a result, most of the patients have never experienced a GP-nurse team working.³⁸ As shown by Laurant *et al.*³⁹ the patients' views about the role of nurses in GP care can dramatically evolve once they acquire relevant knowledge about the nurses' roles.³³ This suggests that before implementing the CCM recommendations, it could be neces-

sary to inform patients about the opportunities for improvements due to a reorganization of GP care.

The informational continuity is a necessary condition for a high-quality GP care

According to Mahadevan (2009, p. 32), an order-winning attribute is an '*attribute that has the potential to sufficiently motivate the customer to buy the product*'.⁴⁰ Given this definition, the information of the GP on the patients' situations could be considered an order-winning attribute of the GP care, because deterioration in this attribute cannot be compensated by improvements in the other attributes. Previously other studies showed that patients highly value the continuity of a doctor-patient relationship and the exchange of information with the doctor.⁴¹⁻⁴³ Our study contributes to the literature by showing that patients prefer to be both well informed by their GP and to consult a GP who is also well informed of the patients' clinical case. Patients with multiple chronic conditions require medical services to be provided by different health professionals, at different places and several times a year. These regular and different contacts with the health-care system have potential for suboptimal management of chronic conditions unless the medical services are well coordinated with a health professional acting as a 'guide' for patients. The lack of coordination and information exchange between the health professionals involved in the chronic care has consistently been described as a major quality issue by the literature underlying the CCM (and other models of chronic care).^{12,13}

One model of GP care is not necessarily suitable for all patients

The variability of patients' preferences questions the relevancy of the CCM to improve GP care in a uniform way for all patients. Our results suggest that implementing CCM recommendations following a '*one size fits all*' strategy could be inefficient due to patients valuing

the opportunities for improvements in different ways.⁴⁴ Therefore, there is a need for tailoring GP care to patients' preferences by at least providing different models of GP care to different subgroups of patients, who are homogeneous in terms of preferences for the CCM recommendations (i.e. market segmentation strategy).

Interestingly the patients-reported health state seems to be related to the patients' expectations for the GP care. Patients with negative views on their health state were more likely to place a lower value on the changes in their health habits than those with positive views. Given that chronic conditions may have important consequences on the patients' daily life and those of their relatives,^{45,46} it could be appropriate to systematically take into account the individuals' feelings about the burden of their chronic conditions. Instead of receiving advice to improve health habits, patients with a negative view of their health state might prefer receiving advice on how to cope with the consequences of the chronic conditions on their daily life.

In the same way, having many chronic conditions appears to reinforce the patients' preferences for information from the GP on their clinical situation. This result provides empirical evidence that patients with multiple chronic conditions are more likely to receive fragmented medical care. With this organization of chronic care, patients usually have to manage the medical services themselves, in particular by communicating information between the health professionals. Given the complexity of managing several chronic conditions simultaneously, some patients may prefer that their GP play a proactive role in chronic care. The GP could use informational tools in collaboration with other health professionals to be continuously informed about the changes in patients' treatments or health outcomes. This information system would allow GPs to contact patients without having to wait for the next follow-up visit. While at the same time, it would also increase the GPs ability to detect potential iatrogenic effects when a patient is

treated for different/multiple diseases. General practitioners would have several opportunities to optimize the management of patients' chronic conditions by removing either redundancies in treatments or treatments with null or negative marginal effects.

Limitations of the study

This study is not free from limitations. First, the recruitment of patients took place in the French health-care system leading to results which might not be generalizable to other contexts. In France, the GP was only recently defined as a gatekeeper coordinating the different medical care given to patients. In addition, most GPs work in the private sector with fee-for-service remuneration and usually in a solo or a mono-disciplinary medical practice. These contextual features might have influenced the results of this study. Cooperation between the GP and other paramedical professionals, especially nurses, remains underdeveloped and therefore could negatively frame the patients' views for an increased role of nurses in the management of chronic care. In this study, this effect cannot be ruled out and further empirical research is needed to investigate this issue. The recruitment of patients was done in a hospital setting to avoid biases related to recruitment in the GP office. Previous studies have shown that patients may have difficulties in answering questions about their GP when they are surveyed in that context (i.e. responses heavily based on the last consultation experienced, respondents' inhibition).^{47,48} In this study, the recruitment centre was carefully selected to have a large catchment area allowing us to recruit patients from different geographical areas (i.e. urban, peri-urban, rural) associated with different models of GP care.

Second, OSAS was used as a support to recruit patients with prevalent chronic conditions such as diabetes, mellitus, asthma and high blood pressure. However, this strategy may introduce a potential confounding effect on the patients' choices. To mitigate the potential effect of an OSAS condition in

patients' preferences, we recruited patients fully compliant to their OSAS treatments, thus ensuring that OSAS symptoms were fully erased and treatment well accepted by patients. However, the recruitment of patients fully compliant with their OSAS treatment may have introduced a bias by selecting a group of patients with specific attitudes towards medical care. In practice, the compliance with OSAS treatment highly depends on clinical aspects such as severity of symptoms rather than attitudinal aspects.⁴⁹

Conclusion

Patients with multiple chronic conditions have clear preferences for the type of services delivered by GPs. Among the different recommendations of CCM, keeping GPs informed of the changes in patients' health conditions and treatments is an important condition for delivering high-quality GP care. Regarding the organizational innovations, such as team working between a nurse and a GP, it could be necessary to first inform patients about the role of the different health professionals and the expected benefits of such collaboration.

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Conflict of interest

None reported.

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