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How much convergence exists between registered process measures and patient reported experience measures? A study on Catalan primary healthcare

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Abstract

The use of quality measures is important for transparency and the continuous improvement of performance. However, we do not know enough about the relationship between registered process measures and patient reported experience measures (PREMs) in primary healthcare. Recent studies point to areas of convergence that run contrary anticipated trends. This is a relevant question for healthcare management and governments as their position is stronger when system's guidelines and targets also matter to patients or, vice versa, when patient-centered measures are used to develop new process measures. Our aim is to study both type of measures, their logic and their level of convergence. We also assess the relationship between PREMs, patients' demographic characteristics and area socioeconomic level. We estimated pairwise correlations with patient experience aggregated at the health-center level and a series of multi-level regression models to assess the adjusted effect of four registered process measures on ratings of patient experience at the patient level. We use patient experience as measured by survey data, two composite quality indices and two single indicators regularly computed by the Catalan Health Service. Continuity of care with the same doctor and accessibility are positively associated with patient experience. No

relationship was observed in the index created to measure quality of assistance. The index measuring the quality of prescriptions was positively associated with patient experience but only when analyzed separately. We conclude that registered process measures and PREMs are not entirely independent, hence improvements of the management side have the potential to impact patient experience.

KEYWORDS

continuity and access, performance, PREMs, primary healthcare, process measures

Highlights

- PREMs are related to some registered process measures.
- Management's position is stronger when the system's targets matter to patients.
- Convergence is observed with continuity of care and timely access.
- The process measure of the overall quality of assistance is not significantly related to PREMs, likely because it comprises too many conditions and diagnostic and resolution measures.
- The process measure of the quality of prescription is weakly but significantly related to PREMs, which is an interesting line of inquiry for further research.

1 | INTRODUCTION

Primary Health Care (PHC) systems in multiple countries have developed a combination of registered process measures and patient-reported experience measures (PREMs) in order to evaluate and improve performance. Behind efforts to develop these dual systems is a need to increase transparency at the government level and to improve the quality of services with a continuous process of learning on the side of both providers—whether they are public, private or nonprofit—and governments paying for PHC services.[1]

Registered process measures reflect the guidelines and performance targets outlined by health management authorities and governments. These evidenced-based clinical guidelines limit the autonomy of healthcare professionals and focus on the system's objectives at the population level.[2] On the other hand, PREMs provide information about patient experiences based on parameters that patients can observe in their use of the system. PREMs can reflect management objectives regarding patient experience and enable progress towards a process that is more patient centered[3–7]; however, they are influenced by factors not necessarily related to the quality of services as defined by management and government entities.

The combination of both types of measures is probably the best option for managing PHC services,[1] but we do not know enough about their convergence. There might be aspects of the convergence between registered measures and PREMs that provide a clear signal of healthcare performance. However, there might be cases where measures diverge. Hence, it is important to know when convergence is less likely, whether there is room for convergence, and what the benefits and limitations of each type of measures are.

Previous studies on this issue have focused more on inpatient services than outpatient services.[8–15] Studies on patient satisfaction found patient experience to be independent from surgical process measures and hospital safety.[16,17] Initially, it was believed that there was little opportunity for both types of measures to converge. This viewpoint is encapsulated in the claim that patients answer survey questions based on "concierge services" as opposed to clinical processes. Along these lines, patients' opinions were considered less than credible due to their lack of formal medical training and supposed tendency to focus on aspects that can be easily influenced by factors unrelated to care. Part of the literature has observed a trend of individual empirical beliefs generating a demand for services as patients tend to think that these will make or maintain them healthy.[13,18,19] Another argument is that PREMs reflect patient characteristics such as their age, sex or health status, which can be confounded with factors not directly associated with the quality of processes.[7,19]

However, a number of studies on hospital performance have found patient experience or satisfaction to be positively associated with hospitals' registered process measures under certain conditions.[8,11,15,20] According to the review article by Anhang Price et al.,[4] better patient experiences are associated with better clinical outcomes, patient safety, and patients' adherence to physician advice. Positive patient experiences appear to reduce unnecessary healthcare use[21] and inpatient complications.[15] Still, other studies reported a negative relationship between patient experience and mortality on the one hand and higher expenditures on the other.[22]

In contrast, PHC has received less scholarly attention. Again, while the evidence first seemed to suggest a lack of convergence between registered process measures and global ratings of care among specific groups of patients,[16] an increasing number of studies report significant associations between the two types of measures. Some studies consider the relationships between clinical quality and patients' experience,[23] productivity and patient satisfaction,[24] organizational characteristics of providers and patient satisfaction,[25] and quality and choice of doctor.[26] Recently, Glenngärd and Anell found that Swedish providers with satisfied patients also tend to successfully adhere to measures taken by the government to increase standardization.[2] In a different investigation, they found evidence of covariation between registered process measures and the PREMs of accessibility and continuity in primary care.[1]

This study considers the association between registered process measures and PREMs in primary care in the Spanish region of Catalonia. Spain is a decentralized state where regions have the authority to manage both hospitals and PHC. The Catalan Institute of Health (ICS) has developed the composite process measures of quality of assistance and quality of prescription. These two indices were created following the logic of standardization. Primary healthcare providers must adapt their practices to a variety of processes regarding health promotion, disease prevention, and the diagnosis and treatment of certain conditions that are significant to the government. In addition to these measures, health authorities collect two other process indicators that have been found to covariate with PREMs[1,19,27]: continuity of care (defined here as the extent to which patients are treated by the same doctor) and timely access to care services (defined as access to non-emergency care within 48 h of requesting an appointment).

These registered process measures can be used to assess performance across primary healthcare providers and to monitor management objectives. However, their association with PREMs is less well established. Our aim is to examine the association between these objective registered process measures and PREMs. The latter are collected by the Catalan Health Department every 2 years through a patient survey. Since continuity and timeliness can be observed by patients and are conceptually similar to some of the PREMs, we expect them to be positively associated. This is less likely for the quality-of-assistance and quality-of-prescription indicators.[28]

2 | METHODS

This study combines the registered process measures of primary care providers and PREMs with data about patients' individual characteristics and the socioeconomic condition of the larger area PHC centers serve. Catalan citizens are assigned to a Basic Area of Health, each with its own Primary Healthcare Center. Because the survey data included

the area identification of respondents, we were able to link patients' individual and area characteristics with the registered process measures of the primary healthcare centers to which they are assigned.

2.1 | Survey data

PREMs are collected through a survey administered by the Catalan health telephone service (061 CatSalut Respon) on behalf of the Catalan Health Service (CatSalut) every two years. The sample framework was drawn from the Catalan Central Registry of Insured Persons. All patients aged 15 or higher who had visited their usual primary healthcare center during the preceding twelve months were eligible for selection (*N* = 117,603). Random samples of approximately 350 users were extracted within each of the Basic Areas of Health with a target of at least 80 completed interviews from each area. Interviews were conducted by phone using CATI software.

The authors created a patients' experience of care index based on the 19 PREM items developed and regularly revised by the Catalan Health Service.[29,30] The items encompass the main dimensions of patient experience identified by the literature, including service accessibility, professional-patient interaction, communication, treatment, and support.[3,19,31] The wording of each of the items is included in the Appendix (Table A1). All items were measured using a 5-point Likert-type scale ranging from 1 to 5, labelled from "very poor" to "excellent" or from "never" to "always," depending on the item. The composite index shows a satisfactory degree of internal consistency with an estimated Cronbach's α of 0.90. The scale was recoded to range from 0 to 100, with higher values denoting a more positive experience of care. The complete survey data and documentation are publicly available.

2.2 | Registered process measures

We used two composite indicators (the quality of assistance index and the quality of prescription index) and two single indicators (the continuity of care index and the 48-h accessibility index) available to all primary health centers managed by the Catalan Health Service (*n* = 287). Restrictions apply to the availability of the data on registered process measures, even if these refer to PHC centers rather than individual patients. The data for the current study were provided by the Catalan Health Institute after obtaining the approval of the university ethics committee and the PADRIS program set by the Catalan administration for studies using patient data.

The quality-of-assistance index is a composite measure developed by the Catalan Health Institute. It reflects the guidelines and performance targets of the health system and provides a homogeneous standard for comparing PHC centers on their health promotion, health prevention, care of acute problems, and diagnosis and treatment functions.[32] It is based on sixty individual indicators, shown in Table A2 of the Appendix. Some of the indicators are linked to specific programs, such as the promotion of treating older people in their homes. Each measure is calculated from the data included in the patients' clinical histories. For each indicator, there is a measure for detection and a measure for resolution. Detection levels measure the expected prevalence correcting for age distribution, economic deprivation, and rurality. Resolution measures define minimum and maximum levels. The quality of assistance index ranges from 0 to 1000, with higher values indicating better quality of care.

The quality-of-prescription index, also developed by the Catalan Health Institute, measures the quality of the drugs prescribed by PHC doctors based on the use pattern considered to be the best therapeutic option for each disease (individual indicators are shown in Table A3 of the Appendix). This index is validated with data from clinical histories and correlates positively with the overall performance of primary health centers and negatively with the expenses generated by the system. Since 2003, it has been used as an incentive for primary health doctors to improve their prescribing by instilling a variable component to doctors' salaries based on improvements to the quality of the drugs they prescribe.[33] This index varies between 0 and 130, with higher values indicating better prescriptions of

drugs in primary care practice. Because it is less complex than the quality-of-assistance index, this process measure may be more easily perceived by patients and is hence more likely to correlate with PREMs.

In addition to these composite indices, we also used the common provider-of-care index, an indicator of continuity of care that measures the percentage of a patient's visits with a single doctor, and the 48-hour-accessibility index, which measures the percentage of patients who are visited within 48 h of requesting an appointment in non-emergency cases.

2.3 | Additional explanatory variables

In the multivariate models, we adjusted for the effect of additional patient-level and center-level characteristics that can be confounded with the effects of factors associated with the quality of processes.[31,34] As individual predictors, we included a series of demographic variables reported in the survey: sex, age, educational level, and self-perceived level of health (measured on a five-point scale ranging from "poor" to "excellent"). There is extensive literature showing that personal characteristics have an influence on satisfaction with public services. In health services research, age and the subjective perception of well-being are important determinants of patient satisfaction[11,34–39], and education can make a difference in the way patients live and report their care experiences.[38]

The socioeconomic status of the area covered by PHC centers may also impact on PREMs. Public primary health services in lower income areas tend to be more congested, and patient's experience of care could be affected by the time dedicated to each person and the level of knowledge that medical personnel have of the patients' histories.[40,41] We thus included a measure of the level of socioeconomic deprivation of the Basic Area of Health as an additional measure at the center level. This measure, according to the Catalan Health Service, is a composite index based on the indicators of age, employment, occupation, education, health, and rurality correlating to the areas' health needs and the centers' level of assistance pressure. The deprivation index ranges from 0 to 100, with higher values denoting more deprivation.

2.4 | Statistical analysis

After the exclusion of noneligible cases (those patients residing in areas assigned to centers not directly managed by the Catalan Health Service) and those with missing data on any of the explanatory variables, the final dataset included 22,567 patients and 284 areas/centers. No differences existed between eligible respondents and non-respondents in terms of age and sex.

We employed a two-fold analytical approach. First, we examined the association between each of the health centers' reported process measures and the average level of patient care experience in the Basic Health Area where the centers are located. To this end, we use the survey data to calculate the average rating for patient care experience within each area based on samples ranging from 77 to 80 respondents per area/center (mean = 79.5). The unit of analysis is thus the healthcare center and the Basic Area of Health it covers (n = 284). For each objective measure, we constructed a scatterplot of its relationship with the area's average level of care experience and used Pearson's correlation coefficient (r) to assess the strength of the bivariate linear association. Statistical significance was set at $p \leq 0.05$.

Next, we estimated a series of models to assess the adjusted effect of the four objective registered process measures using patients' ratings of their patient care experience at the patient (i.e., survey respondent) level. Due to the multilevel nature of the data (patients nested within healthcare centers/areas), we fitted hierarchical, random-intercept linear models. In this case, patients constitute the level-1 unit of analysis, whereas health areas/centers constitute the level-2. This approach allowed us to account for variations in patient care experiences at the individual level and to adjust for the potential effect of individual characteristics (e.g., sex, age, education, perceived

health) as well as other health area features (e.g., level of deprivation). We first estimated a baseline model including all patient-level variables and the area's socioeconomics. We then added each of the objective measures separately. A final model included all the process measures at the same time. We assessed the strength of associations based on the size and statistical significance of multilevel regression coefficients. This information was complemented with the models' Akaike Information Criterion and R-squared values, particularly the R-squared between areas/centers, which indicates the proportion of variance explained at level 2, at which the objective predictors are measured.[42] All analyses were conducted using STATA version 16.1.

3 | RESULTS

Table 1 shows the statistics for the patient sample and the health areas/centers. PREM ratings of PHC centers were moderately positive, with an overall average of 70.9 on the 0–100 scale. Self-perceived health was "good" or better for most of the sample (75%). Primary healthcare centers fare reasonably well in terms of the objective indices of overall quality of care, pharmaceutical prescription, and continuity of care but rather poorly in terms of the percentage of patients who are visited within 48 h of requesting an appointment (mean = 31.1%), although this variable has a positively skewed distribution with a substantial number of centers achieving much higher percentages.

Figure 1 displays the bivariate relationship between the primary health centers' four main registered process measures and the average care experience scores obtained using the PREMs for the corresponding areas. Several findings emerge from the analysis. First, while patient experience appears to be unrelated to the general quality-of-care index, it shows a positive and statistically significant correlation with the quality-of-prescription indicator. On the other hand, there is a stronger association of care experience with continuity of care by the same doctor and with the 48-hour-accessibility indicator. As expected, in both cases the correlation is positive and highly statistically significant, suggesting that continuity of care by the same doctor and timely accessibility substantially enhance patients' experience of care.

Table 2 presents the results of the multilevel models of individual perceptions of patients' care experience. Model 1 includes only the control variables, models 2 to 5 separately add each of the four objective registered process measures, and model 6 includes all four (composite indices and indicators) along with covariates. The results of the covariates are consistent across the models. Patient's care experience is positively related to patients' age, although we find that the age group with the most negative ratings is not the youngest but that between 25 and 34 years. Patient experience is significantly more negative among women than among men. Experience scores increase with educational level, respondents with more formal education evaluate their patient care experience more positively than respondents with no completed education. However, patients with a secondary education report a more positive experience than those with a primary education and those with post-secondary education. Care experience also increases with self-reported health status. These estimates indicate that individuals with an "excellent" self-perceived health evaluate their experience nearly 14 points higher than those reporting "poor" health. Finally, living in an area with higher a level of socioeconomic deprivation (and, hence, more assistance pressure) is significantly associated with decreased patient care experience.

Models 2 to 5 show that, when included separately, three of the four registered process measures are statistically significant predictors of patient care experience, after adjusting for individual factors and the deprivation level of Basic Health Areas. As suggested by the results of the aggregate analyses, patient experience levels are impervious to differences in the centers' overall quality of assistance as defined by the quality-of-assistance index (Model 2). However, experience scores are significantly associated with the quality of drug prescription (Model 3), continuity of care by the same doctor (Model 4), and patient accessibility to primary health services within 48 h (Model 5). However, only the coefficients for continuity of care and 48-h accessibility remain statistically significant when all predictors are included, as in Model 6. According to this model, a two standard deviation increase[43] in the centers' measures of continuity of care and 48-h accessibility cause an increase of 1.39 and 2.76 points, respectively, in

TABLE 1 Descriptive statistics for variables in the analysis.

Variable	Mean	SD	Min.	Q1	Median	Q3	Max.	n
Patient characteristics								
Experience of care (0–100)	70.9	15.0	0.0	61.8	72.4	81.6	100.0	22,567
Sex								22,567
Male (%)	49.0							22,567
Female (%)	51.0							22,567
Age								22,567
15–24 (%)	8.2							22,567
25–34 (%)	13.5							22,567
35–44 (%)	22.7							22,567
45–54 (%)	17.8							22,567
55–64 (%)	16.8							22,567
65+ (%)	21.0							22,567
Education								22,567
No education (%)	3.1							22,567
Primary (%)	26.8							22,567
Secondary (%)	35.4							22,567
Tertiary (%)	33.4							22,567
Other (%)	1.3							22,567
Perceived health								22,567
Poor (%)	3.6							22,567
Fair (%)	21.4							22,567
Good (%)	44.2							22,567
Very good (%)	21.9							22,567
Excellent (%)	8.9							22,567
Area/center characteristics								
Experience of care (avg. 0–100)	70,9	3,4	61,7	68,8	71,0	72,9	80,1	284
Area deprivation (0–100)	43.4	14.4	0.9	35.3	43.1	50.9	100.0	284
Quality of care (0–1000)	723.5	77.0	415.4	679.4	728.1	771.5	910.4	284
Quality of prescription (0–130)	81.2	18.1	25.0	71.0	82.0	94.0	130.0	284
Usual provider (0–100)	71.6	7.3	53.9	66.1	72.1	76.2	89.2	284
48 h accessibility (0–100)	31.1	20.3	2.6	18.0	25.3	36.7	98.6	284

patients' experience scores. Model 6 obtains the lowest AIC (indicating a better fit) and the highest level-2 R^2, (0.531). Compared to Model 1, this represents an increase of 37.3% points in the proportion of variance explained at the area/center level.

4 | DISCUSSION

The combined analysis of registered process measures and PREMs provides evidence that system guidelines and performance targets designed with the aim of creating incentives for PHC professionals to adjust their behavior to system goals, limit their autonomy, and focus on the system's objectives at the population level[2] reflect aspects of
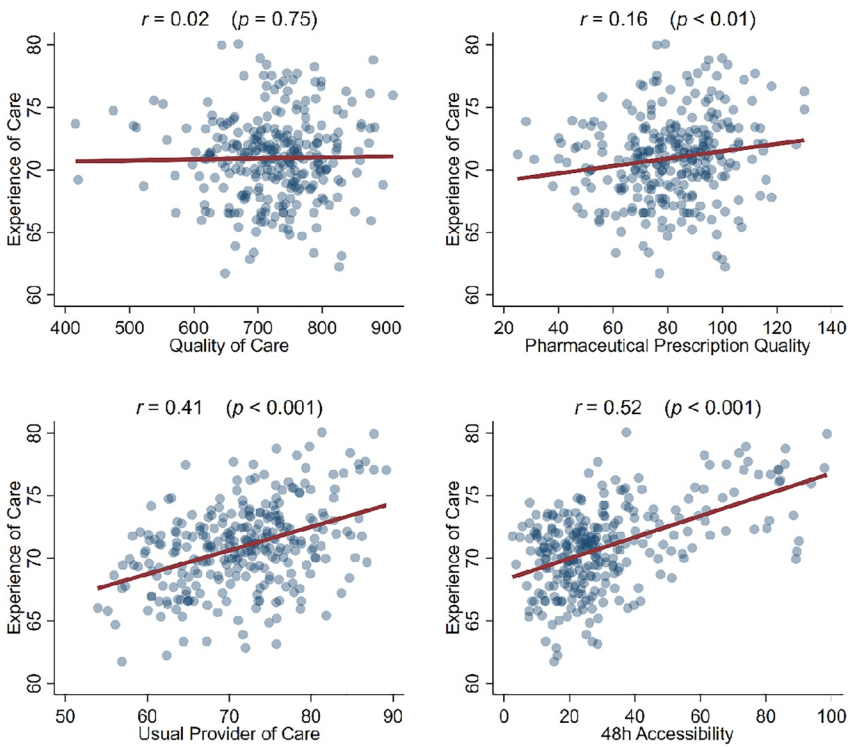
FIGURE 1 Relationship between centers' objective quality measures and average ratings of patient experience. [Colour figure can be viewed at wileyonlinelibrary.com]

healthcare that matter to patients. Additionally, patients form their PREMs in ways that correspond with some, but not all, of the measures that management uses to provide guidelines to professionals and communicate the ways they intend to achieve better quality in PHC.

These results provide strong evidence in support of a positive association between continuity of care and timely accessibility with patient experience of care.[1] Although these effects are relatively modest in size, the contribution of these two aspects of performance to patient experience is non-negligible (as compared to other predictors—e.g., the effect of sex falls roughly in between these two). Patients seem to be able to observe and capture the functional and most tangible aspects of the healthcare process at the primary care level.

This study did not find a strong relationship between PREMs and the two main composites of registered process measures designed to provide quality of assistance and quality of prescription. The quality-of-prescription index was positively and significantly associated with patient experience but only when included separately from the other registered process measures. The system guidelines are designed to induce primary health professionals to prescribe efficiently and well. Most patients have their own empirical beliefs about medicines[18] but have neither clinical knowledge nor training to judge the medicines they are prescribed or the changes to the medicines they are taking. However, these results show that patient experience can improve if patients understand the reasons why they are told to take a specific drug, the basic function of the drug prescribed and the consequences it may have on their health and living conditions.

The results ruled out an association between PREMs and the quality-of-assistance index, probably because this index is too broadly defined, includes both detection and resolution levels for too many specific conditions, and is too complex for most patients. At the level of the individual, it is unlikely that patient experience shows a strong association with a complex index system measuring overall quality of assistance.

This result is not contradictory with maintaining and developing both types of measures to improve understanding of the overall performance of PHC systems. Process measures are necessary for management, can be negotiated,

TABLE 2 Multilevel regression analysis of individual-level patient care experience.

	(1)	(2)	(3)	(4)	(5)	(6)
Fixed effects (coefficients)						
Patient characteristics						
Sex (female)	−2.040***	−2.040***	−2.040***	−2.038***	−2.030***	−2.029***
	(0.190)	(0.190)	(0.190)	(0.190)	(0.190)	(0.190)
Age (ref. = 15–24)						
25–34	−1.881***	−1.881***	−1.886***	−1.890***	−1.875***	−1.887***
	(0.421)	(0.421)	(0.421)	(0.421)	(0.420)	(0.420)
35–44	−0.582	−0.581	−0.583	−0.582	−0.592	−0.593
	(0.389)	(0.389)	(0.389)	(0.389)	(0.389)	(0.389)
45–54	1.893***	1.893***	1.893***	1.888***	1.886***	1.882***
	(0.408)	(0.408)	(0.408)	(0.408)	(0.408)	(0.408)
55–64	3.100***	3.100***	3.095***	3.093***	3.081***	3.073***
	(0.420)	(0.420)	(0.420)	(0.420)	(0.420)	(0.420)
65+	3.843***	3.845***	3.841***	3.828***	3.801***	3.789***
	(0.422)	(0.422)	(0.422)	(0.422)	(0.422)	(0.422)
Education (ref. = other)						
No education	−0.180	−0.182	−0.184	−0.175	−0.115	−0.118
	(0.989)	(0.989)	(0.989)	(0.988)	(0.988)	(0.988)
Primary	2.426**	2.424**	2.426**	2.397**	2.403**	2.387**
	(0.845)	(0.845)	(0.845)	(0.845)	(0.844)	(0.844)
Secondary	3.379***	3.378***	3.379***	3.351***	3.372***	3.354***
	(0.840)	(0.840)	(0.840)	(0.840)	(0.840)	(0.840)
Tertiary	2.876***	2.876***	2.877***	2.855***	2.888***	2.872***
	(0.844)	(0.844)	(0.844)	(0.843)	(0.843)	(0.843)
Health (ref. = poor)						
Fair	2.378***	2.379***	2.386***	2.354***	2.362***	2.351***
	(0.540)	(0.540)	(0.540)	(0.540)	(0.540)	(0.540)
Good	4.777***	4.777***	4.783***	4.747***	4.744***	4.730***
	(0.524)	(0.524)	(0.524)	(0.524)	(0.524)	(0.524)
Very good	10.302***	10.304***	10.303***	10.273***	10.266***	10.246***
	(0.553)	(0.553)	(0.553)	(0.553)	(0.552)	(0.552)
Excellent	13.784***	13.786***	13.787***	13.756***	13.762***	13.742***
	(0.602)	(0.602)	(0.602)	(0.602)	(0.602)	(0.601)
Area/center characteristics						
Deprivation	−0.035**	−0.036**	−0.035**	−0.019	−0.039***	−0.028*
	(0.013)	(0.013)	(0.013)	(0.012)	(0.011)	(0.011)
Quality of care		0.002				−0.002
		(0.002)				(0.002)

TABLE 2 (Continued)

	(1)	(2)	(3)	(4)	(5)	(6)
Quality of prescription			0.026**			0.017
			(0.010)			(0.009)
Usual provider				0.163***		0.096***
				(0.024)		(0.023)
48h accessibility					0.081***	0.068***
					(0.008)	(0.008)
Constant	63.329***	61.915***	61.164***	50.998***	61.001***	54.382***
	(1.192)	(2.092)	(1.450)	(2.172)	(1.172)	(2.433)
Random effects (variance components)						
Health areas/centers	7.167***	7.144***	6.941***	5.829***	4.454***	3.990***
	(0.814)	(0.812)	(0.795)	(0.701)	(0.586)	(0.547)
Patients	199.998***	199.998***	199.998***	199.998***	199.997***	199.998***
	(1.895)	(1.895)	(1.895)	(1.895)	(1.895)	(1.895)
Health areas/centers	284	284	284	284	284	284
N	22,567	22,567	22,567	22,567	22,567	22,567
Level-1 R^2	0.072	0.072	0.072	0.072	0.072	0.072
Level-2 R^2	0.158	0.161	0.185	0.316	0.477	0.531
AIC	184,028	184,029	184,023	183,988	183,937	183,923

Standard errors in parentheses.

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

and are automatically updated. PREMs are also necessary for management as they provide a patient perspective and align with one of the main goals of PHC: patient centeredness. However, they take more time to collect and depend on response rates, which vary with patient and area characteristics.[1] Their convergence with registered process measures is particularly interesting for health system administrators as these can ensure that process measures reflect aspects that matter to patients. When convergence does not occur, as in the case with the index to measure quality of assistance in the Catalan system, it likely denotes that the two types of measures are too distinct. In our case, the index includes a large number of very different conditions, including diagnostic and resolution items, which makes it unlikely to converge with average patient experience. Breaking down the index and asking patients about the diagnosis and treatment of specific diseases might help establish a stronger association between these types of measures.

The results largely confirmed previous studies' evidence about the how sociodemographic factors affect PREMs. The result for age was expected, as extant research shows that older people tend to be more benevolent in their judgment of public services, particularly when the services are perceived to be more important in their daily life and they do not pay for them.[35-38,44] The finding that female patients assess care experience more negatively than men is intriguing and deserves further research.[44] Women tend be more inclined to support public services,[45] but in the case of health services, their evaluations can be influenced by other factors. According to a recent survey, women are more likely than men to say a healthcare provider has dismissed their concerns or did not believe them or to have a negative experience because of their age, gender, or ethnicity[46]. We also found that satisfaction with care increased with education.[38] A higher level of education implies a better understanding of the system, which can be associated with a better experience of care. Regarding self-reported health status, better health was found to be associated with a more positive evaluation of the experience of care.[35,38,41] Results for education and self-reported health are in keeping with previous studies, although the evidence for these two measures is inconsistent within the literature.

Patient experience is also affected by contextual characteristics of the area where patients live and where PHC centers are located. In this study, patients living in less deprived areas were found to be more demanding when assessing their patient experience. The opposite was found in a Swedish study where higher social deprivation was associated with lower patient satisfaction.[2] In the Catalan context, residents from more affluent areas are more likely to combine public and private healthcare and may thus be more stringent in their judgments of the public services they receive.

5 | LIMITATIONS

One of the current study's limitations is the use of data from one specific region of Spain where the public health system is highly decentralized. Primary healthcare is structured around primary health centers staffed with public personnel (and a few exceptions of private or nonprofit providers). In organizations with public personnel, it may be easier to impose performance targets. Similar European health systems rely more heavily on private doctors for PHC. It is therefore possible that our results will differ from those for other health systems. Another limitation concerns the registered process measures used in our study. The analysis was based on two indexes that are specific to the Catalan administration even if they are similar to the ones used in other European countries. A parallel argument can be made regarding the socio-economic index used to provide contextual data about the health areas where primary health centers are located, which is also specific of the observed system.

6 | CONCLUSIONS

This study provides further evidence supporting the claim that registered process measures and PREMs at the primary healthcare level are not entirely separate worlds. Registered process measures reflect system demands just as PREMs have an inherently subjective dimension that is highly dependent on personal characteristics and previous experiences with health care services. However, there are areas (including continuity and accessibility of care) where objective and subjective measures are conceptually similar to each other; hence demands from management appear to align with patient expectations, reflected in their observations of the health care they receive. In other, more conceptually distant dimensions, setting goals and targets to create incentives for doctors to act according to prede-fined care processes have the potential to improve the quality of assistance and prescriptions but are not as clearly reflected in PREMs. For these types of measures to influence patient experience, the explanations given by doctors to patients concerning both procedures and prescriptions are probably a key factor that requires more research. For surveys to reflect the guidelines that the system establishes for professionals, they need to change their focus and collect more detailed information about the diagnosis and treatment of specific conditions.

DATA AVAILABILITY STATEMENT

The survey data that support the findings of this study is publicly available. Data on registered process measures may be requested to the authors but is subject to the authorization of ICS (Institut Català de la Salut) who allowed its use for this study.

ETHICS STATEMENT

Not applicable.

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APPENDIX

TABLE A1 Experience of care dimensions and items from the survey.

Experience of care dimensions[3,23,34]		Survey item	Response scale (5-point)
Accessibility	Got an appointment as soon as you needed it	Q2. How easy to arrange a visit on a date that suits you	"Excellent" to "very poor"
	Got an answer when you had a question	Q18. How was the attention when you had an urgent matter	"Excellent" to "very poor"
	Time the doctor came in the exam room	Q3. Punctuality to enter in the room for the visit with the doctor	"Excellent" to "very poor"
Interaction-communication	Spend enough time	Q6. Time the doctor spends on you	"Excellent" to "very poor"
	Explain things	Q9. The doctor provides you the information you need	"Always" to "never"
		Q10. You understand the information	"Always" to "never"
	Listen carefully, got an answer when you had a question	Q7. Predisposition to listen and to take charge of what worries you	"Excellent" to "very poor"
		Q8. Predisposition to wait for your opinion	"Excellent" to "very poor"
		Q13. Nurse's predisposition to listen and take charge	"Excellent" to "very poor"
	Clinical team interaction	Q16. The information provided by different professionals is coherent	"Always" to "never"
		Q17. When other doctors visit you, they have information about what they did to you before	"Always" to "never"

(Continues)

TABLE A1 (Continued)

Experience of care dimensions[3,23,34]		Survey item	Response scale (5-point)
Treatment –Support	Treat you with courtesy	Q12. Treatment (doctor)	"Excellent" to "very poor"
		Q14. Treatment (nurse)	"Excellent" to "very poor"
		Q19. Treatment, kindness (reception personnel)	"Excellent" to "very poor"
	Professionals' caring and concern for you	Q11. Feeling to be in good hands (doctor)	"Always" to "never"
		Q13. Feeling to be in good hands (nurse)	"Always" to "never"
		Q20. The visit(s) allowed you to take charge of your health	"Excellent" to "very poor"
	Premises	Q5. Cleanness	"Excellent" to "very poor"
		Q4. Noise in the waiting room	"None" to "too much"

Note: The survey data and documentation are openly available at https://ceo.gencat.cat/es/estudis/registre-estudis-dopinio/estudis-de-la-generalitat/detall/index.html?id=7091.

TABLE A2 Quality of assistance index.

EQAG01 - Cardiovascular disease	**EQAG08 - Preventive activities**
- EQA0201 - Adequate treatment of atrial fibrillation	- EQA0301 - Alcohol consumption screening
- EQA0202 - Good control of treatment with anticoagulants	- EQA0302 - Reduction of alcohol consumption in high-risk drinkers
- EQA0203 - Antiaggregating treatment in IC/CVA	- EQA0303 - Weight reduction in obesity and overweight
- EQA0204 - LDL control in IC/CVA	- EQA0304 - Abstainers in a population at risk
- EQA0205 - AT control in IC/CVA	- EQA0305 - Smoking cessation
- EQA0206 - Treatment with beta-blockers of IC/hart failure	- EQA0306 - Improvement of physical activity in insufficiently active patients with CVRF
- EQA0207 - Treatment with ACEI or ARAII in CHF and in hypertension or DM with nephropathy (two sub-indicators)	- EQD0313 - Diagnostic adequacy of obesity (2 sub-indicators)
- EQD0238 - Diagnostic adequacy of cardiovascular disease (three sub-indicators)	
EQAG02 - Diabetes mellitus type 2	**EQAG09—Vaccinations**
- EQA0208 - DM2: Diabetic foot screening	- EQA0308 - Pneumococcal vaccination coverage for over 64 years old
- EQA0209 - DM2: HbA1C control	- EQA0309 - Tetanus vaccination coverage for over 39 years old
- EQA0210 - DM2: Retinopathy screening	- EQA0310 - HCV: anti-VBH and anti-VAH vaccination
- EQA0212 - AT control in DM	- EQA0312 - Triple viral vaccination in adults
- EQD0239 - Quality of DM2 diagnosis (three sub-indicators)	- EQA0501 - Influenza vaccination in over 59s
	- EQA0502 - Influenza vaccination risk population
EQAG03 - Arterial hypertension	**EQAG10—ATDOM (attention at home)**
- EQA0213 - AH: AT control	- EQA0401 - Comprehensive assessment of people in ATDOM
- EQA0235 - AH: AT control in patients with CRF	- EQA0402 - Assessment of the risk of pressure ulcers in ATDOM population
- EQD0240 - Diagnostic adequacy of hypertension	- EQA0403 - Achieving a safe environment at home in ATDOM population
	- EQA0404 - Caregiver overload of ATDOM patients

T A B L E A 2 (Continued)

EQAG04—Dyslipidemia	EQAG11 - Social assessment
- EQA0214 - LDL control in patients with high CVR - EQA0215 - Dyslipidemia: Calculation of CVR (35-74a) - EQD0241 - Diagnostic adequacy of hypercholesterolemia	- EQA0406 - Social assessment of dependent people - EQA0407 - Social assessment in frail elderly
EQAG05 - Chronic respiratory obstruction	EQAG12 - Quaternary prevention
- EQA0220 - Verification of inhalers - EQD0242 - Diagnostic adequacy of respiratory disease (5 sub-indicators)	- EQA0216 - Low CVR with wrongly indicated lipid-lowering agents - EQA0217 - New wrongly indicated statins - EQA0222 - Inadequacy of the prevention of gastropathy with PPIs - EQA0224 - Correct treatment of asymptomatic hyperuricemia - EQA0228—Wrongly indicated treatment in osteoporosis with low risk of fracture - EQA0229 - Adequacy of treatment in acute gastroenteritis - EQA0232 - Adequacy of the treatment of acute bronchitis, CVA and flu - EQA0238 - Persistence of wrongly indicated statins - EQA0239 - Incorrect use of PSA in over 70s - EQA0313 - Incorrect use of PSA - EQA0314 - Excessive metabolic control DM2 in an aging population
EQAG06 - acute pathology	EQAG19—Dentistry
- EQA0223 - Correct treatment of nephritic colic - EQA0226 - Adequacy of treatment in acute tonsillitis - EQA0230 - Appropriate treatment of urinary tract infections - EQA0231 - Adequacy of the treatment of non-suppurative acute otitis	- EQA0601 - Oral examination in diabetic patients - EQA0602 - Oral examination in DM2 with poor glycemic control
EQAG07 - other health problems	
- EQA0219 - Monitoring of new cases of iron deficiency anemia - EQA0227 - Good control of hypothyroidism - EQD0247 - diagnostic adequacy of other health problems (8 sub-indicators)	

Note: Restrictions apply to the availability of the raw data, which were used under license for this study. Data are available from the authors with the permission of Catalan Health Institute. The classification of indicators is available at http://pressupostos.camfic.cat/DemoECAP/umi_1/sisap-umi.eines.portalics/index.html.

T A B L E A 3 Quality of prescription index.

Use of antibiotics (AB)	Use of drugs for respiratory pathology (asthma and COPD)
- IF419 - DHD of antibiotics - IF421 - % Amoxicillin + clavulanic/total penicillin - IF423 - % recommended drugs/AB	- IF427 - % recommended drugs/asthma and COPD
Use of urinary antispasmodics	Use of medicines for osteoporosis
- IF447 - DHD urinary antispasmodics - IF449 - % recommended drugs/urinary antispasmodics	- IF415 - DHD Medicines osteoporosis - IF417 - % recommended drugs/total osteoporosis drugs
Use of hypnotic anxiolytics (ANSH)	Use of medicines for musculoskeletal pathology
- IF435 - DHD of hypnotic anxiolytics (HANS) - IF437 - % recommended drugs/HANS	- IF409 - DHD nonsteroidal anti-inflammatory drugs (NSAIDs) - IF411 - % recommended drugs/NSAIDs - IF413 - DHD Chondroprotectors

TABLE A3 (Continued)

Use of antidepressants (DEPRE)	Use of antiulcer drugs (ULC)
- IF429 - DHD of antidepressants	- IF405 - DHD of antiulcer drugs
- IF431 - % recommended drugs/DEPRE	- IF407 - % PPI recommended/total PPI
- IF433 - % recommended second-line drugs	
Use of antidiabetics	Use of antihypertensives (AHT)
- IF439 - % alternative antidiabetics to SULFONYLUREES RECOM/DIABO	- IF399 - % IUD alone or associated with recommended/AHT
- IF441 - % recommended drugs/oral antidiabetics	- IF401 - % ARAII/(IECA + ARAII)
- IF443 - % Recommended basal insulins	- IF403 - % recommended drugs/AHT
Use of drugs for Benign Prostatic Hyperplasia (BPH)	Global indicators
- IF445 - % recommended drugs/BPH	- IF455 - Follow up PHF recommendations - APC (annual)
	- IF457 - Following recommendations of the PHF - APC
Use of hypolipidemic agents (HIPO)	
- IF425 - % recommended drugs/lipid-lowering agents	

Note: Restrictions apply to the availability of the raw data, which were used under license for this study. Data are available from the authors with the permission of Catalan Health Institute. The classification of indicators is available at http://pressupostos.camfic.cat/DemoECAP/umi_1/sisap-umi.eines.portalics/index.html.