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Patient-Reported Outcomes

Enhancing Patient Response to Patient-Reported Outcome Measures: Insights From a Leading Dutch University Hospital

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ABSTRACT

Objectives: Engaging patients with patient-reported outcome measures (PROMs) is a widely recognized and pressing challenge, yet our understanding of how to achieve this is limited. This study investigated strategies implemented by a Dutch university hospital aimed at enhancing response rates among outpatients from nearly 70 subdepartments. Response rates improved, but remained below desired levels. To deepen understanding and inform future strategies, we identified patient and consultation characteristics associated with response behavior.

Methods: We investigated strategies and their underlying rationales through a document analysis of internal hospital documentation (2020–2023) using the COM-B model. We exploited electronic health record data to identify patient and consultation characteristics associated with PROMs completion, estimating a multivariate logistic regression model ($n = 46\,468$ outpatient consultations).

Results: Thirteen strategies targeted outpatients' capability, opportunity, and motivation to complete PROMs. In 2023, PROMs were completed in more than half of the 46 468 unique consultations (56%) for which a PROM was sent. Challenges persisted in establishing effective feedback mechanisms and accommodating non-Dutch-speaking patients. The multivariate analysis showed a significantly higher response among patients of high or middle socioeconomic status and those with an in-person consultation, ie, not using telehealth. Women, patients attending a follow-up visit, or those having their consultation on a Friday were slightly less likely to complete PROMs.

Conclusions: Response rates to PROMs improved but remained below desired levels, despite multiple strategies. Hospitals may benefit from effective patient feedback on PROMs and tailoring strategies to engage specific patient groups. These approaches can enhance successful implementation and promote equity in value-based healthcare.

Keywords: patient-reported outcome measure, response, implementation, strategy, value-based healthcare.

VALUE HEALTH. 2024; ■(■):■-■

Highlights

- Achieving high response rates to patient-reported outcome measures (PROMs) is a widely recognized and pressing challenge, yet understanding of how to accomplish this is limited. A leading Dutch university hospital aimed to enhance response rates by targeting patients' capability, opportunity, and motivation.
- Response rates were higher among patients of high or middle socioeconomic status and those with an in-person consultation, ie, not using telehealth. Women and patients attending a follow-up visit were slightly less likely to complete PROMs.
- Hospitals may benefit from establishing patient feedback mechanisms for PROMs and tailoring strategies to engage specific patient groups, thereby promoting equity in value-based healthcare.

Introduction

Value-based healthcare (VBHC) gained interest in healthcare systems worldwide, driven by the imperative to optimize value in patient care.^{1,2} Patient value is high when the outcomes that matter most to a patient are achieved effectively and efficiently relative to the costs involved.^{1,2} In addition, societal value and equity are increasingly emphasized in VBHC.³ Patient-reported outcome measures (PROMs) gained significant interest for measuring outcomes from the perspective of patients,⁴⁻⁷ as a crucial component for VBHC.⁸ PROMs are tools that enable patients to assess their functional status and well-being, often through an online survey.⁹ At the individual patient level, PROMs may contribute to patient understanding and their involvement in self-care, symptom monitoring, and tailored care delivery.^{10,11} Aggregated PROMs data can be used to evaluate and improve

care.^{10,12} However, patient response rates to PROMs have been suboptimal across various settings, thereby limiting the full potential utility of PROMs in enhancing value in patient care.¹²⁻¹⁸ These low response rates hinder clinicians' decision making, introduce bias in analyzing aggregated PROMs data, and pose a risk of diminishing stakeholder buy-in for sustaining PROMs. Therefore, efforts are urgently needed to improve response rates.^{13,17}

Although various factors have been identified that influence PROMs completion,^{16,19,20} such as the method of PROM delivery,¹⁸ limited attention has been given to studying strategies aimed at enhancing response rates, despite recognition of this as a critical next step.^{21,22} Thus far, studies reporting on PROMs implementation in VBHC were predominantly health condition specific, lacking hospital-wide insights.^{16,23} Recently, however, centers reported on their PROMs implementation strategy.^{24,25} Moreover,

many studies considered in-clinic patients or specific time points, such as admission or discharge, with a minority of studies focusing on the use of electronic PROMs for routine outpatient care.^{16,23} Research into patient response to PROMs for purposes such as registries has identified associations with various explanatory variables, including socioeconomic status (SES),²⁶ language and disease severity,²⁶⁻²⁸ and having a follow-up consultation.²⁸ The variables sex and age yielded inconsistent results across studies,²⁶⁻²⁸ underscoring the need for hospitals to conduct local investigations.

Motivated by the widely acknowledged and urgent challenges in achieving high PROMs response rates, along with the limited insight into how to accomplish this, this study aimed to investigate the efforts of a leading Dutch university hospital to enhance PROMs completion among outpatients of nearly 70 specialty subdepartments. Although response rates showed a notable increase between 2021 and the end of 2023, they remained below desired levels. By the latter year, PROMs were completed in more than half of the 46 468 unique consultations (56%) for which a PROM was sent. In this study, we investigated the strategies implemented by the hospital aimed at enhancing response rates. Furthermore, we analyzed patient and consultation characteristics associated with PROMs response to inform potential future strategies aimed at further enhancing response rates.

The Setting

This study was conducted at one of the largest Dutch university hospitals, seeing nearly 200 000 unique patients annually. Almost a decade ago, the first specialty subdepartments began inquiring PROMs among their outpatients using electronic surveys,²⁹⁻³² with the objective of advancing VBHC by discussing outcomes during patients' consultations.³³⁻³⁵ Subsequently, additional subdepartments continued to join in a stepwise approach, facilitated by a central support team, leading to a steady increase in the number of outpatients receiving PROMs. In 2023, PROMs were sent to outpatients from 68 subdepartments, covering approximately 17% of the entire outpatient population.

Process of Using PROMs

Patients received the request to complete one or multiple electronic PROMs 1 week before their specialty outpatient consultations via email (see Fig. 1, left). The hospital used different PROM tools across 3 tiers: generic, domain specific, and disease specific (see Fig. 1, right). Patients were able to complete each survey separately (ie, ranging from 1 to 3 surveys) by logging into a secure patient portal.

Methods

Two distinct yet complementary methods were used to comprehensively understand the challenges associated with enhancing patient response to PROMs and how these could be addressed. First, we qualitatively analyzed internal documentation on PROMs implementation from 2020 to 2023. This aimed to investigate strategies that the hospital implemented and their underlying rationales, providing insight into why specific strategies were or were not used. Second, given persistent limitations in patients' response rates, we estimated a multivariate logistic regression analysis using patients' PROMs completion data and electronic health record (EHR) data. This analysis aimed to identify patient and consult characteristics associated with PROMs completion. Although the first step aimed to provide actionable insights into possible strategies, the second angle was anticipated to yield insights that may guide future strategies, enabling the

development of a more effective set of strategies to support patients.

Internal Documentation

Data collection and inclusion

Author V.v.E. obtained access to the digital workspace from the central support team, containing 8984 files. This team facilitated and oversaw the implementation of PROMs. To identify documents on hospital-level strategies, their underlying rationales, and unaddressed barriers, the following keywords were used to systematically discern potentially relevant files: "response," "compliance," "evaluation," "barrier," "facilitator," "challenge," "plan," "intervention," and "strategy." Files were screened and included if they were either contributing new strategies that the hospital implemented to enhance response rates or they reported factors associated with outpatients' response behavior to PROMs. These data were extracted. If files referred to other files, these were also screened in the analysis. This resulted in data extraction from 10 documents. The list of extracted strategies was reviewed with a member of the central support team to distinguish between strategies successfully implemented and sustained and those that were not, accompanied by an inquiry into the underlying reasons.

Data analysis

We first mapped the extracted strategies onto the COM-B model as part of the Behavior Change Wheel.³⁹ COM-B identifies "capability," "opportunity," and "motivation" as essential conditions for achieving the desired behavior. Strategies were categorized according to the specific construct they appeared to target. Barriers to PROMs response that remained unaddressed were labeled as "unsolved barriers." Subsequently, we matched the hospital's strategies to the 9 intervention functions as stated in the Behaviour Change Wheel (education, persuasion, incentivization, coercion, training, restriction, environmental restructuring, modeling, enablement).³⁹

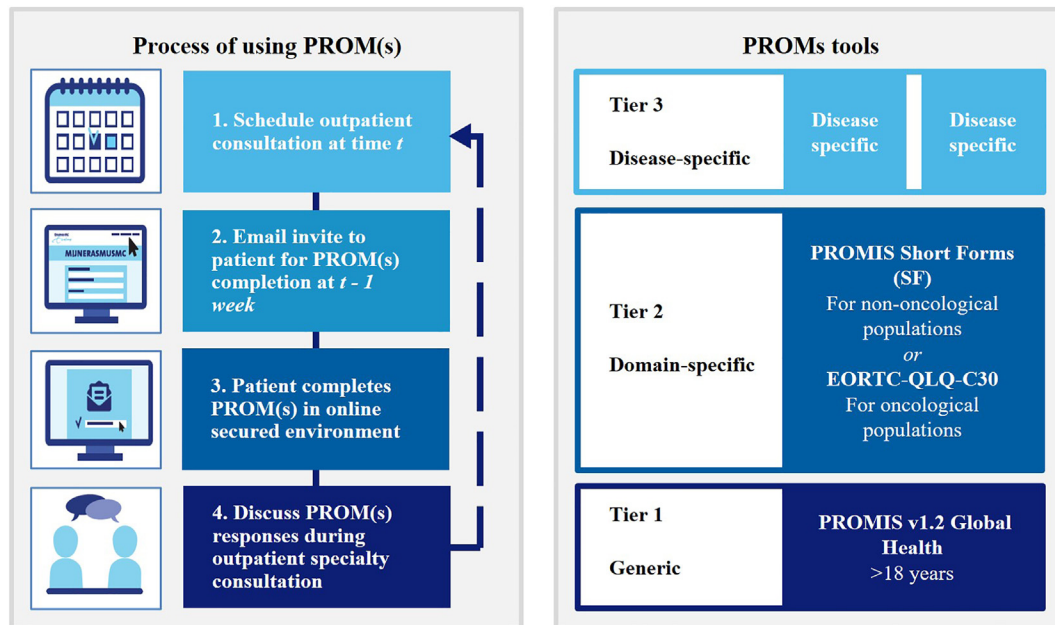
PROMs Completion and EHR Data

Data collection and preparation

PROMs response data to generic and domain-specific PROMs ($n = 53\,992$ consultations) were retrieved from December 1, 2022, to November 30, 2023, along with deidentified patient information from the EHR. Data were merged based on patient identification and consultation number. Subsequently, we used the latest available postal code area SES data from Statistics Netherlands (data set 2021, including students)⁴⁰ and merged these data using the first 4 digits of a patient's home address. We split patients' SES scores into tertiles reflecting *high*, *middle*, and *low* SES.

We excluded consultations involving pediatrics and those for which SES data could not be obtained due to patients living abroad (see Fig. 2).⁴⁰ This led us to include 28 588 unique patients, with 46 468 outpatient consultations and 76 647 sent PROMs. The higher number of outpatient consultations and sent PROMs than the unique patient count was due to some patients having multiple outpatient visits throughout the study period, each associated with one or several PROMs. Differentiating by PROM instrument, the generic PROMIS v1.2 Global Health was sent for 43 452 outpatient consultations, the domain-specific nononcological PROMIS Short-Forms (SF) for 13 715 consultations, and the oncology-specific European Organisation for Research and Treatment of Cancer (EORTC) Core Quality of Life questionnaire computer adaptive testing (CAT) for 19 480 consultations (see Results, Table 1).

Figure 1. Process of PROMs completion (left) and the 3 tiers of PROMs (right). For the generic tier, the hospital used the tool PROMIS v1.2 Global Health.³⁶ Within the domain-specific tier, PROMIS Short-Forms (SF)³⁷ were used among the nononcological population, all including v2.0 Physical function 4a, v1.0 Anxiety 4a, v1.0 Depression 4a, v1.0 Fatigue 4a, v1.1 Pain interference 4a, v1.0 Sleep disturbance 4a, and v1.0 Satisfaction with participation in social roles 4a. The EORTC QLQ-C30 CAT³⁸ was used for the oncological population. Subdepartments could select additional disease-specific PROMs.



CAT indicates computer adaptive testing; EORTC, European Organisation for Research and Treatment of Cancer; PROM, patient-reported outcome measure; QLQ-C30, Core Quality of Life questionnaire.

Multivariate logistic regression

We estimated a multivariate logistic regression of the binary outcome y_{cp} , "PROM completed," where 1 indicated completion of at least one of the received PROMs for a specific consultation and 0 indicated noncompletion. The same regression equation was separately estimated for 4 additional outcomes of interest y_{cp} : "all PROMs completed," which was coded as 1 if all PROMs for a specific consultation were completed and 0 otherwise, as well as the separate surveys "PROMIS v1.2 Global Health completed,"

"PROMIS SF completed," and "EORTC completed." The content of the PROMIS SF is described in Figure 1.

$$y_{cp} = P_p + C_c + \varepsilon_{cp}$$

We included 3 patient-specific (P_p) variables, *female*, *age*, and *SES high/SES middle/SES low*, and 5 consultation-specific (C_c) variables, *consultation took place*, *teleconsultation*, *follow-up*, *Monday/midweek/Friday*, and *morning/afternoon*. ε_{cp} represented the error term.

Figure 2. Sample selection.

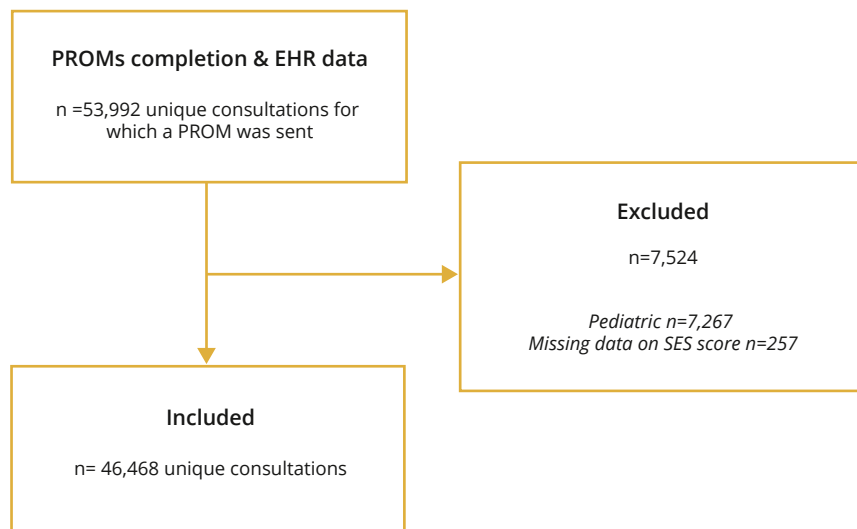


Table 1. Thirteen strategies aimed at enhancing PROMs response through enhancing patients' capability, opportunity, and motivation and 3 unsolved barriers.

Category	Enhancing capability	Enhancing opportunity	Enhancing motivation
Implemented strategies (intervention function)	1.1. Invitation to complete the PROM(s) (education) 1.2. Animated video instructions (education) 1.3 Assisted completion – training function (training) 1.4 Reminders (enablement)	2.1 Alternative log-in code (enablement) 2.2 Phone application (environmental restructuring) 2.3 Assisted completion – enablement function (enablement) 2.4 English translations (enablement)	3.1 Education on purpose and benefits (education; persuasion; incentivization) 3.2 Disease-specific PROMs (other: adapt the innovation) 3.3. Feedback on PROM responses (education; persuasion) 3.4. Asking nonresponders to respond (education; persuasion) 3.5 Minimal survey burden (other: adapt the innovation)
Unsolved barriers		Non-Dutch-speaking patients	Perceived inappropriateness for one's consultation Previous negative experiences

PROM indicates patient-reported outcome measure.

We included the variables *female*, *age*, *SES (high/middle/low)*, and *follow-up* based on previous research.^{26-28,41} These studies revealed varying relationships between gender and PROMs response rates: showing higher nonresponse rates among men²⁶ and women,²⁷ whereas others found no significant relationship.²⁸ Nonresponse was associated with both patients younger than 55 years²⁶ and older patients.^{27,28} Higher SES was associated with higher PROMs response rates.⁴¹ In addition, new patients were more likely to respond than follow-up patients.²⁸ The type of PROM tool did not significantly influence response rates.²⁸

The inclusion of *Monday/midweek/Friday* and *morning/afternoon* was inspired by a study suggesting that the dimension time might affect PROMs response rates, although this study focused on the timing of sending PROMs.⁴² Our qualitative findings identified *teleconsultation* as a potentially relevant variable. Patients often perceived this type of consultation as less conducive to discussing PROMs, which they verbally linked to nonresponse behavior (see Results). We also considered whether the *consultation took place*, anticipating that patients might be less likely to complete PROMs if their outpatient visit did not occur as scheduled.

Consultation took place was coded as 0 when the consultation was canceled or rescheduled by either patient or provider. *Teleconsultation* was coded as 1 if the consultation description in the EHR included “telephone,” “video,” or “e-mail,” as opposed to no such distinction. *Follow-up* was coded as 1 if the healthcare professional identified the consultation as pertaining to a “control patient” in the EHR, as opposed to “new patient.” The 2 remaining consultation-specific variables reflected whether the consultation was planned for a *Monday*, the 3 days in the middle of the week (*midweek*) or the *Friday*, and in the *morning* or the *afternoon*.

Results

Implemented Strategies and Their Rationales

The hospital implemented 13 core strategies to address nonresponse, informed by several patient evaluations. These strategies, organized according to their focus on enhancing patients' capability, opportunity, or motivation, are presented in Table 1.³⁹ The strategies related to 6 of 9 intervention functions: education, training, enablement, environmental restructuring, incentivization, and persuasion.³⁹ The intervention functions not

identified were coercion, restriction, and modeling.⁴³ Three unresolved barriers remained concerning patients' opportunity and motivation.

Enhancing capability

The hospital implemented 4 strategies aimed at ensuring patients possessed the necessary knowledge, skills, and attention to complete PROMs. Strategy 1.1 supported patients in understanding that they needed to complete PROMs. Strategies 1.2 and 1.3 aimed to support patients in acquiring the knowledge and skills required to access and complete PROMs, addressing barriers such as limited procedural knowledge and digital proficiency. Strategies 1.4 focused on enhancing patients' memory and attention, addressing the barrier of patients forgetting to complete PROMs. In addition, some patients mistakenly assumed they had already completed the PROM, “likely due to confusion with other hospital surveys like the COVID-19 symptom checklist” (internal document dated September 16, 2021).

Strategy 1.1: invitation to complete the PROM(s). Patients received appointment letters mentioning that they will receive an invitation to complete the PROM(s) 1 week before their consultation; see also strategy 3.1. In 2022, messages were “expanded to include specific appointment dates and clinic locations to clarify for which appointment the PROM was required” (internal document dated July 14, 2022).

Strategy 1.2: animated video instructions. An animated video was created to guide patients through the PROM completion procedure, up to the point where they discuss their responses with the clinician. However, the 2021 evaluation revealed that most PROM responders did not watch the video, because they did not open the attached flyer containing the video link in the email. They found the email instructions clear enough. Among the patients who did watch the video, almost all found it helpful.

Strategy 1.3: assisted completion—training function. In-hospital PROM completion assistance was initially provided using volunteers with tablets in local waiting rooms, fostering patients' skills for subsequent independent completion. As PROMs became more widespread, a central service center was established, dedicated to assisting patients with PROM completion. However, due to limited use, this service was

integrated into the more generic “Patient Service Center.” This center also handled requests via email or phone, monitoring and intervening on frequently posed questions.

The use of in-hospital completion service was monitored, showing that between July 1, 2020, and October 10, 2023, approximately 6% of initial nonresponders effectively used this service to complete their PROM. Over the years, this percentage decreased whereas overall response rates increased, signifying a trend toward more patients completing PROMs independently without the use of this service. The reduced use of the phone/email helpdesk also suggested a declining need for assistance. The shift to more PROMs completions outside the hospital seemed beneficial as in-hospital completion presented 2 key limitations. First, some patients experienced discomfort completing their PROMs in the hospital due to time pressure from their upcoming consultation and general stress. Second, in-hospital completion posed challenges in providing clinicians timely access to patients’ PROM outcomes for use in their consultation preparations.

Strategy 1.4: reminders. Automated email reminders were sent to nonresponders 3 days before their appointment, including weekends. The hospital considered using digital posters in waiting rooms as additional prompts but decided against it because waiting rooms accommodated patients from various disciplines, some of which did not yet use PROMs.

In addition, medical students piloted phone call reminders to nonresponders 1 day before their consultation, after the success of local secretaries in this role, because some patients overlooked email reminders. Although this increased response rates, this practice was discontinued primarily due to high costs. Moreover, some patients expressed discomfort with receiving unsolicited phone calls, feeling that the hospital was exerting pressure on them to complete the PROMs.

Enhancing opportunity

Four strategies aimed to ensure that patients experienced no external barriers to PROMs completion, yet 1 barrier remained insufficiently unaddressed. Strategies 2.1 and 2.2 aimed to enhance access to PROMs, among others addressing the issue of patients unable to log in to the secured web-based patient portal where the PROM could be accessed due to missing or forgotten national digital identification. Strategy 2.3 involved the assisted completion service (strategy 1.3), shifting its focus from training to enablement. Strategy 2.4 aimed to provide patients who speak English but not Dutch the opportunity to complete PROMs.

Strategy 2.1: alternative log-in code. Nonresponders checking in at the hospital kiosk on the day of their consultation received a temporary code to access their PROM, eliminating the need for their digital identification. They could complete their PROM using this code at the Patient Service Center (see strategy 1.3).

Strategy 2.2: phone application. Efforts were made to integrate PROM surveys into an upcoming phone application, aiming to improve ease and accessibility: “Filling out the questionnaire on a phone is more accessible than using a PC or tablet. Therefore, the development of this app is expected to have a positive effect on compliance” (internal document dated July 14, 2022).

Strategy 2.3: assisted completion—enablement function. The in-hospital assistance (see strategy 1.3) enabled PROM completion among patients without computer or phone

access, as well as those with visual or manual impairments. Although support from patients’ relatives could potentially aid in their PROM completion, concerns were raised regarding the impact of the relative’s presence on the accuracy of their answers.

Strategy 2.4: English translations. Volunteers in several waiting rooms assisted patients who spoke English but not Dutch by providing printed copies of the official English version of the PROMIS v1.2 Global Health survey, alongside the official Dutch online version. Volunteers were trained to assist English-speaking patients in completing the Dutch PROM using this side-by-side comparison.

Unsolved barrier. Limited options were available for non-Dutch-speaking patients given that PROMs were only available in Dutch due to limitations in the EHR: “It is desirable to have the PROMs surveys and related information available in different languages. Unfortunately, [name EHR provider] does not yet support this capability. We remain vigilant in exploring opportunities as they arise” (internal document dated July 14, 2022). Strategy 2.4 provided partial but not comprehensive support for non-Dutch-speaking patients, and its usage declined further with the move to the more generic “Patient Service Center,” where this service was not available (see strategy 1.3).

Enhancing motivation

Five strategies were implemented to encourage patients to complete their PROMs. Strategy 3.1 aimed to clarify the purposes and benefits of PROMs. Initially communication to patients was unclear and generic, with messages such as “you have a task to be completed” (internal document dated May 21, 2022). Strategies 3.2 and 3.3 aimed to tackle the barrier of patients perceiving limited benefit from completing PROMs or experiencing mismatches with their expectations. For example, patients expected their responses to be discussed during consultations, yet all the hospital’s patient and research evaluations showed limitations in this area.⁴⁴ In strategy 3.4 focused on motivating nonresponders. Strategy 3.5 focused on issues stemming from survey length and overall survey fatigue: “The burden is too high; too many questionnaires and other forms need to be filled out” (internal document dated July 14, 2022).

Strategy 3.1: education on purpose and benefits of PROMs. Patient communication about PROMs emphasized that the survey helps them prepare for their consultation and express their priorities. The message intentionally did not promise that their responses will be acknowledged and discussed by their clinician to prevent disappointment from unmet expectations. Patients were directed to a webpage available in Dutch and English for more information.^{45,46} The Dutch webpage also included a movie featuring clinicians explaining the relevance of VBHC and the use of PROMs, along with a patient testimonial.

Strategy 3.2: integration of disease-specific PROMs. To enhance patients’ perceived relevance of PROMs and address concerns that “some patients felt that the survey content did not align with their specific illness or condition; the questions were perceived as too general” (internal document dated August 28, 2021), subdepartments were enabled to include disease-specific PROMs, next to generic and domain-specific PROMs.

Strategy 3.3: feedback on PROM responses. Clinicians were supported and encouraged to inform patients that they had reviewed their responses and to discuss these responses generally,

as well as to explore specific items in-depth if needed. Based on the June 2023 evaluation, patients appeared to be 3 times more likely to complete a subsequent PROM if their clinician had accessed their responses to the previous one. In addition, a patient dashboard was planned to enable patients to review and interpret their outcomes independently (internal document dated July 11, 2023), reducing the sole reliance on healthcare professionals for feedback.

Strategy 3.4: asking nonresponders to respond. Clinicians were also encouraged to ask nonresponders to complete subsequent surveys and to explicate the relevance of PROM questions to their patients. Among others, this aimed to address the barrier where patients perceived completing PROM as “irrelevant when their condition is stable” (document dated July 14, 2022).

Strategy 3.5: minimal survey burden. To minimize patient burden, subdepartments were limited to inquiring 3 disease-specific surveys with no overlapping items. Most PROMs were limited to being distributed only once every 3 months and only if the patient had an appointment scheduled. CAT was used to shorten certain surveys, dependent on technical possibility: “Within this system [CAT], the next question is determined based on the response to the previous one. This ensures patients are not asked irrelevant questions” (internal document dated February 3, 2022). Data warehousing allowed all involved professionals to access a patient’s outcomes while safeguarding that certain sensitive information from disease-specific PROMs was not universally accessible. This strategy reduced repetitive inquiries for patients seeing multiple healthcare professionals due to multimorbidity.

Unsolved barriers. No strategy comprehensively targeted nonresponse due to patients perceiving their consultation as inappropriate for discussing PROMs: “a telephone consultation was perceived as inappropriate, as well as discussions focused on more critical matters, or those involving treatments” (internal document dated July 14, 2022). A second unresolved barrier is the limitation in PROMs completion due to previous negative experiences. To exemplify, information technology issues temporarily prevented completion and disappointment manifested when patients’ responses were not discussed by their clinician (internal document dated July 11, 2023). Furthermore, some patients experienced negative emotions associated with completing PROMs, such as heightened stress from being confronted with their health status or stemming from difficulties during completion. Clinicians noted that these emotions negatively affected the sentiment during consultations, next to potentially limiting patients’ future engagement with PROMs. In response, although not aimed at enhancing response rates, clinicians were given the ability to selectively exclude patients who disliked PROMs from automated inquiries. Despite introducing limitations on the use of aggregated PROMs data, the hospital’s primary focus remained on ensuring that PROMs served the best interests of patients.

Response Rates

Based on PROMs response rates that the hospital monitored and reported in their evaluations, we found that rates improved over the years, with a 17% increase in response rates between 2021 and the end of 2023. Based on the 1-year PROMS response data and EHR data, from late 2022 to late 2023, we observed that adult outpatients completed one or several PROMs before their consultation for more than half of the 46 468 unique consultations

Table 2. Summary statistics outcomes.

Outcome variables	n	Mean (%)
PROM completed	46 468	55.8
All PROMs completed	46 468	45.5
PROMIS v1.2 Global Health completed (generic)	43 452	55.4
PROMIS SF completed (domain-specific, nononcological patients)	13 715	49.8
EORTC QLQ-C30 CAT completed (domain-specific, oncological patients)	19 480	45.1

CAT indicates computer adaptive testing; EORTC, European Organisation for Research and Treatment of Cancer; PROM, patient-reported outcome measure; QLQ-C30, Core Quality of Life questionnaire; SF, Short-Forms.

(56%) for which a PROM was sent, as shown in Table 2. In 46% of the consultations, all the sent PROMs were completed. In the next section, we report the results for the outcome variable *PROM completed*. The results for the remaining outcome variables, ie, *all PROMs completed*, *PROMIS v1.2 Global Health completed*, *PROMIS SF completed*, and *EORTC completed*, are presented in Appendix 1 in Supplemental Materials found at <https://doi.org/10.1016/j.jval.2024.09.016>.

Patient and Consult Characteristics Associated With PROMs Completion

Slightly more than half of outpatients receiving PROMS were female (53%) with an average age of 57 years (minimum 18, maximum 97), as shown in Table 3. In 95% of cases, the planned consultation occurred without cancellation by a patient or a healthcare professional. Approximately 23% of consultations for which PROMs were sent out took place via teleconsultation, ie, via phone or Internet. Approximately 26% of consultations were identified in the EHR to pertain a new outpatient, whereas 74% were follow-ups.

We observed statistically significant higher response rates for consultations involving outpatients of high or middle SES; see Table 4. Higher response rates were also more likely for

Table 3. Summary statistics explanatory variables of PROMs recipients.

Category	Variable	Mean (%)
Patient characteristics (P_p)	Female	52.6
	Age	56.9
	SES high	33.5
	SES middle	33.4
	SES low	33.1
Consultation characteristics (C_c)	Consultation took place	94.9
	Teleconsultation	22.9
	Follow-up	74.0
	Monday	18.6
	Midweek	64.0
	Friday	17.4
	Morning	55.4
Afternoon	44.6	

PROM indicates patient-reported outcome measure; SES, socioeconomic status.

Table 4. Multivariate logistic regression of PROM completed on person and consultation characteristics.

Category	Variable	Odds ratio	P value
Person characteristics (P _c)	Female	0.881	.000
	Age	1.000	.668
	SES high	1.976	.000
	SES middle	1.675	.000
Consultation characteristics (C _c)	Consultation took place	5.799	.000
	Teleconsultation	0.616	.000
	Follow-up	0.817	.000
	Monday	1.168	.000
	Midweek	1.092	.001
	Morning	0.977	.258
	Constant	0.202	.000

Note. n = 46 468 consultations. Reference values are SES low, Friday, and afternoon.

PROM indicates patient-reported outcome measure; SES, socioeconomic status.

consultations that actually took place, potentially because patients may anticipate cancellations. For consultations that did not take place in person, ie, “teleconsultation,” keeping all else equal, PROM completion was less likely (odds ratio 0.616). Furthermore, women and patients attending a follow-up visit or having their consultation on a Friday were slightly less likely to complete PROMs. We did not find a statistically significant relationship between PROMs response and the consultation taking place in the morning or afternoon. In addition, Table 2 displays that nononcological outpatients showed slightly higher response rates to their specific survey than oncological outpatients. Sensitivity checks were performed by assessing the consistency of results using various operationalizations of the variables *age*, *Monday/midweek/Friday*, and *morning/afternoon*. These checks qualitatively suggested similar results in terms of odds ratios and P values.

Discussion

Achieving high patient response rates to PROMs is widely recognized as a pressing challenge.¹²⁻¹⁸ However, there is limited understanding of how to accomplish this. Therefore, this study explored how a leading Dutch university hospital aimed to enhance outpatients' response to electronic PROMs within the context of VBHC.³² Through document analysis, we investigated the implemented hospital-level strategies and their underlying rationales. Although response rates improved over the years, they remained below desired levels despite implemented strategies. To deepen our understanding of response behavior and inform future strategies, we estimated a multivariate logistic regression model using PROMs completion data and EHR data to identify patient and consultation characteristics associated with nonresponse.

We identified 13 strategies targeting patients' capability, opportunity, and motivation to complete PROMs. These strategies included 6 of the 9 intervention functions: education, training, enablement, environmental restructuring, persuasion, and incentivization.³⁹ An unused yet potentially relevant function is modeling, which involves providing examples of how other patients complete and discuss PROMs. In addition, restriction and coercion were not used, signaling that the hospital aimed to enhance PROMs use with positive reinforcement rather than punitive measures.

PROMs completion increased over the years, resulting in adult outpatients completing a PROM before their specialty consultation in more than half of the 46 468 unique consultations (56%) for which a PROM was sent between late 2022 and late 2023. Although causal relationships between the implemented strategies and the observed enhanced response rate could not be established, certain strategies that the hospital implemented are identified as supportive in previous research in other settings, including clear communication on the purpose of PROMs,¹⁶ email reminders,^{13,14,16,17,42,47,48} and the use of CAT to reduce survey length and improve perceived relevance.^{17,47} The forthcoming use of a phone application to inquire PROMs is also expected to be impactful, given the highest response rates observed in mobile applications.¹³

Despite the strategies, the hospital continued to face challenges in achieving high response rates. Persistent challenges in response behavior may have stemmed from limited understanding of response behavior, thereby constraining possible strategies, and suboptimal execution of strategies. For example, certain strategies were limited by constrained budget or were vulnerable because they depended on the actions of others. In addition, certain hospital-wide strategies, such as reminders in waiting rooms, were not yet feasible due to PROMs being available to just one-fifth of the total outpatient population.

A significant issue in the studied hospital was that PROMs were available only in Dutch due to EHR constraints. Our multivariate analysis further reaffirmed lower SES²⁶ as a predictor of nonresponse. To ensure that PROMs are inclusive and do not exacerbate health inequities,^{24,49} hospitals may benefit from enhancing user experience and service design.⁴⁹ Developments in inclusive chatbots may also be of interest.^{50,51}

In addition, our analysis revealed that response was significantly less likely for follow-up consultations²⁸ compared with new patient consultations and for teleconsultations compared with consultations conducted in the hospital setting. Moreover, women and those having their consultation on a Friday had slightly lower odds of completing PROMs. These areas warrant targeted strategies. Although in some cases statistically significant, the estimated odds ratios for age of the patient and whether the consultation took place in the morning were close to 1, suggesting these do not currently warrant further targeted action to reduce nonresponse.

Furthermore, our findings highlight the critical need to focus on clinicians' behavior and their role in improving patient response rates. Sending PROMs connected to patients' outpatient visits set patient expectations regarding the use of these data by a clinician during consultations,^{47,52,53} potentially boosting response rates by establishing personal benefits. However, failure to address patients' responses during consultations led to patient disappointment and reduced likelihood of future completion.⁵⁴ Establishing alternative feedback mechanisms beyond sole reliance on clinician feedback could help alleviate this issue.

Notably, clinicians in the studied hospital could manually exempt patients from completing PROMs when the negative consequences, such as heightened stress from difficulty in completion, outweighed the benefits from the patient's perspective. Although exempting patients from PROMs may be preferable for the individual patient, it poses a challenge in maintaining the representativeness of aggregated data,^{14,17} forming a consideration for hospitals to address.

Regarding the overall approach to enhancing patient response to PROMs, implementation science (IS)⁵⁵ can be helpful.²¹ IS explores the factors that facilitate or impede the integration of innovations, such as PROMs, into practice and identifies strategies to support this integration.⁵⁶⁻⁵⁸ Its cyclical process involves

identifying areas for improvement,^{59,60} selecting and applying strategies,^{39,43,61-64} and evaluating outcomes,^{65,66} with useful resources referenced. Contextual parameters help clarify why a strategy may be effective in one setting but not in another, and thus warrant careful consideration.⁶⁴ Insights from published IS studies on PROMs can also guide hospitals in the implementation process.^{21,67,68}

In addition, there has been an increased emphasis on integrating complexity thinking in IS.^{69,70} Complexity thinking underscores that patient response behavior is influenced by multiple factors in nonlinear and unpredictable ways, beyond the control of any single entity. Therefore, adopting an adaptive and experiential approach is crucial. In this iterative process, Justin Smith's Longitudinal Implementation Strategy Tracking System could be a useful tool for monitoring strategies and adaptations.⁷¹

In terms of limitations, we were unable to explore the effectiveness of individual strategies due to their combined and dynamic use. Limited data availability hindered the inclusion of explanatory variables considered relevant elsewhere, such as language and disease severity.²⁶⁻²⁸ Another limitation is the reliance on conclusions drawn from internal hospital documents rather than basing them on their own analyses. Nonetheless, our study among outpatients from nearly 70 subdepartments contributed to addressing the widely experienced critical need to improve patient response rates to PROMs. It offered actionable insights into possible strategies and identified patient and consultation factors that could be relevant for consideration in future strategies. In doing so, our study surpassed the scope of existing barrier and facilitator studies, as well as local pilot studies in the existing literature. Future studies could explore departmental differences in response rates and include additional explanatory variables to provide a comprehensive understanding of PROM response behavior.

In conclusion, this study emphasized the importance of understanding and addressing the diverse factors that influence patient response behavior to PROMs. Hospitals could benefit from establishing patient feedback mechanisms for PROMs, tailoring strategies to specific patient groups—such as those with low SES and those receiving teleconsultations—and embracing IS. These approaches can enhance effective implementation and promote equity in VBHC.

Author Disclosures

Author disclosure forms can be accessed below in the [Supplemental Material](#) section.

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