Research Square

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Sociodemographic and clinical correlates of treatment efficacy expectations in patients with cancer: a prospective multicenter cross-sectional study from the NEOTEAM-SEOM group

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Research Article

Keywords: cancer, patient-reported outcomes, psycho-oncology, shared decision-making, treatment efficacy expectations, vulnerability

Posted Date: September 8th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-10843110/v1

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Additional Declarations: No competing interests reported.

Abstract

Background

Treatment efficacy expectations may influence treatment decision-making, adherence, psychological adjustment, and patient-clinician communication in cancer care. However, the factors associated with these expectations across different disease stages remain incompletely understood. We examined treatment efficacy expectations and their sociodemographic and clinical correlates, including patient participation in treatment decision-making, in patients with cancer.

Methods

. We conducted a prospective multicenter cross-sectional study at 15 Spanish university hospitals. Adults with nonhematologic cancer across all disease stages were evaluated before initiation of planned systemic anticancer therapy. Treatment efficacy expectations were assessed using a four-item questionnaire addressing expectations of cure, improvement in quality of life, symptom relief, and severe treatment-related adverse effects. An overall mean score ≥ 3 defined high expectations. Prespecified correlates included age, sex, socioeconomic vulnerability, disease stage, neutrophil-to-lymphocyte ratio, and patient participation in treatment decision-making, and were evaluated using multivariable logistic regression.

Results

. Of 769 patients assessed for eligibility, 755 were included in the analysis; 460 (60.9%) were women and 286 (37.9%) had advanced, unresectable disease. Overall, 623 patients (82.5%) reported high treatment efficacy expectations. In multivariable analysis, women had higher odds of reporting high expectations than men (adjusted OR, 1.75; 95% CI, 1.16–2.63; *P* = .007), as did patients with low versus high socioeconomic vulnerability (adjusted OR, 1.65; 95% CI, 1.11–2.46; *P* = .014). Compared with advanced, unresectable disease, localized disease (adjusted OR, 1.79; 95% CI, 1.08–2.96; *P* = .024) and locally advanced, resectable disease (adjusted OR, 1.98; 95% CI, 1.22–3.21; *P* = .006) were associated with higher expectations. Age, neutrophil-to-lymphocyte ratio, and patient participation in treatment decision-making were not independently associated. Model discrimination was modest (AUC, 0.67; 95% CI, 0.62–0.72), with limited explanatory capacity (Nagelkerke R^2 = 0.082).

Conclusions

. High treatment efficacy expectations were common and were independently associated with female sex, lower socioeconomic vulnerability, and less advanced disease. Because expectations were not benchmarked against therapeutic intent, objective probabilities of benefit, or subsequent outcomes, these findings identify correlates rather than the accuracy of patients' expectations. The substantial unexplained variability supports directly eliciting treatment expectations in clinical practice rather than inferring them from patient characteristics, to individualize communication and support shared decision-making.

Background

Treatment efficacy expectations refer to patients' beliefs about what a planned anticancer treatment is likely to achieve and the burden it may entail. For the purposes of this study, this construct reflects an overall appraisal of anticipated treatment benefit and burden, encompassing expectations regarding cure, improvement in quality of life, symptom relief, and severe treatment-related toxicity. Treatment efficacy expectations are related to, but distinct from, prognostic awareness. The former concern the anticipated effects of treatment, whereas the latter reflects understanding of the likely course and outcome of the disease. These expectations are clinically relevant because they may influence willingness to receive treatment, treatment decision-making, psychological adjustment, and patient-clinician communication [1–3].

Previous studies have consistently shown that patients' expectations regarding cure, treatment benefit, recurrence, or toxicity may differ from clinicians' estimates [2–7]. Most of this evidence has focused on advanced or incurable cancer, whereas studies in earlier-stage disease have primarily examined individual dimensions such as recurrence or treatment toxicity [4–7]. Importantly, high or favorable treatment expectations should not automatically be interpreted as unrealistic or inaccurate. Such judgments require comparison with an external reference, such as therapeutic intent, clinician-estimated prognosis, objective probabilities of treatment benefit, or subsequent clinical outcomes [2, 3]. In the absence of such a reference, expectations are more appropriately characterized by their level or favorability rather than their accuracy.

The therapeutic landscape has changed substantially with the introduction of targeted therapies and immunotherapies, increasingly guided by predictive biomarkers. In selected populations, these treatments can achieve substantial and durable clinical benefits, in some settings exceeding those obtained with conventional chemotherapy [8, 9]. However, their efficacy remains highly heterogeneous and depends on tumor biology, biomarker status, and clinical context. The exceptional outcomes achieved in selected subgroups may therefore coexist with considerably more limited benefit for other patients and may contribute to highly favorable expectations in some patients, particularly in advanced disease, where major therapeutic advances often coexist with noncurative treatment intent [3]. This evolving therapeutic landscape makes understanding patients' expectations particularly relevant to contemporary oncology.

Factors associated with treatment efficacy expectations remain incompletely understood. Clinical characteristics conveying prognostic information, particularly disease stage, may be associated with anticipated treatment benefit. Biological factors may also be relevant; for example, NLR is an established prognostic biomarker across solid tumors, although whether such biological information is reflected in patients' treatment expectations is unknown [10]. Social context may influence how patients access, process, and interpret medical information. Socioeconomic status is associated with disparities across the cancer continuum [11], and social and psychosocial characteristics have been associated with differences in prognostic awareness [12]. Patient participation in treatment decision-making may also be

relevant, although greater involvement in decisions does not necessarily imply greater understanding of treatment intent or expected benefit [2, 3]. Evidence examining these factors simultaneously remains limited, particularly in heterogeneous populations encompassing different tumor types and disease stages.

Against this background, an important knowledge gap remains regarding how patients perceive the expected efficacy of contemporary systemic anticancer treatments and which clinical and patient-related characteristics are associated with these expectations. Therefore, the present study aimed to characterize treatment efficacy expectations in a large prospective multicenter cohort of patients with cancer across all disease stages and to examine sociodemographic and clinical correlates, including patient participation in treatment decision-making.

Methods

Study design and population

We conducted a prospective, multicenter cross-sectional study between March 2024 and May 2026 across 15 medical oncology departments at Spanish university hospitals. Eligible participants were adults (≥ 18 years) with histopathologically confirmed nonhematologic cancer at any disease stage who were candidates for systemic anticancer therapy, either in the perioperative setting or for unresectable advanced disease.

Exclusion criteria included physical or mental conditions that, in the opinion of the treating oncologist, could limit participation; significant cognitive impairment or reading or writing difficulties precluding questionnaire completion; previous treatment for another cancer within the preceding 2 years; or any clinical circumstance that could interfere with study procedures.

Patients were consecutively recruited during routine outpatient oncology visits before initiation of the planned systemic anticancer therapy. All participating medical oncologists were instructed to discuss with patients during this visit their cancer diagnosis and stage, the proposed treatment, its therapeutic intent, and the expected treatment benefit, with the amount and level of detail tailored to each patient's preference for information. After this clinical discussion, eligible patients were informed about the study objectives and procedures and, if they agreed to participate, provided written informed consent. Participants were then instructed to self-complete the study questionnaires at home and return them to the study staff at the subsequent visit, before initiation of systemic anticancer therapy. Participation did not interfere with routine clinical care.

The study was approved by the Research Ethics Committee of the Principality of Asturias, which served as the coordinating ethics committee (CEImPA2024.073), and by the ethics committees of all participating centers.

Clinical variables and patient-reported data

All study data were prospectively captured in a web-based electronic case report form (eCRF): https://www.neopsico.es/. Clinical, laboratory, and treatment variables were recorded by the treating oncologist. Sociodemographic information and questionnaire responses were completed in writing by the participants themselves and subsequently entered into the eCRF. The eCRF incorporated predefined validation filters and consistency checks, and data were subject to remote monitoring to identify missing, inconsistent, or implausible entries and minimize data-entry errors.

Clinical variables included tumor site, disease stage (localized; locally advanced, resectable; or advanced, unresectable), histologic type (adenocarcinoma vs nonadenocarcinoma), Eastern Cooperative Oncology Group (ECOG) performance status (0–1 vs ≥ 2), serum albumin level (normal vs hypoalbuminemia), NLR (< 4 vs ≥ 4), and treatment modality. NLR was calculated by dividing the absolute neutrophil count by the absolute lymphocyte count obtained from routine peripheral blood samples and was categorized a priori as < 4 or ≥ 4 [13]. Treatment modality was classified according to the primary systemic anticancer therapy planned at study entry into five mutually exclusive categories: combination chemotherapy alone, single-agent chemotherapy alone, immunotherapy with or without other anticancer therapy, targeted therapy with or without chemotherapy or endocrine therapy, and endocrine therapy alone.

Patient-reported sociodemographic characteristics included age, sex, educational level, current employment status, and living arrangement. For the analyses, age was categorized as < 70 versus ≥ 70 years. Socioeconomic vulnerability was assessed using a prespecified composite index developed specifically for this study and informed by previous research on social vulnerability [14–16]. The index was intended as a pragmatic measure of cumulative social disadvantage rather than a validated socioeconomic instrument and comprised three indicators: primary education or less, not currently employed, and not living with a partner. One point was assigned to each indicator, yielding a score from 0 to 3, with higher scores indicating greater socioeconomic vulnerability. The three components were weighted equally a priori, and the score was dichotomized as low vulnerability (0–1 points) or high vulnerability (2–3 points) for the primary analyses.

Patient participation in treatment decision-making was assessed using the six-item Patient Participation Scale (PPS) [17]. Each item is rated on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree), yielding a total score from 6 to 30, with higher scores indicating greater perceived involvement and satisfaction with the decision-making process. Because no validated clinical cutoff was available for this population, participants were classified according to the observed score distribution as having high (PPS ≥ 24) or low (PPS < 24) participation. Internal consistency in the present cohort was good (Cronbach α = .863).

Treatment efficacy expectations were assessed using a standardized four-item questionnaire previously developed and used by our research group [4–6]. The questionnaire assesses patients' expectations regarding whether the planned treatment would cure their cancer, improve their quality of life, relieve

cancer-related symptoms, and cause severe treatment-related adverse effects. Each item was rated on a four-point Likert scale ranging from 1 (little) to 4 (a great deal). The adverse-effects item was reverse scored so that higher values consistently reflected more favorable treatment expectations. An overall expectation score was calculated as the mean of the four items; a mean score ≥ 3 defined high treatment efficacy expectations, whereas a score < 3 defined low or moderate expectations. Internal consistency of the questionnaire in the present cohort was good (Cronbach α = .811).

Statistical analysis

Categorical variables were summarized as frequencies and percentages, and differences in treatment efficacy expectations across patient subgroups were assessed using Pearson's chi-square test. A multivariable logistic regression model was used to identify factors independently associated with high versus low/moderate treatment efficacy expectations. Covariates were prespecified on the basis of clinical relevance and previous evidence and included age group, sex, socioeconomic vulnerability, disease stage, NLR, and patient participation in treatment decision-making. All covariates were entered simultaneously into the model, with categorical predictors represented by indicator variables. Adjusted odds ratios (ORs) and corresponding 95% confidence intervals (CIs) were estimated for each covariate. Model calibration was assessed using the Hosmer-Lemeshow goodness-of-fit test, and discrimination was evaluated using the area under the receiver operating characteristic curve (AUC). Model fit and overall predictive performance were further summarized using the − 2 log-likelihood, Cox and Snell and Nagelkerke pseudo-R^2 statistics, and Brier score. Analyses were performed using complete cases. All statistical tests were two-sided, and a P value < .05 was considered statistically significant. Statistical analyses were performed using IBM SPSS Statistics, version 26.0 (IBM Corp).

Reporting followed the STROBE checklist for cross-sectional studies (Table 1).

Table 1
STROBE reporting checklist for cross-sectional studies.

Item	Recommendation	How addressed in this manuscript	Manuscript location
Title and abstract			
1a	Indicate the study's design with a commonly used term in the title or the abstract.	The title identifies the study as a prospective multicenter cross-sectional study; the abstract Methods section also explicitly states the prospective multicenter cross-sectional design.	Title; Abstract – Methods
1b	Provide in the abstract an informative and balanced summary of what was done and what was found.	The structured abstract summarizes the rationale, setting and population, assessment of treatment efficacy expectations, prespecified multivariable analysis, prevalence of high expectations, adjusted associations with sex, socioeconomic vulnerability and disease stage, model performance, and the main clinical interpretation.	Abstract
Background			
2	Explain the scientific background and rationale for the investigation being reported.	The Background defines treatment efficacy expectations, distinguishes them from prognostic awareness, reviews prior evidence on patient–clinician differences in treatment expectations, discusses the contemporary therapeutic landscape, and identifies uncertainty regarding sociodemographic, clinical, biological, and decision-making correlates.	Background – paragraphs 1–4
3	State specific objectives, including any prespecified hypotheses.	The study objective was to characterize treatment efficacy expectations across disease stages and examine their sociodemographic and clinical correlates, including patient participation in treatment decision-making. No directional hypothesis was prespecified in the final manuscript.	Background – final paragraph; Abstract – Background
Methods			
4	Present key elements of study design early in the paper.	The first sentence of Methods identifies a prospective, multicenter cross-sectional study conducted in 15 Spanish university hospitals.	Methods – Study design and population
5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure,	Patients were consecutively recruited from 15 medical oncology departments at Spanish university hospitals between March 2024 and May 2026 during routine outpatient visits, before initiation of planned	Methods – Study design and population

Abbreviation: STROBE, Strengthening the Reporting of Observational Studies in Epidemiology. Checklist adapted from the official STROBE checklist for cross-sectional studies (version 4).

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Title and abstract			
	follow-up, and data collection.	systemic anticancer therapy. Questionnaires were completed after the oncology consultation and returned before treatment initiation. There was no longitudinal follow-up for the present cross-sectional analysis.	
6a	Give the eligibility criteria, and the sources and methods of selection of participants.	Eligible participants were adults aged ≥ 18 years with histopathologically confirmed nonhematologic cancer at any disease stage who were candidates for systemic anticancer therapy, either perioperatively or for advanced, unresectable disease. Exclusion criteria included conditions limiting participation, cognitive impairment or reading/writing difficulties, treatment for another cancer within the previous 2 years, or other clinical circumstances interfering with study procedures. Consecutive recruitment occurred during routine outpatient oncology visits.	Methods – Study design and population
7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable.	The outcome was high versus low/moderate treatment efficacy expectations, derived from a four-item questionnaire. Prespecified correlates in the multivariable model were age group, sex, socioeconomic vulnerability, disease stage, NLR, and patient participation in treatment decision-making. Additional descriptive/bivariate variables included tumor site, histology, ECOG performance status, serum albumin, educational attainment, employment status, and treatment modality. Operational definitions and category boundaries are specified in Methods and the table notes.	Methods – Clinical variables and patient-reported data; Statistical analysis; Tables 2–4
8	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group.	Clinical, laboratory, and treatment variables were recorded by the treating oncologist in a web-based eCRF. Sociodemographic data and questionnaire responses were self-completed in writing by patients and subsequently entered into the eCRF by study staff. NLR was calculated from routine peripheral-blood absolute neutrophil and lymphocyte counts; serum albumin was classified using each local laboratory reference range. Patient participation was measured with the six-item PPS and treatment efficacy expectations with a standardized four-item questionnaire. The same assessment procedures were used across study groups; the eCRF incorporated	Methods – Clinical variables and patient-reported data; Table 2 note

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Title and abstract			
		validation filters, consistency checks, and remote monitoring.	
9	Describe any efforts to address potential sources of bias.	Selection bias was limited by consecutive multicenter recruitment. Information/measurement bias was reduced by assessment at a standardized pretreatment time point, standardized clinician instructions, patient self-completion of questionnaires, predefined variable definitions, and eCRF validation and remote monitoring. Potential confounding was addressed through a prespecified multivariable logistic regression model. Residual confounding, measurement limitations, and cross-sectional design are acknowledged in the Discussion.	Methods – Study design and population; Clinical variables and patient-reported data; Statistical analysis; Discussion – limitations
10	Explain how the study size was arrived at.	No formal sample-size calculation was performed. The study size was determined by consecutive recruitment of eligible patients during the prespecified study period; 755 participants were included in the complete-case analysis.	Methods – Study design and population; Statistical analysis; Results – Participant characteristics
11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why.	Age was categorized as < 70 versus ≥ 70 years. ECOG performance status was grouped as 0–1 versus ≥ 2, and albumin as normal versus hypoalbuminemia according to the local laboratory reference range. NLR was categorized a priori as < 4 versus ≥ 4. The socioeconomic vulnerability index ranged from 0 to 3 and was dichotomized as low (0–1) versus high (2–3). PPS scores ranged from 6 to 30 and were categorized as high (≥ 24) versus low (< 24) participation based on the observed distribution because no validated clinical cutoff was available. The treatment expectation score was the mean of four Likert items and was categorized as high (≥ 3) versus low/moderate (< 3).	Methods – Clinical variables and patient-reported data; Tables 2–4
12a	Describe all statistical methods, including those used to control for confounding.	Categorical variables were summarized as frequencies and percentages and compared using Pearson's chi-square test. Factors independently associated with high expectations were examined using multivariable logistic regression. Prespecified covariates (age group, sex, socioeconomic vulnerability, disease stage,	Methods – Statistical analysis

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Title and abstract			
		NLR, and patient participation) were entered simultaneously. Adjusted ORs with 95% CIs were reported. Calibration, discrimination, and model performance were assessed using the Hosmer–Lemeshow test, AUC, − 2 log-likelihood, Cox and Snell and Nagelkerke pseudo-R^2, and Brier score.	
12b	Describe any methods used to examine subgroups and interactions.	No subgroup analyses or interaction tests were prespecified or performed.	Methods – Statistical analysis
12c	Explain how missing data were addressed.	Analyses were performed using complete cases. The final analytic cohort comprised 755 participants with complete data for the variables included in the primary analysis.	Methods – Statistical analysis; Results – Participant characteristics
12d	If applicable, describe analytical methods taking account of sampling strategy.	Not applicable. Participants were consecutively recruited; no complex survey sampling, clustering weights, or sampling weights were used in the analysis.	Methods – Study design and population; Statistical analysis
12e	Describe any sensitivity analyses.	No sensitivity analyses were prespecified or performed.	Methods – Statistical analysis
Results			
13a	Report numbers of individuals at each stage of study—e.g., numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, and analysed.	A total of 769 patients were assessed for eligibility; 755 met all eligibility criteria and were included in the complete-case analysis. Because the study was cross-sectional, there was no follow-up stage.	Results – Participant characteristics
13b	Give reasons for non-participation at each stage.	Fourteen patients were excluded because they did not meet all inclusion criteria and/or met at least one exclusion criterion.	Methods – Study design and population; Results – Participant characteristics
13c	Consider use of a flow diagram.	Participant disposition is reported narratively. A flow diagram was not included because only 14 of 769 patients assessed were excluded and there was no longitudinal follow-up.	Results – Participant characteristics

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Title and abstract			
14a	Give characteristics of study participants (e.g., demographic, clinical, social) and information on exposures and potential confounders.	Baseline sociodemographic, clinical, laboratory, treatment, and patient-participation characteristics are summarized for all 755 participants. The Results also report age, sex, socioeconomic vulnerability, tumor site, disease stage, histology, ECOG performance status, albumin, NLR, treatment modality, participation, and treatment efficacy expectations.	Table 2; Results – Participant characteristics
14b	Indicate number of participants with missing data for each variable of interest.	The primary analysis used complete cases, and the variables presented in Tables 2–4 are reported for all 755 analyzed participants; no missing values are shown for these variables.	Methods – Statistical analysis; Tables 2–4
15	Report numbers of outcome events or summary measures.	High treatment efficacy expectations were reported by 623 of 755 patients (82.5%); 132 (17.5%) reported low/moderate expectations. Category-specific outcome proportions are reported for all examined variables.	Results – Participant characteristics and Factors associated with treatment efficacy expectations; Tables 2–3
16a	Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (e.g., 95% CI). Make clear which confounders were adjusted for and why they were included.	Unadjusted category-specific proportions and chi-square P values are reported in Table 3. Adjusted associations are reported as ORs with 95% CIs in Table 4 and Fig. 1. The multivariable model included the prespecified covariates age group, sex, socioeconomic vulnerability, disease stage, NLR, and patient participation, selected on the basis of clinical relevance and previous evidence.	Methods – Statistical analysis; Results – Factors associated with treatment efficacy expectations and Multivariable logistic regression; Tables 3–4; Fig. 1
16b	Report category boundaries when continuous variables were categorized.	Category boundaries are reported for age (< 70/≥70 years), NLR (< 4/≥4), socioeconomic vulnerability (0–1/2–3 points), PPS (< 24/ ≥24), treatment efficacy expectations (< 3/≥3 mean score), and ECOG performance status (0–1/≥2). Serum albumin was categorized using the lower limit of the local laboratory reference range.	Methods – Clinical variables and patient-reported data; Tables 2–4

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Title and abstract			
16c	If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period.	Not applicable. The outcome was assessed cross-sectionally at a single pretreatment time point, with no time-to-event risk period.	Not applicable
17	Report other analyses done—e.g., analyses of subgroups and interactions, and sensitivity analyses.	No subgroup, interaction, or sensitivity analyses were performed. Model calibration, discrimination, and overall performance measures are reported for the prespecified multivariable model.	Results – Multivariable logistic regression; Table 4; Figs. 1–2
Discussion			
18	Summarise key results with reference to study objectives.	The first Discussion paragraph summarizes the prevalence of high treatment efficacy expectations and the independent associations with female sex, lower socioeconomic vulnerability, and localized or locally advanced, resectable disease, while noting the lack of independent association with age, NLR, or patient participation and the model's limited explanatory capacity.	Discussion – paragraph 1
19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias.	Limitations include the cross-sectional design, inability to assess expectation accuracy against therapeutic intent or objective benefit, residual disease-specific confounding, use of a study-specific nonvalidated socioeconomic vulnerability index, possible misclassification of nonemployment due to retirement, a distribution-based PPS cutoff, dichotomization of the expectation score, and aggregation of distinct expectation domains. The likely direction and magnitude of these potential biases cannot be quantified from the available data.	Discussion – limitations paragraph
20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence.	The Discussion distinguishes favorable expectations from prognostic misunderstanding, compares findings with prior studies, interprets stage, sex, socioeconomic vulnerability, clinical biomarkers, and participation cautiously, and emphasizes that the model supports population-level correlates rather than individual prediction or causal inference.	Discussion – paragraphs 2–8; Conclusions

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Title and abstract			
21	Discuss the generalisability (external validity) of the study results.	Generalisability is supported by multicenter recruitment across 15 hospitals, inclusion of multiple tumor types and disease stages, and standardized pretreatment assessment. The Discussion contextualizes findings within the Spanish publicly funded health-care system and acknowledges residual disease-specific heterogeneity; external validity beyond similar oncology settings should therefore be interpreted cautiously.	Methods – Study design and population; Discussion – socioeconomic vulnerability and limitations paragraphs
Other information			
22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based.	Funding from the Spanish Society of Medical Oncology Foundation (FSEOM2023), AstraZeneca (AZ2024), and the Agencia Estatal de Investigación/Ministerio de Ciencia, Innovación y Universidades (PID2025-171773OB-I00) is reported. The funders had no role in study design, data collection, analysis, interpretation, or manuscript preparation.	Declarations – Funding

Abbreviation: STROBE, Strengthening the Reporting of Observational Studies in Epidemiology. Checklist adapted from the official STROBE checklist for cross-sectional studies (version 4).

Results

Participant characteristics

Of 769 patients assessed for eligibility, 755 met all eligibility criteria and were included in the complete-case analysis. The mean age was 62.5 years (SD, 11.1; range, 29–91 years), and 561 patients (74.3%) were younger than 70 years. Most participants were women (n = 460, 60.9%). High socioeconomic vulnerability was present in 310 patients (41.1%), 490 (64.9%) had primary education or less, and 543 (71.9%) were not currently employed.

Breast cancer was the most common tumor type (n = 202, 26.8%), followed by colorectal cancer (n = 124, 16.4%) and lung cancer (n = 85, 11.3%). Advanced, unresectable disease was present in 286 patients (37.9%), 487 (64.5%) had adenocarcinoma histology, and 711 (94.2%) had an ECOG performance status of 0 or 1.

Regarding laboratory characteristics, 636 patients (84.2%) had normal serum albumin levels and 574 (76.0%) had NLR < 4. Combination chemotherapy alone was the most common treatment modality (n = 420, 55.6%). High participation in treatment decision-making (PPS ≥ 24) was reported by 357 patients

(47.3%). Overall, 623 patients (82.5%) reported high treatment efficacy expectations, whereas 132 (17.5%) reported low or moderate expectations (Table 2).

Table 2
Sample characteristics (n = 755).

Variable	Category	n (%)
Age group	< 70 years	561 (74.3)
	≥ 70 years	194 (25.7)
Sex	Male	295 (39.1)
	Female	460 (60.9)
ECOG performance status	0–1	711 (94.2)
	≥2	44 (5.8)
Socioeconomic vulnerability	Low	445 (58.9)
	High	310 (41.1)
Educational attainment	Medium-high	265 (35.1)
	Low	490 (64.9)
Employment status	Currently employed	212 (28.1)
	Not currently employed	543 (71.9)
Tumor site	Breast	202 (26.8)
	Colorectal	124 (16.4)
	Lung	85 (11.3)
	Non-colorectal digestive	83 (11.0)
	Gynecologic	62 (8.2)
	Other	199 (26.3)
Disease stage	Localized	234 (31.0)
	Locally advanced, resectable	235 (31.1)
	Advanced, unresectable	286 (37.9)
Histology	Adenocarcinoma	487 (64.5)
	Nonadenocarcinoma	268 (35.5)
Serum albumin	Normal	636 (84.2)
	Hypoalbuminemia	119 (15.8)

Abbreviations: PPS, Patient Participation Scale; NLR, neutrophil-to-lymphocyte ratio; CT, chemotherapy.

Variable	Category	n (%)
NLR	< 4	574 (76.0)
	≥ 4	181 (24.0)
Systemic anticancer treatment	Combination CT alone	420 (55.6)
	Single-agent CT alone	54 (7.2)
	Immunotherapy (+/- other therapy)	135 (17.9)
	Targeted therapy (+/- CT or endocrine therapy)	87 (11.5)
	Endocrine therapy alone	59 (7.8)
Patient participation (PPS)	Low (PPS < 24)	398 (52.7)
	High (PPS ≥ 24)	357 (47.3)

Abbreviations: PPS, Patient Participation Scale; NLR, neutrophil-to-lymphocyte ratio; CT, chemotherapy.

Factors associated with treatment efficacy expectations

In bivariate analyses, treatment efficacy expectations differed significantly according to age, sex, socioeconomic vulnerability, disease stage, and histology (Table 3). High expectations were more frequent among patients younger than 70 years than among those aged 70 years or older (84.8% vs 75.8%; P = .004), among women than men (87.2% vs 75.3%; P < .001), and among patients with low versus high socioeconomic vulnerability (86.3% vs 77.1%; P = .001). Expectations also differed by disease stage (P < .001), with high expectations reported by 87.6% of patients with localized disease, 87.2% of those with locally advanced, resectable disease, and 74.5% of those with advanced, unresectable disease. Patients with adenocarcinoma more frequently reported high expectations than those with nonadenocarcinoma histology (85.0% vs 78.0%; P = .015).

Table 3
Bivariate associations with treatment efficacy expectations.

Variable	Category	High expectations n/N (%)	Low/moderate expectations n/N (%)	P value
Age group (years)	< 70	476/561 (84.8)	85/561 (15.2)	**.004**
	≥ 70	147/194 (75.8)	47/194 (24.2)	
Sex	Male	222/295 (75.3)	73/295 (24.7)	**< .001**
	Female	401/460 (87.2)	59/460 (12.8)	
ECOG performance status	0–1	590/711 (83.0)	121/711 (17.0)	.176
	≥ 2	33/44 (75.0)	11/44 (25.0)	
Socioeconomic vulnerability	Low	384/445 (86.3)	61/445 (13.7)	**.001**
	High	239/310 (77.1)	71/310 (22.9)	
Educational attainment	Medium-high	209/265 (78.9)	56/265 (21.1)	.052
	Low	414/490 (84.5)	76/490 (15.5)	
Employment status	Currently employed	179/212 (84.4)	33/212 (15.6)	.386
	Not currently employed	444/543 (81.8)	99/543 (18.2)	
Tumor site	Lung	64/85 (75.3)	21/85 (24.7)	.051
	Colorectal	95/124 (76.6)	29/124 (23.4)	
	Breast	178/202 (88.1)	24/202 (11.9)	
	Non-colorectal digestive	67/83 (80.7)	16/83 (19.3)	
	Gynecologic	52/62 (83.9)	10/62 (16.1)	

Abbreviations: PPS, Patient Participation Scale; NLR, neutrophil-to-lymphocyte ratio; CT, chemotherapy.

Variable	Category	High expectations n/N (%)	Low/moderate expectations n/N (%)	P value
	Other	167/199 (83.9)	32/199 (16.1)	
Disease stage	Localized	205/234 (87.6)	29/234 (12.4)	**< .001**
	Locally advanced, resectable	205/235 (87.2)	30/235 (12.8)	
	Advanced, unresectable	213/286 (74.5)	73/286 (25.5)	
Histology	Nonadenocarcinoma	209/268 (78.0)	59/268 (22.0)	**.015**
	Adenocarcinoma	414/487 (85.0)	73/487 (15.0)	
Serum albumin	Normal	529/636 (83.2)	107/636 (16.8)	.270
	Hypoalbuminemia	94/119 (79.0)	25/119 (21.0)	
NLR	< 4	482/574 (84.0)	92/574 (16.0)	.061
	≥ 4	141/181 (77.9)	40/181 (22.1)	
Systemic anticancer treatment	Combination CT alone	350/420 (83.3)	70/420 (16.7)	.370
	Single-agent CT alone	48/54 (88.9)	6/54 (11.1)	
	Targeted therapy (+/- CT or endocrine therapy)	70/87 (80.5)	17/87 (19.5)	
	Immunotherapy (+/- other therapy)	105/135 (77.8)	30/135 (22.2)	
	Endocrine therapy alone	50/59 (84.7)	9/59 (15.3)	
Patient participation (PPS)	Low	326/398 (81.9)	72/398 (18.1)	.643
	High	297/357 (83.2)	60/357 (16.8)	

Abbreviations: PPS, Patient Participation Scale; NLR, neutrophil-to-lymphocyte ratio; CT, chemotherapy.

High expectations were numerically more frequent among patients with NLR < 4 than among those with NLR ≥ 4 (84.0% vs 77.9%), although the difference did not reach statistical significance (P = .061). No significant associations were observed with educational level (P = .052), tumor site (P = .051), employment status (P = .386), ECOG performance status (P = .176), serum albumin level (P = .270), treatment modality (P = .370), or patient participation in treatment decision-making (P = .643).

Multivariable logistic regression

In the multivariable analysis, sex, socioeconomic vulnerability, and disease stage were independently associated with treatment efficacy expectations (Table 4). Men had lower odds of reporting high expectations than women (adjusted OR, 0.57; 95% CI, 0.38–0.86; P = .007), whereas patients with low socioeconomic vulnerability had higher odds than those with high vulnerability (adjusted OR, 1.65; 95% CI, 1.11–2.46; P = .014). Disease stage was also independently associated with treatment efficacy expectations (overall P = .009). Compared with patients with advanced, unresectable disease, those with localized disease (adjusted OR, 1.79; 95% CI, 1.08–2.96; P = .024) and locally advanced, resectable disease (adjusted OR, 1.98; 95% CI, 1.22–3.21; P = .006) had higher odds of reporting high expectations (Fig. 1). Age, NLR, and patient participation in treatment decision-making were not independently associated with treatment efficacy expectations.

Table 4
Multivariable logistic regression analysis of factors associated with high treatment efficacy expectations.

Variable	Category	Adjusted OR (95% CI)	P value
Age group	≥ 70	1 (reference)	
	< 70	1.19 (0.77–1.83)	.441
Sex	Female	1 (reference)	
	Male	0.57 (0.38–0.86)	**.007**
Socioeconomic vulnerability	High	1 (reference)	
	Low	1.65 (1.11–2.46)	**.014**
Disease stage	Advanced, unresectable	1 (reference)	**.009**
	Localized	1.79 (1.08–2.96)	**.024**
	Locally advanced, resectable	1.98 (1.22–3.21)	**.006**
Neutrophil-to-lymphocyte ratio (NLR)	≥ 4	1 (reference)	
	< 4	1.20 (0.78–1.86)	.404
Patient participation (PPS)	High	1 (reference)	
	Low	0.93 (0.63–1.37)	.719
Model performance: Omnibus chi-square = 38.24, P < .001; −2 log-likelihood = 661.61; Cox and Snell R^2 = 0.049; Nagelkerke R^2 = 0.082; Hosmer-Lemeshow chi-square = 5.32, P = .723; AUC = 0.668 (95% CI 0.619–0.718); Brier score = 0.137.			

The overall model was statistically significant (omnibus χ^2 = 38.24; P < .001) and showed modest discrimination (AUC, 0.67; 95% CI, 0.62–0.72) (Fig. 2). There was no evidence of lack of fit according to the Hosmer-Lemeshow test (χ^2 = 5.32; P = .723). The Cox and Snell and Nagelkerke pseudo-R^2 values were 0.049 and 0.082, respectively; the Brier score was 0.137, and the − 2 log-likelihood was 661.61.

Discussion

In this prospective multicenter cross-sectional study of 755 adults with nonhematologic cancer across all disease stages who were evaluated before initiation of planned systemic anticancer therapy at 15 Spanish university hospitals, high treatment efficacy expectations were reported by 82.5% of patients. Female sex, lower socioeconomic vulnerability, and localized or locally advanced, resectable disease were independently associated with higher expectations, whereas age, NLR, and patient participation in treatment decision-making were not. However, the modest discrimination and limited explanatory

capacity of the multivariable model indicate that these measured characteristics account for only a small proportion of the variability in patients' expectations.

These findings complement a literature that has largely focused on patients with advanced or incurable cancer. In the landmark Cancer Care Outcomes Research and Surveillance (CanCORS) study, Weeks et al. reported that most of the 1,193 patients with metastatic lung or colorectal cancer receiving chemotherapy did not understand that chemotherapy was not at all likely to be curative [2]. Similarly, in a prospective multicenter study by Carmona-Bayonas et al. involving 550 patients with incurable advanced cancer after their initial oncology consultation, 74% believed that treatment could help cure their cancer and only 17.6% demonstrated clear prognostic awareness, despite 84% recognizing the severity of their disease [3]. More recently, Subramaniam et al. found that 20% of patients receiving palliative systemic therapy considered cure likely and, among those who estimated their life expectancy, 62% selected a longer survival interval than their oncologist [18]. Nevertheless, the high expectations observed in our study should not be interpreted as evidence of prognostic misunderstanding. Our measure incorporates expectations of cure, improvement in quality of life, symptom relief, and severe toxicity, and these expectations were not compared with treatment intent, clinician estimates, objective probabilities of benefit, or subsequent outcomes. Accordingly, our findings characterize a favorable treatment outlook rather than its accuracy. This distinction is reinforced by recent evidence suggesting that hope and prognostic awareness are not necessarily incompatible. Among 189 patients with advanced cancer entering early-phase clinical trials, Boulanger et al. found no association between hope and either perception of treatment intent or having discussed prognosis with an oncologist [19].

Disease stage was the clinical characteristic most clearly associated with treatment expectations. Patients with advanced disease were less likely to report high expectations than those with localized or locally advanced, resectable cancer, a finding that is clinically plausible given the greater potential for cure at earlier stages. However, disease stage alone should not be regarded as a proxy for either treatment expectations or prognostic understanding. In a recent study of older adults with cancer, prognostic awareness differed according to disease stage, although substantial variability remained within stage groups [20]. Moreover, the prospective longitudinal eQuiPe study of 801 patients with advanced cancer showed that awareness of a limited prognosis increased from 15% to 40% during the last year of life, with most changes toward a more realistic perception occurring during the final 6 months [21]. These findings emphasize that disease stage, treatment expectations, and prognostic awareness are related but distinct constructs and that patients' perceptions may evolve over the disease trajectory.

Women were more likely than men to report high treatment efficacy expectations. However, previous evidence does not support a consistent sex-related pattern. In two previous studies from our group conducted in patients with advanced cancer, sex was not independently associated with treatment expectations. In patients with advanced, unresectable lung cancer evaluated before systemic treatment, expectations did not differ according to sex or other measured sociodemographic and clinical characteristics [4]. Likewise, Carmona-Bayonas et al., in a broader cohort encompassing multiple

advanced tumor types, found no independent association between sex and the expectation that treatment could cure the disease, whereas patients with breast cancer were less likely than those with other tumor types to expect cure from treatment [3]. Notably, more realistic expectations regarding treatment curability in that study were associated with greater anxiety and depression and poorer quality of life, underscoring that greater realism and psychological well-being do not necessarily coincide [3]. Together, these findings suggest that the relationship between sex and treatment expectations is complex and may depend on tumor context and psychological adaptation. The association observed in our cohort should therefore be interpreted as a population-level correlate rather than evidence of an intrinsic difference between men and women and warrants further investigation of potential mediating factors, including communication, information preferences, coping, hope, and psychological distress.

Socioeconomic vulnerability was also independently associated with treatment expectations, with patients with lower vulnerability reporting more favorable expectations. Direct evidence relating cumulative socioeconomic vulnerability specifically to treatment efficacy expectations is scarce. Social circumstances may nevertheless influence how patients access, process, and interpret medical information and the support available during clinical encounters. In the recent UK ProgESC study, being in a relationship was independently associated with better prognostic understanding, whereas higher educational attainment showed a nonsignificant association in the same direction [22]. Spain has a predominantly publicly funded health care system with near-universal coverage and care largely free at the point of delivery [23]. This may reduce financial barriers to anticancer treatment and shape treatment expectations differently from health systems in which access depends more strongly on insurance coverage or patients' ability to pay. Our composite index captures several dimensions of social vulnerability, including education, employment, and living with a partner. Because it was developed specifically for this study and has not been externally validated, this association should be regarded as hypothesis-generating.

Among prognostically relevant clinical and laboratory variables, serum albumin, which partly reflects nutritional and systemic inflammatory status, was not associated with treatment efficacy expectations in the bivariate analysis, whereas NLR, an established inflammatory prognostic biomarker across solid tumors, was associated with expectations in neither the bivariate nor multivariable analyses [10, 13]. ECOG performance status was also not associated with expectations in the bivariate analysis; however, its limited variability, with 94.2% of patients having an ECOG performance status of 0 or 1, limited its meaningful evaluation in the multivariable model. Thus, unlike disease stage, routinely available clinical and biological indicators of prognosis did not appear to translate directly into patients' subjective expectations of treatment benefit.

Patient participation in treatment decision-making was not independently associated with treatment efficacy expectations. This finding should not be interpreted as indicating that shared decision-making is unimportant. The PPS captures perceived involvement and satisfaction with the decision-making process but does not directly assess the content, clarity, or comprehension of information about treatment goals and expected benefits. Consistent with this distinction, Weeks et al. found that patients'

role in treatment decision-making was not associated with understanding that chemotherapy for metastatic disease was noncurative [2]. Moreover, Patell et al. showed that patients' perceptions of curability, tumor response, symptom palliation, survival benefit, and toxicity represent distinct dimensions of treatment expectations [1]. Participation in treatment decision-making and understanding the intent and expected magnitude of treatment benefit should therefore be considered complementary rather than interchangeable dimensions of patient-centered care.

Taken together, these findings suggest that treatment efficacy expectations are multidimensional and likely associated with factors beyond those captured in our model, including communication, coping, hope, social support, and individual treatment preferences [1, 3]. Longitudinal data further indicate that patients' perceptions may evolve over the disease trajectory [21], while greater prognostic awareness does not necessarily appear to be incompatible with maintaining hope [19]. Rather than supporting individual prediction, our findings identify population-level correlates and highlight the complex and dynamic nature of treatment expectations.

The clinical relevance of these findings lies in directly eliciting patients' expectations rather than attempting to infer them from demographic or disease characteristics. Sex, socioeconomic vulnerability, and disease stage identify population-level differences but, given the substantial unexplained variability, should not be used to predict expectations in individual patients. Brief exploration of what patients expect treatment to achieve may help clinicians identify areas requiring clarification, individualize communication about expected benefits and uncertainty, and support shared decision-making while preserving hope.

The prospective multicenter recruitment and standardized data collection strengthen the study, but several limitations should be considered. First, the cross-sectional assessment precludes causal inference and does not capture changes in expectations over time. Second, expectations were not compared with therapeutic intent, clinician-estimated prognosis, objective probabilities of benefit, or subsequent clinical outcomes; therefore, their accuracy cannot be determined. Third, the inclusion of multiple tumor types, stages, and treatment modalities broadens the clinical applicability of the study but may leave residual confounding from disease-specific factors. The socioeconomic vulnerability index was developed specifically for this study and has not been externally validated; equal weighting and dichotomization of its components, particularly the inclusion of nonemployment, which may also reflect retirement, may have influenced classification. Similarly, the PPS cutoff of 24 was based on the observed distribution rather than a validated clinical threshold. Finally, dichotomizing the treatment expectation score facilitated clinical interpretation but reduced information, and combining expectations regarding cure, quality of life, symptom relief, and toxicity into a single measure may obscure differences among these individual dimensions.

Conclusions

In this prospective multicenter cross-sectional study, 82.5% of patients reported high treatment efficacy expectations, which varied according to sex, socioeconomic vulnerability, and disease stage. These associations reflect population-level correlates and should not be interpreted causally or as evidence that patients' expectations were accurate or inaccurate. Future longitudinal studies should examine how treatment efficacy expectations relate to patient satisfaction, psychological well-being, and subsequent treatment outcomes, and whether their systematic assessment can improve patient-centered communication and shared decision-making in oncology.

Abbreviations

AEI
Agencia Estatal de Investigación
AUC
area under the receiver operating characteristic curve
CanCORS
Cancer Care Outcomes Research and Surveillance
CI
confidence interval
CT
chemotherapy
eCRF
electronic case report form
ECOG
Eastern Cooperative Oncology Group
SEOM
Spanish Society of Medical Oncology Foundation
NLR
neutrophil-to-lymphocyte ratio
OR
odds ratio
PPS
Patient Participation Scale
ROC
receiver operating characteristic
SD
standard deviation
SEOM
Spanish Society of Medical Oncology.

Declarations

Ethics approval and consent to participate

The study was conducted in accordance with the Declaration of Helsinki and was approved by the Research Ethics Committee of the Principality of Asturias (CEImPA2024.073), which served as the coordinating ethics committee, and by the ethics committees of all participating centers. Written informed consent was obtained from all participants before inclusion.

Consent for publication

Not applicable.

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request, in accordance with the conditions of informed consent. Data will be provided in anonymized form.

Competing interests

The authors declare that they have no competing interests related to the scope of this article.

Funding

This study was funded by the Spanish Society of Medical Oncology Foundation (FSEOM) through the Collaborative Groups Projects (FSEOM2023) and by AstraZeneca (AZ2024) and was supported by the *Agencia Estatal de Investigación* (AEI), *Ministerio de Ciencia, Innovación y Universidades*, Spain, under grant PID2025-171773OB-I00. The funding bodies had no role in the design of the study, data collection, analysis, interpretation of data, or writing of the manuscript.

Authors' contributions

CN, CC, and PJF contributed to the conceptualization, methodology, project administration, and writing of the original draft. CN, CC and PJF contributed to the methodology and formal analysis, performed the data analysis, and prepared the figures. All authors contributed to patient recruitment, data curation, and the provision of clinical information, and provided comments and substantive revisions to the manuscript. All authors participated in data interpretation and discussion, critically reviewed the manuscript, and approved the final version.

Acknowledgements

The authors would like to thank the Spanish Society of Medical Oncology (SEOM) for supporting this study, as well as all patients and investigators who participated. The authors also acknowledge the IRICOM team for their technical support in the development and maintenance of the web-based registry.

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Figures

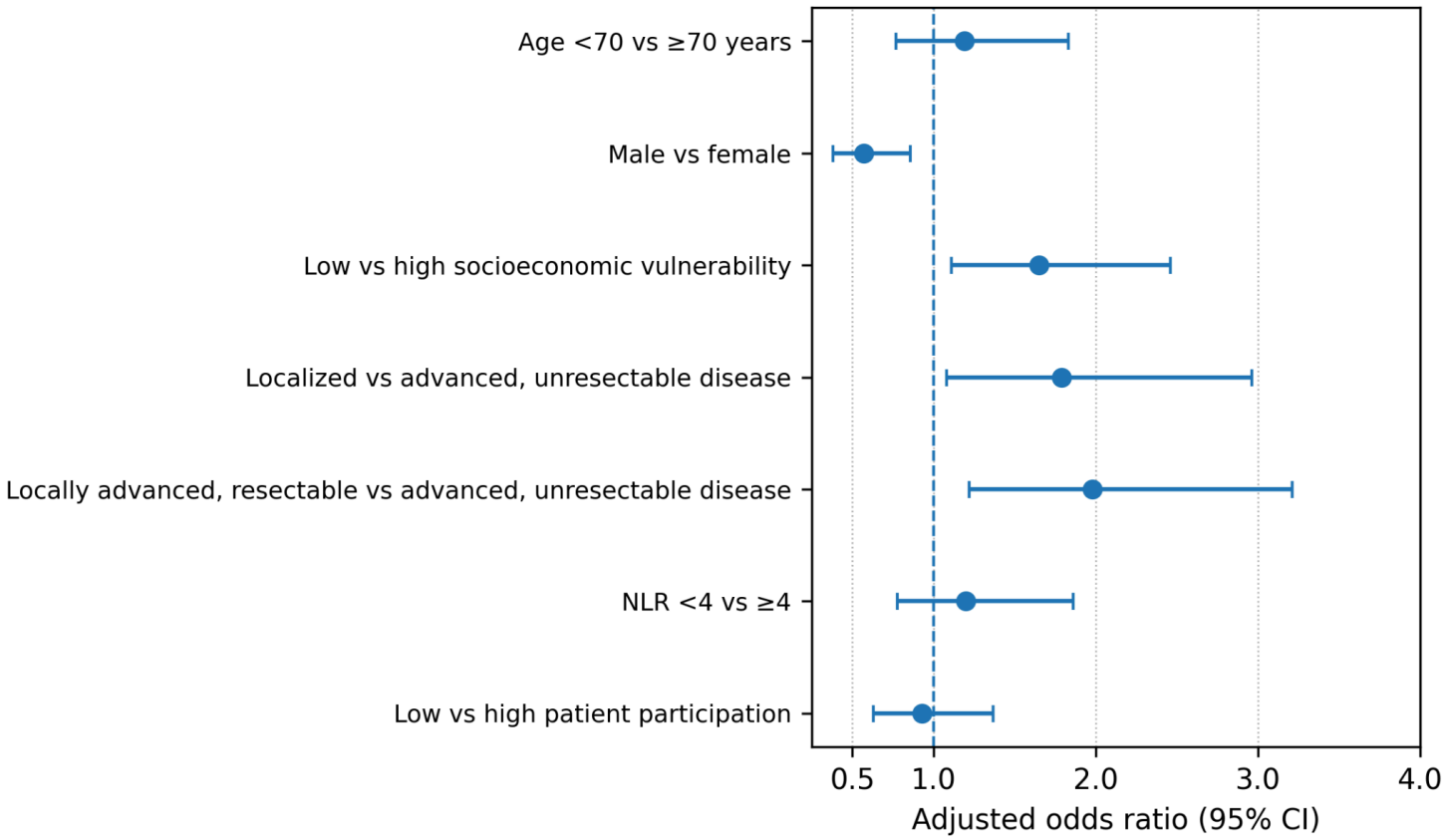

Figure 1

Forest plot of the multivariable logistic regression model for high treatment efficacy expectations.

Adjusted odds ratios (ORs) and 95% confidence intervals are shown for all variables retained in the final multivariable model. The vertical dashed line represents OR = 1.0. ORs >1 indicate higher odds of high treatment efficacy expectations, whereas ORs <1 indicate lower odds.

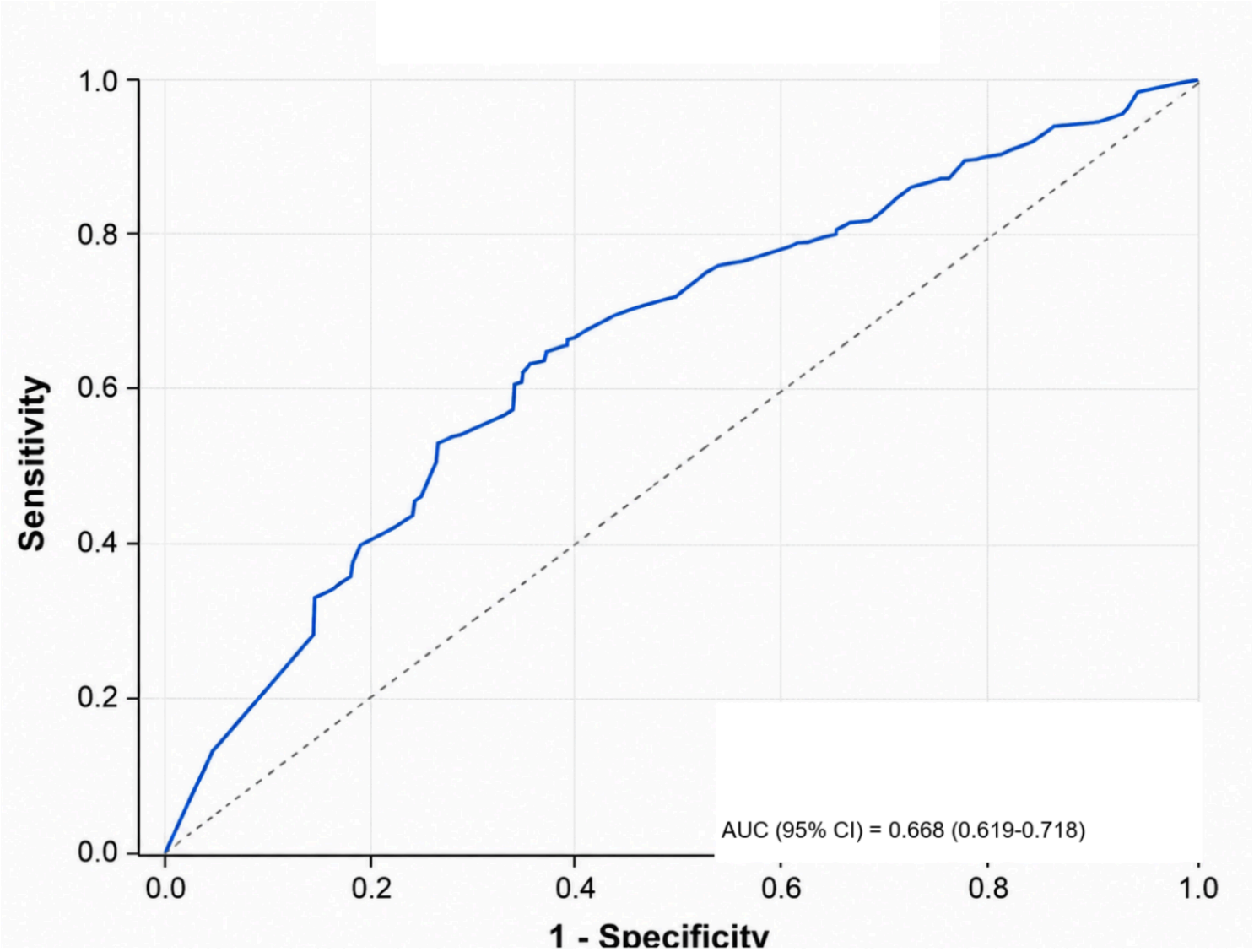

Figure 2

Receiver operating characteristic curve for the multivariable model of high treatment efficacy expectations.

The area under the curve was 0.668 (95% CI, 0.619-0.718). The diagonal line represents no discrimination.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- Table1Treatefficacyexpectation.docx
- Table2Treatefficacyexpectation.docx
- Table3Treatefficacyexpectation.docx

- Table4Treatefficacyexpectation.docx