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RESEARCH PAPER

Disentangling the reasons why older adults do not readily participate in cancer trials: a socio-epidemiological mixed methods approach

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Abstract

Background: Few studies of the under-representation of older adults in cancer clinical trials (CTs) have encompassed the entire pathway from a trial being available in a cancer centre to the patient's invitation to participate and then agreement or refusal to participate.

Objectives: The study's primary objective was to evaluate CT non-invitation and refusal rates. The secondary objectives were to identify factors associated with non-invitation and refusal and to assess experiences of CT participation from the patients' and professionals' perspectives.

Methods: Here, we used mixed methods and a socio-epidemiological approach to analyse reasons for the non-participation of eligible older patients with a solid cancer in cancer CTs in France.

Results: We found that non-invitation and low CT participation are mainly related to the patients' sociodemographic characteristics and living conditions (such as social isolation, being single, divorced or widowed, not having children and the absence of close family members) and the healthcare professionals' perceptions of insufficient informal support or a high homecare requirement.

Conclusion: Our results suggest that efforts to increase fair inclusion and the participation of older adults in CTs should target the physician–patient relationship, the medical profession and hospital funding, rather than the patient alone.

Keywords: cancer trial, non-invitation, inclusion, participation, refusal to participate, older people

Key Points

- There are few literature data on the reasons why pre-screened, eligible older patients do not participate sufficiently in clinical trials.

- In the present qualitative and quantitative study of older patients with cancer, we assessed non-invitation and refusal to participate in a clinical trial.
 - Non-invitation and low clinical trial participation are mainly related to the patients' sociodemographic characteristics.
-

Introduction

Over the last 30 years, policies aiming at making innovation more inclusive and more applicable have incentivised clinical trial (CT) providers to include more older patients. Following on from the US Food and Drug Administration's initial policy statement of 1989 [1], in 2006 the European Medicines Agency recommended an 'increase in the number of elderly patients participating in the clinical development programmes, requiring a proportion of the efficacy and safety database, in relation to the indication, and mirroring the target population' [2].

In contrast to children, women and ethnic minorities, little progress has been made on the inclusion of older adults [3]. Between 2000 and 2020, participants over 75 years of age accounted for less than 10% of inclusions in US cancer CTs [4]. In CTs opened to recruitment in 2019, the median age of trial participants was 6.5 years lower than that of the population of US cancer patients [5]. This gap is increasing: a systematic review of 20 randomised clinician trials with a total of 64,813 participants found that more than 60% of the people killed by coronavirus disease 2019 (COVID-19) were aged 80 or over; in fact, the mean age of people included in the COVID-19 vaccine trials was 45.2 [6].

A similar trend is seen in France: only 7.7% of cancer CT participants were aged 75 or over [7], and only 17.7% were aged 70 or over [8]. Only one of the 37 ongoing colorectal cancer CTs in 2018 was reserved for older patients, and the inclusion rate decreased dramatically after the age of 80 [9].

Although a large number of studies have addressed the lack of enrolment of older cancer patients in CTs, most focused on eligibility criteria [10, 11]. Few studies have investigated the entire inclusion pathway, i.e. from a trial being available in a centre, to eligibility criteria, invitation to participate and inclusion [12]. Other barriers to participation include investigators' reluctance to invite eligible older patients, and older patients' reluctance to accept invitations [9]. We recently demonstrated that one-third of eligible older patients with colorectal cancer were not invited to participate in a CT, and that 17% of the invited patients were not included [9].

We hypothesised that determining the reasons for CT non-participation after older patients had been screened would help to increase the participation rate. This is why we used mixed methods and combined epidemiological and sociological approaches in studying the entire inclusion pathway. Interview data can add depth and context to a quantitative analysis of social and epidemiological variables.

The primary objective of this study of older patients with a solid cancer was to evaluate CT non-invitation and refusal rates. The secondary objectives were to identify

factors associated with non-invitation and refusal and to assess experiences of CT participation from the patients' and professionals' perspectives.

Materials and methods

Study design and participants

QualiSAGE is a multicentre, prospective, socio-epidemiological cohort study of the inclusion of older patients with cancer in CTs; it comprises a quantitative study of eligible patients' characteristics and their decision to accept or refuse participation, and a qualitative study of illness trajectories and experiences of invitation. The mixed-methods study (based on a survey and interviews) was designed to describe the care trajectory of older patients with cancer included (or not) in a CT. QualiSAGE's inclusion criteria were as follows: age 70 or over, a solid cancer, eligibility to at least one CT (See [Supplementary Table 1](#) for a list) and treatment in one of five cancer centres in the greater Paris area of France between 2017 and 2020. After the participants had given their written, informed consent, they were included in QualiSAGE by their oncologist and followed up for invitation (or not) in a CT and inclusion (or refusal) in a CT ([Figure 1](#)). Details of the study design are given in [Supplementary Material](#).

Data collection

Quantitative data on patient characteristics were collected by CT staff and interview data on experiences of inclusion or non-inclusion were collected by social scientists (for full details, see [Supplementary Material](#)).

Data analysis

Summary statistics were used to describe the study population. The frequencies of patients invited to participate in a CT and then included in a CT were estimated, along with their 95% confidence intervals (CIs). Univariate analyses (based on a chi-squared test or Fisher's exact test, as appropriate) were used to identify factors associated with non-invitation and refusal to participate. Variables with $P < 0.2$ were included in a multivariate logistic regression analysis. A stepwise backward procedure was used to remove variables (based on $P < 0.05$) until the final model was obtained. In sensitivity analyses, we evaluated the associations between the studied variables and non-invitation of patients eligible at this step of the CT.

The qualitative analysis of interview transcripts included an iterative, cross-sectional, thematic analysis by two social scientists (MH and BD), according to the principles of

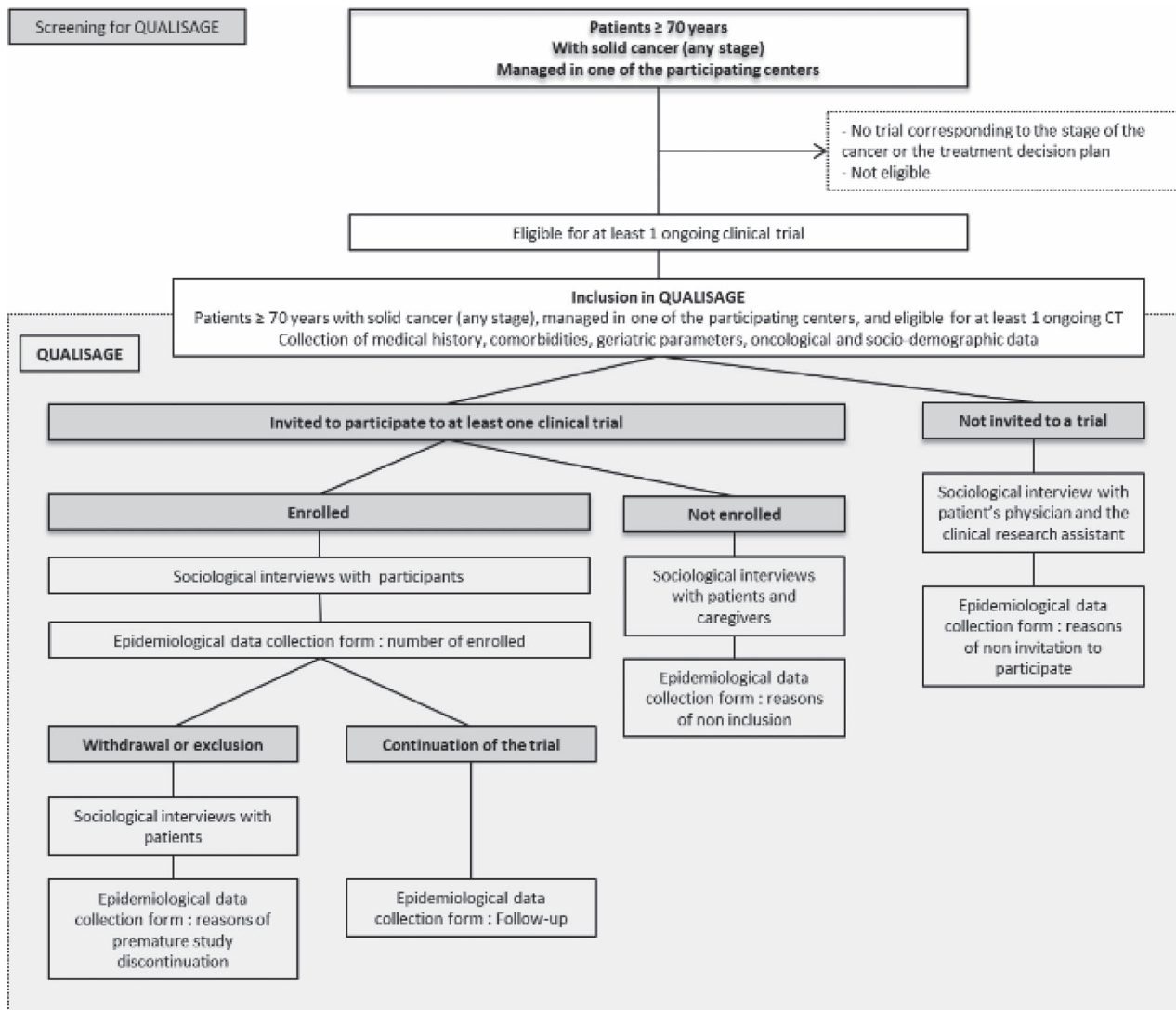


Figure 1. Study design: QualiSAGE, a multicentre socio-epidemiological mixed methods prospective cohort study of the inclusion of older patients with cancer in CTs.

grounded theory [13]. This analysis captured emerging, data-driven threads and links to theoretical concepts suggested by the data in three steps [14]: (i) manual, first-level coding with regard to age, sex, type of cancer, social category and CT participation; (ii) sharing notes taken during interviews in discussions about tentative findings, and recording common findings; (iii) use of the constant comparison method [13, 14]. For full details of the data analysis, see [Supplementary Material](#).

Results

Characteristics of the study participants

In all, 11 clinical research professionals (10 women and 1 man) agreed to be interviewed (Table 1). Of the 311 patients assessed for eligibility, 265 (184 women and 81 men) were included in our quantitative analyses (Figure 2): the median

(interquartile range) age was 76 (72–81) (Table 2). A subgroup of 25 patients agreed to be interviewed: 20 had agreed to participate in a CT, and five had refused (Table 3; for two case studies, [Supplementary qualitative data Quali 1 and 2](#)). For a full description of the participants' characteristics, see [Supplementary Material](#).

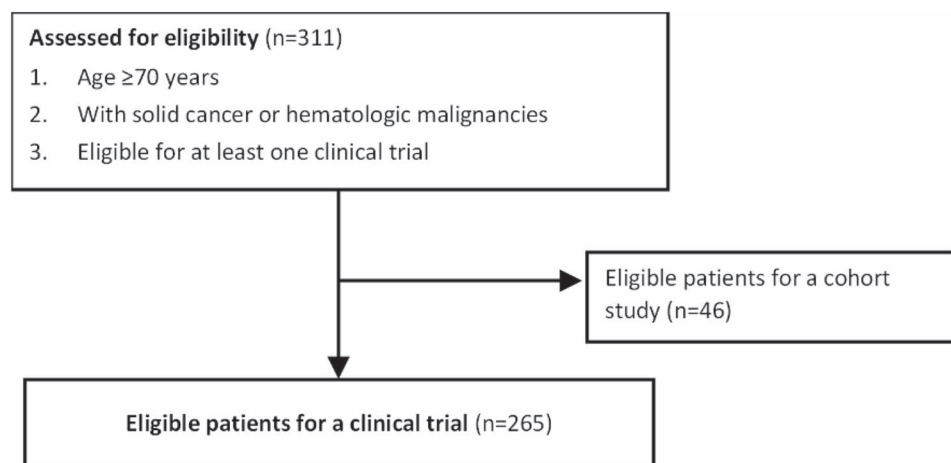
Non-invitation and associated factors

Of the 265 patients eligible for a CT, 223 (84.2%; 95% CI: 79.2%–88.3%) were invited to participate in at least one CT. Compared with invited patients, non-invited patients ($n = 42$) were more likely to be female (67% versus 83%, respectively), to be single/divorced/widowed (38% versus 66%), to have no children (9.6% versus 29%) and to live alone (35% versus 54%) (Table 2). Non-invited patients were more likely than invited patients to have a poor Eastern Cooperative Oncology Group performance status (24%,

Table 1. Characteristics of the clinical research professional study population ($N = 11$)

	Role	Years of clinical practice with older patients	Years of experience in cancer clinical research	Sex**	Age range	Cancer care and research centre***
1.	Oncologist*	>15 years	11–15 years	F	>60 years old	Centre 3
2.	Oncologist*	11–15 years	5–10 years	F	<40 years old	Centre 5
3.	Clinical trial technician	n/a	5–10 years	F	40–60 years old	Centre 5
4.	Oncologist*	11–15 years	5–10 years	F	<40 years old	Centre 5
5.	Clinical trial technician	n/a	5–10 years	F	<40 years old	Centre 5
6.	Oncologist*	>15 years	>15 years	M	>60 years old	Centre 1
7.	Clinical trial associate	11–15 years***	11–15 years	F	<40 years old	Centre 4
8.	Oncologist*	>15 years	< 5 years	F	40–60 years old	Centre 2
9.	Clinical research registered nurse	11–15 years	< 5 years	F	<40 years old	Centre 2
10.	Clinical research registered nurse	n/a	< 5 years	F	<40 years old	Centre 3
11.	Clinical trial associate	n/a	< 5 years	F	<40 years old	Centre 3

*All medical oncologists, except for one radiation oncologist **M: male; F: female. ***Centres 1 and 4: Private cancer centres; Centre 2: military hospital; Centre 3: general community hospitals; Centre 5: university hospital. Centres 1 and 4 host a high number of CTs, with 4/5 older patients invited, of which 78% participate. Interviewees cited as, e.g.: (Oncologist, >15 years of clinical research, community hospital)

**Figure 2.** Final patient study population.

versus 7%), risk for a cognitive disorder (37% versus 9%, respectively), a primary caregiver (87% versus 67%), breast cancer (74% versus 38%), localised cancer (68% versus 38%) and more likely to be receiving radiotherapy (50% versus 13%) or hormone therapy (52% versus 24%).

In a multivariate analysis, the factors independently associated with non-invitation were poor performance status, radiotherapy, primary education only, being single/divorced/widowed, not having children and having home support (see [Supplementary Material](#) and [Supplementary Table 2](#)). Patients receiving radiotherapy were more likely to have breast cancer, to receive hormone therapy and to have localised cancer. In an analysis with imputation of missing data, only poor performance status, radiotherapy, being single/divorced/widowed and not having children were independently associated with non-invitation (see [Supplementary Material](#) and [Supplementary Table 2](#)).

Our sensitivity analyses of the 251 eligible patients gave similar findings. The factors associated independently with the non-invitation were poor performance status (adjusted odds ratio (aOR) [95%CI] = 7.6 [1.8–33.2]; $P = 0.007$),

radiotherapy (20.2 [5.9–70]; $P < 0.001$), primary education (4.1 [1.1–15.7]; $P = 0.038$), being single/divorced/widowed (4.1 [1.2–14.1]; $P = 0.024$) and having home support (7.6 [1.9–29.4]; $P = 0.004$). In the analysis with data imputation, only poor performance status ($P = 0.004$), radiotherapy ($P < 0.001$) and being single/widowed/divorced ($P = 0.054$) were independently associated with the non-invitation.

The qualitative interview data showed that the patient's age was not the only criterion used by physicians and clinical research staff in deciding whether or not to invite the person to participate in a CT. When categorising 'older participants', the professionals considered living conditions as well as general health. One oncologist from a private-sector cancer centre with over 15 years of clinical research experience said 'Although a participant might be very old, they still might be fully independent and capable of understanding the CT's procedures and constraints'.

Characteristics related to lack of social support and declining ability to manage everyday life were frequent among patients who were eligible for a CT but were not invited to participate. An oncologist from a community hospital with

Table 2. Characteristics of the patient study population and comparison of patients who were not invited to participate in comparison to those who were invited (*N* = 265)

		Total population <i>N</i> = 265 <i>N</i> (%)	Not invited <i>N</i> = 42 <i>N</i> (%)	Invited <i>N</i> = 223 <i>N</i> (%)	<i>P</i> value
Age	<80	186 (70.2)	29 (69.1)	157 (70.4)	0.860
	≥80	79 (29.8)	13 (30.9)	66 (29.6)	
Gender	Men	81 (30.6)	7 (16.7)	74 (33.2)	0.033
	Women	184 (69.4)	35 (83.3)	149 (66.8)	
ECOG-PS, <i>missing n</i> = 15	≥2	24 (9.6)	9 (24.3)	15 (7.0)	0.001
Cancer	Colorectal	15 (5.7)	4 (9.5)	11 (4.9)	<0.001
	Liver/pancreas	17 (6.4)	3 (7.1)	14 (6.3)	
	Prostate	28 (10.6)	0 (0.0)	28 (12.6)	
	Breast	115 (43.4)	31 (73.8)	84 (37.7)	
	Other gynaecological	26 (9.8)	2 (4.8)	24 (10.8)	
	Lung	55 (20.8)	0 (0.0)	55 (24.7)	
	Others ^a	9 (3.4)	2 (4.8)	7 (3.1)	
Metastases, <i>missing n</i> = 2		151 (57.4)	13 (31.7)	138 (62.2)	0.0003
Decision treatment, <i>missing n</i> = 1	Surgery	17 (6.4)	1 (2.4)	16 (7.2)	0.49
	Chemotherapy	178 (67.4)	30 (71.4)	148 (66.7)	0.55
	Targeted therapy	57 (21.6)	10 (23.8)	47 (21.2)	0.70
	Immunotherapy	25 (9.5)	1 (2.4)	24 (10.8)	0.15
	Radiotherapy	50 (18.9)	21 (50.0)	29 (13.1)	<0.001
	Hormone therapy	75 (28.4)	22 (52.4)	53 (23.9)	0.0002
	Supportive care	1 (0.38)	0 (0.0)	1 (0.45)	1.000
Marital status, <i>missing n</i> = 10	Single	19 (7.5)	8 (21.1)	11 (5.1)	0.001
	Married/in couple	148 (58.0)	13 (34.2)	135 (62.2)	
	Divorced	29 (11.4)	5 (13.2)	24 (11.1)	
	Widowed	59 (23.1)	12 (31.6)	47 (21.7)	
Education, <i>missing n</i> = 31	Primary	54 (23.1)	10 (32.3)	44 (21.7)	0.19
	Secondary/higher education	180 (76.9)	21 (67.7)	159 (78.3)	
Live alone, <i>missing n</i> = 10		96 (37.7)	21 (53.9)	75 (34.7)	0.023
Have children, <i>missing n</i> = 6		226 (87.3)	29 (70.7)	197 (90.4)	0.0005
Primary caregiver, <i>missing n</i> = 29		172 (69.9)	33 (86.8)	139 (66.8)	0.013
Home support, <i>missing n</i> = 14		89 (35.5)	17 (45.9)	72 (33.6)	0.149
Regular activities	Physical activity, <i>missing n</i> = 50	135 (62.8)	16 (55.2)	119 (64.0)	0.36
	Social activity, <i>missing n</i> = 74	111 (58.1)	13 (52.0)	98 (59.0)	0.51
	Intellectual activity, <i>missing n</i> = 69	156 (79.6)	16 (66.7)	140 (81.4)	0.09
	Leisure activity, <i>missing n</i> = 63	138 (68.3)	17 (65.4)	121 (68.8)	0.73
BMI, <i>missing n</i> = 15	Normal	64 (25.6)	12 (33.3)	52 (24.3)	0.066
	Underweight	75 (30.0)	11 (30.6)	64 (29.9)	
	Overweight	77 (30.8)	5 (13.9)	72 (33.6)	
	Obese	34 (13.6)	8 (22.2)	26 (12.2)	
Comorbidities, <i>missing n</i> = 2	≥1	96 (36.5)	14 (33.3)	82 (37.1)	0.64
Geriatric assessment, <i>N</i> = 138					
Impaired ADL, <i>missing n</i> = 29	≤5	5 (4.6)	1 (6.7)	4 (4.3)	0.68
Impaired IADL, <i>missing n</i> = 59	<8	22 (27.9)	2 (33.3)	20 (27.4)	0.76
TUG, <i>missing n</i> = 48	>20 s	9 (10)	2 (18.2)	7 (8.9)	0.33
Impaired mini-GDS, <i>missing n</i> = 42	≥1	28 (29.2)	2 (22.2)	26 (29.9)	0.63
Impaired MMSE, <i>missing n</i> = 65	<24	9 (12.3)	3 (37.5)	6 (9.2)	0.022
Impaired G-8, <i>missing n</i> = 37	≤14	86 (64.7)	8 (47.1)	78 (67.2)	0.11

ADL, activities of daily living; BMI, body mass index; ECOG-PS, eastern cooperative oncology group performance status; IADL, instrumental ADL; GDS, geriatric depression scale; MMSE, mini mental state examination; TUG, timed get-up-and-go test.

over 15 years of clinical research experience stated that ‘a therapeutic trial is quite demanding for an older person who is a little isolated and does not understand things too well. They have to give their written consent, do blood tests, etc.: there are quite a few things to get through’. The professionals perceived social isolation (Supplementary Material Quali 4.1) and a low level of education (Supplementary Material Quali 4.2) as a characteristic that hindered inclusion.

Lastly, some professionals considered that geriatric problems would be more of a burden for investigators. One oncologist from a community hospital with more than 15 years of clinical research experience stated that ‘What prevents us from inviting patients is thinking that the trial might be more difficult or more complicated. Patients who are a little less independent or perhaps a little slower to respond will manage fewer things by themselves, in the event of

Table 3. Characteristics of the population of interviewed patients ($N = 25$)

	Sex	Age	Previous occupation	Cancer	Years since first symptoms	Clinical trial	Cited as
1.	Male	84	Photographer	Prostate	22	Accepted	(Male, 84 years old, living with prostate cancer for 22 years)
2.	Male	71	Butcher & instructor	Prostate	11	Accepted	(Male, 71 years old, living with prostate cancer for 11 years)
3.	Male	77	Warehouse worker	Colon	1	Accepted	(Male, 77 years old, living with colon cancer for 1 year)
4.	Male	76	Army, Engineer	Prostate	14	Accepted	(Male, 76 years old, living with prostate cancer for 14 years)
5.	Male	86	Air force, General	Prostate	23	Accepted	(Male, 86 years old, living with prostate cancer for 23 years)
6.	Male	72	Heating technician	Prostate	2	Accepted	(Male, 72 years old, living with prostate cancer for 2 years)
7.	Male	80	High-ranking official in international agency	Prostate	2	Accepted	(Male, 80 years old, living with prostate cancer for 2 years)
8.	Male	86	Office worker (transport)	Prostate	1	Accepted	(Male, 86 years old, living with prostate cancer since 1 year)
9.	Male	74	Office worker (police)	Prostate	4	Refused	(Male, 4 years old, living with prostate cancer)
10.	Male	76	Army, Colonel turned defence consultant	Prostate	10	Refused	(Male, 76 years old, living with prostate cancer for 10 years)
11.	Female	74	Secretary	Breast	14	Accepted	(Female, 74 years old, living with breast cancer for 14 years)
12.	Female	81	Photographer	Breast	6	Accepted	(Female, 81 years old, living with breast cancer for 6 years)
13.	Female	73	Worked very shortly. Married to a management consultant.	Breast	<1	Accepted	(Female, 73 years old, living with breast cancer for less than 1 year)
14.*	Female	71	Secretary	Breast	<1	Accepted	(Female, 72 years old, living with breast cancer within the last year)*
15.	Female	73	Bank employee	Breast	<1	Refused	(Female, 73 years old, living with breast cancer within the last year)
16.	Female	75	Nanny	Breast	<1	Refused	(Female, 75 years old, living with breast cancer within the last year)
17.	Male	72	Engineer	Lung	<1	Accepted	(Male, 72 years old, living with lung cancer within the last year)
18.	Female	81	Janitor	Breast	12	Refused	(Female, 81 years old, living with breast cancer for 12 years)
19.	Male	75	Police inspector	Lung	25	Accepted	(Male, 75 years old, living with lung cancer for 25 years)
20.	Male	70	Site supervisor	Pleura	<1	Accepted	(Male, 70 years old, living with pleural cancer for less than 1 year)
21.**	Male	74	Mechanic	Colon	<1	Accepted	(Male, 74 years old, living with colon cancer for less than a year)
22.	Female	70	Lab technician	Lung	1	Accepted	(Female, 70 years old, living with lung cancer for 1 year)
23.	Male	71	Missing	Prostate then pleura	4 then 1	Accepted	(Male, 71 years old, living with prostate and pleural cancer for 4 years)
24.	Male	77	Police inspector	Lung	<1	Accepted	(Male, 77 years old, living with lung cancer for less than 1 year)
25.	Male	84	Missing	Bladder then lung	Unsure, around 8	Accepted	(Male, 84 years old, living with bladder and lung cancer for 8 years)

*See Suppl. Quali 1 for case of Mrs. E. **See Suppl. Quali 1 for case of M. C.

a problem or a complication'. Thus isolated older patients requiring homecare are less frequently invited to participate in a cancer CT.

Refusal to participate in a CT, and the associated factors

Of the 223 patients invited to participate in a CT, 174 (78%; 95% CI: 72%–83.3%) were included in at least one CT, 30 (13.5%; 9.3%–18.6%) refused to participate and 19 were not included for other reasons.

Compared with patients who agreed to participate and were included in a CT, the patients who refused to participate were more likely to be women (62% versus 83%, respectively) and single/divorced/widowed (30% versus 62.1%), more likely to live alone (28% versus 57%) and more likely not to have any children (7.6% versus 20%) (Supplementary Table 3). Patients who refused to participate

were more likely than those who accepted to have digestive cancer (30% versus 8.6%), breast cancer (53% versus 32%), localised cancer (63% versus 33.5%) and more likely to have received radiotherapy (30% versus 9.2%). In contrast, patients who refused were less likely to practise intellectual activities (58%, versus 88% of those who agreed), social activities (42% versus 63%) or leisure activities (37.5% versus 75%).

In a multivariate analysis, the factors independently associated with refusing to participate in a CT were a low educational level, being single/divorced/widowed, having localised cancer and not practising intellectual or social activities (Supplementary Table 4). An analysis with imputation of missing data gave quite similar results, except that practising intellectual activities was no longer significant (Supplementary Table 4).

Our survey data showed that the few patients who refused an invitation had contrasting profiles. From our interview

data, five case studies [15] illustrate the social characteristics of patients who refused to participate ($n = 5$ refusals). For example, women with small, informal support networks and who reported little physical, intellectual or leisure activity tended to refuse CT invitations. This was the case for Mrs. F, an 81-year-old widowed former janitor with breast cancer diagnosed 12 years previously. Mrs. F lived alone but her daughter accompanied her to medical appointments. She kept her home clean and tidy but said that she was 'too tired' to participate in a trial: "I told myself: you will not be able to go out, all you will be doing is going to the hospital, doing housework and sleeping (. . .), so why sign up for that? Have not you done enough in your life? You deserve some rest (for additional data, see [Supplementary qualitative data Quali 4.3](#)).

Discussion

Contextualising the inclusion process

According to the results of our qualitative and quantitative analyses, healthcare professionals think that social isolation, requiring home care and having a low educational level restricted the participation of theoretically eligible older patients in CTs. Moreover, our quantitative analyses showed that poor performance status and radiotherapy (itself associated with breast cancer, hormone therapy and localised cancer) were associated with a lower likelihood of invitation to participate in a CT. The physician's perceptions of personal independence and the ability to understand instructions are key factors in deciding whether or not to invite an older patient to participate in a CT. With regard to the patients, the main factors associated with refusing to participate in a CT were a low educational level, social isolation, localised cancer and the absence of social activities.

Few studies have focused on the patients' sociodemographic characteristics and social isolation as factors in not being invited or refusing to participate in a CT. In fact, these aspects are crucial for understanding the under-representation of older patients in cancer CTs and the consequences for producing robust scientific evidence for this specific population [10]. We considered the contexts and conditions that led to older adults not participating in CTs, such as variety of living situations, the physician-patient relationship, physicians' perceptions of older patients and the implications for further incentivising fair inclusion.

From patients' deprivation to physicians' perception

For Phase I trials, deprivation (an ecological indicator related to income, employment, health, education, crime, access to services and the living environment in the area of residence) and ethnicity were associated with not being invited: patients living in the least deprived areas were almost twice as likely to be invited than those living in the most deprived areas [16]. We sought to further examine the relationship with social deprivation by conducting in-depth, inductive interviews

and including CTs beyond Phase I. It is noteworthy that we observed an association with individual social characteristics, such as previous employment and the educational level. This suggests that understanding physicians' perception of older patients' ability to follow instructions and keep up with the demands of CT participation is crucial for increasing invitation rates. According to the literature, poor health literacy is also associated with failure to invite patients to participate in a cancer CT; physicians might avoid inviting to patients who will supposedly be difficult to inform adequately about the trial's goals and procedures [17].

Our results confirmed the importance of the physician-patient relationship [18, 19] and, more specifically, physicians' perceptions of age in older patients and medical decision-making [20, 21] when considering whether to invite a patient to participate in a CT. This relationship is embedded in the context of CTs: clinicians decide whether to invite an older patient to participate by considering up the lack of individual-level benefit and the additional demands in terms of time, commuting and fatigue. Further investigation of the patient-physician and participant-investigator relationships is needed. France has a strong clinical tradition that has discouraged the organisation of large CTs; this might explain why some physicians (such as geriatricians and general practitioners) are reluctant to collaborate and promote greater CT participation by older patients. Encouraging a research culture during a clinician's medical training might foster the inclusion of minorities.

In a recent systematic review of the participation of older adults in cancer CTs, nine of the 12 observational studies featured physician-dependent barriers [22]. Providers were reportedly reluctant to enrol older adults because of the greater risk of adverse events and concerns about multiple comorbidities. Providers were also hesitant with regard to the patient's age alone. Other barriers included time demands, a lack of medical staff and preferences for another treatment. In a qualitative study of oncologists' perceptions of barriers to CT enrolment of older adults with cancer (based on semi-structured interviews), the two most commonly cited factors were 'stringent eligibility criteria' and 'oncologist concerns for treatment toxicities' [23]. The nine other themes were 'oncologist bias', 'patient attitudes, beliefs and understanding', 'patient goals', 'patient burden', 'patient transportation', 'caregiver burden', 'oncologist time, support', 'patient lack of access to cancer centres with trials' and 'patient awareness'.

Non-invitation

In our study, radiotherapy was unexpectedly and independently associated with non-invitation. We hypothesise that the factors associated with radiotherapy (breast cancer, localised disease and hormone therapy) were relevant, rather than radiotherapy *per se*. Non-invitation might have been more likely for patients with a good prognosis. We furthermore hypothesise that non-participation by radiotherapy patients is related to the burden of the

treatment regimen (5 to 25 days of treatment, sometimes at a location other than the chemotherapy centre). These aspects might also increase the likelihood of non-invitation.

We have reported previously on the influence of the institutional context on the determination of eligibility, invitation and recruitment [9]. Moreover, it is known that very few patients will turn down an invitation to participate in a cancer CT [9]. This implies that further targeting on the individual level (such as increasing the provision of consent or estimating consent as a function of the personality type [24]) is misguided. Our results also raise the issue of the impact of national health insurance schemes on inclusion. The French healthcare system offers affordable, high-quality care to most cancer patients; we hypothesise this makes participating in a CT less attractive.

Strengths and limitations

Our study had a number of strengths. First, the study encompassed qualitative and quantitative analyses and adopted public health and critical social science perspectives. Secondly, data were collected at a variety of cancer treatment centres (university hospitals, regional hospitals, dedicated cancer centres and a military hospital). Thirdly, our study shed light on invitations and refusal to participate and went beyond questions about eligibility.

The study had several limitations. First, few interviewed patients refused to participate in a CT. Secondly, the CTs were predominantly studies of chemotherapy, targeted therapies, immunotherapies, antibody-drug conjugates and hormone therapy; there were few CTs on treatment strategies, radiotherapy, surgery and supportive care. The heterogeneity of tumour sites was both a strength and a limitation because it ensured scalability to a broader population of patients with cancer but also encompassed some very diverse treatment issues.

Implications for research and practice

Incentivising fair inclusion (defined as both representing the minorities affected by the disease and being transparent) and publicly reporting population characteristics [25] are commendable goals and should be actively pursued by study sponsors. However, the oncologists' sometimes narrow perceptions of older patients' ability to understand CT instructions and withstand the demands of participating in a CT limited the invitation process and should be given high priority at the clinical level. This could be achieved by raising oncologists' awareness of older patients' individual and specific abilities to withstand treatments and CT participation, and by promoting cooperation between oncologists and geriatricians. This calls for efforts at the institutional level because increased hospital funding would allow for longer, more in-depth oncology consultations. Hiring clinical staff trained in the specifics of ageing and elder care might also be beneficial as they could help investigators invite a broader

range of older patients to participate in CTs. Patient support groups' involvement in the initiation, recruitment and follow-up of patient cohorts might also help to increase CT participation.

Conclusion

Low CT invitation and participation rates were mainly related to the patients' sociodemographic characteristics (including their living conditions and the lack of close family members, i.e. being single/divorced/widowed, and not having any children), and the professionals' perception of insufficient informal support or a high homecare requirement. Our findings suggest that efforts to increase the participation of older adults in CTs should focus on the physician–patient relationship, the medical profession and hospital funding, rather than the patient.

Supplementary Data: Supplementary data mentioned in the text are available to subscribers in *Age and Ageing* online.

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