A difficult balancing act : Informing breast cancer patients about adjuvant systemic therapy

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Chapter 5

Breast cancer specialists' views on and use of risk prediction models in clinical practice: *a mixed methods approach*

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Abstract

Purpose

Risk prediction models (RPM) in breast cancer quantify survival benefit from adjuvant systemic treatment. These models (e.g. Adjuvant! Online (Adjuvant!)) are increasingly used during consultations, despite their not being designed for such use. As still little is known about oncologists' views on and use of RPM to communicate prognosis to patients, we investigated if, why, and how they use RPM.

Methods

We disseminated an online questionnaire that was based on the literature and individual and group interviews with oncologists.

Results

Fifty-one oncologists (partially) completed the questionnaire. Adjuvant! is the best known (95%) and most frequently used RPM (96%). It is used to help oncologists decide whether or not to recommend chemotherapy (>85%), to inform (86%) and help patients decide about treatment (>80%), or to persuade them to follow the proposed course of treatment (74%). Most oncologists (74%) believe that using Adjuvant! helps patients understand their prognosis.

Conclusion

RPM have found a place in daily practice, especially Adjuvant!. Oncologists think that using Adjuvant! helps patients understand their prognosis, yet studies suggest that this is not always the case. Our findings highlight the importance of exploring whether patients understand the information that RPM provide.

Introduction

Deciding about adjuvant systemic therapy for breast cancer can be a difficult balancing act between potential survival gains and side-effects. Many risk prediction models (RPM) have been developed to primarily aid oncologists' decision-making about adjuvant systemic treatment (1). RPM seem to meet a need and appear to have been widely adopted in clinical practice. For example, the Dutch breast cancer adjuvant systemic treatment guidelines are largely based on Adjuvant! survival and treatment benefit estimates (2). The American National Comprehensive Cancer Network (NCCN) guidelines have incorporated Oncotype Dx in their adjuvant systemic treatment decision-making algorithm (2,3). The British National Institute for Health and Clinical Excellence (NICE) has incorporated the Nottingham Prognostic Index in their decision algorithm and both NICE and NCCN endorse the use of Adjuvant! to support estimations of individual prognosis and absolute benefit of adjuvant treatment (4,3).

A 2005 questionnaire amongst American medical oncologists found that 80% had ever used Oncotype Dx, and that 78% used Adjuvant! (5). A small questionnaire study amongst 25 British medical oncologists from 13 oncology centers found that 96% of the participants used Adjuvant! to calculate mortality estimates and 36% also used it to calculate relapse probabilities. Most participants (≥84%) were confident that Adjuvant! estimates are accurate (6).

Most RPM offer graphical representations of prognostic information, and this increases their appeal for use in the consultation to convey prognostic information to patients. The UK-based questionnaire found that 92% of participants regularly discussed the survival probabilities and treatment benefit estimates from Adjuvant! with their patients, and a quarter also said they provided patients with the printout from Adjuvant! (6). Not much is known about such use of RPM during the consultation (i.e., frequency and reason for use) and similarly, little is known about how well patients understand prognostic information from RPM. The information these models provide is complex and could cause confusion if risk communication is not done properly, and increase patients' anxiety. Patients tend to have problems understanding probabilities, in part due to limited understanding of health statistics (7,8). Two small studies (<30 patients) assessing patients' understanding of prognostic information before and after receiving results from Adjuvant! reported that 43% - 65% were not able to accurately recall recurrence-free (RFS) and/or overall survival (OS) immediately after the consultation with their medical oncologist (9,10). In a few patients the use of Adjuvant! printouts led to heightened confusion and decreased comprehension (10). Simplifying Adjuvant!'s printout resulted in significantly more accurate recall (11), although at the cost of information loss.

A drawback of RPM is that the point estimates they provide reflect average outcome probabilities derived from groups of similar patients (7). Adjuvant! provides survival estimates as point estimates without the confidence interval surrounding the estimates. Knowing the width of the confidence interval could help oncologists gauge how robust Adjuvant!'s survival estimates are. Yet, it is unknown if oncologists are interested in this type of information and if and how they would disclose the associated uncertainty to their patients. Many patients have difficulties understanding uncertainty (7); and the effect of and how best to share uncertainty with patients is unknown (12,13).

Given the lack of information on the use of RPM to communicate prognosis to patients, and the pitfalls if not done appropriately, we assessed oncologists' a) familiarity with and use, b) reasons for use, for themselves and with patients, c) views on the (dis) advantages of RPM, and d) wish for uncertainty estimates and views about communicating these to patients.

Methods

Questionnaire development

Given the limited literature on this subject, we first conducted semi-structured interviews (N=10) with surgical and medical oncologists. We aimed to conduct a minimum of 10 interviews, and during the analysis process we also observed that after 10 interviews new categories, themes or explanations stopped emerging (data saturation). Subsequently, we held two online focus groups with a new group of surgical and medical oncologists (8 active participants out of 20 who agreed to participate). Oncologists attending the 2011 Dutch Medical Oncology congress and members of the Comprehensive Cancer Centre The Netherlands (IKNL) medical oncology and breast cancer working parties were invited to participate via e-mail, if they wanted to participate they indicated their preference for either an interview or focus group. IKNL has a nationwide coverage, facilitating the recruitment of our target population throughout The Netherlands.

The themes explored in the interviews were oncologists' a) familiarity with and use, b) reasons for use, both for themselves and with patients, c) views on the (dis)advantages of RPM, and d) wish for uncertainty estimates and views about communicating these to patients. We used the information obtained in the interviews to formulate statements, which we posted on a website especially created for these online focus groups. The online focus group participants were asked to post their views about the statements during a four-week period. They were also able to respond to other participants' posts. Participants were not aware of each other's identity. The data from the interviews and online focus groups were independently coded by two researchers using NVivo 9 software, and an open coding system. Discrepancies in coding were resolved by consensus.

Next, we used the data from the interviews and online focus groups to develop an online questionnaire. With the online questionnaire we explored all the themes (a-d) described above (Appendix 1). We also assessed participants' a) characteristics, and b) general reluctance to disclose uncertainty (14). To limit participants' time investment, most questions were multiple choice; answering categories were based on the findings of our qualitative analyses. Participants were also offered the option of providing open answers.

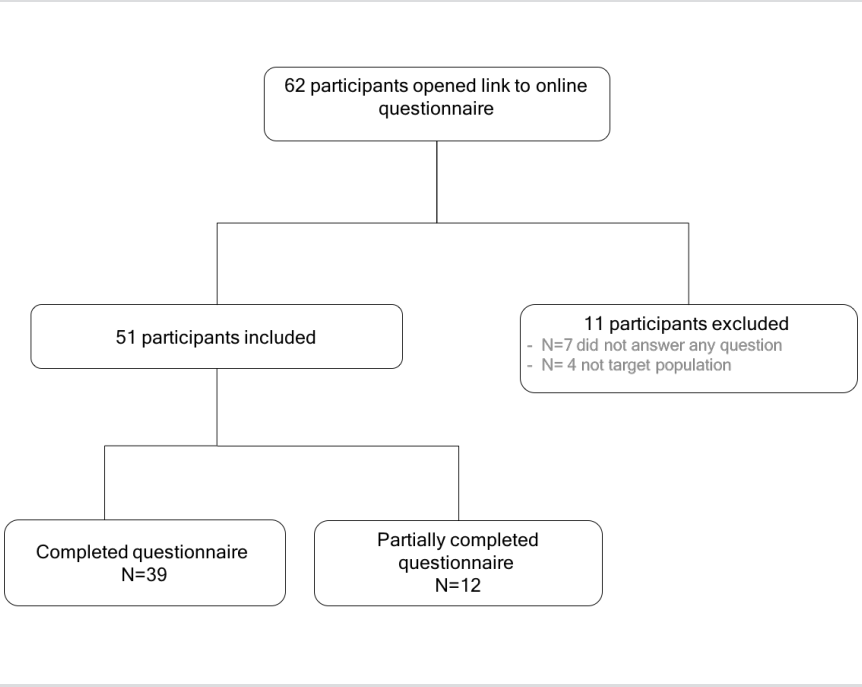

Figure 1 Flowchart of participants

Recruitment of participants online questionnaire

The Comprehensive Cancer Centre The Netherlands sent out an invitation on our behalf to the members of all regional medical oncology and breast cancer working parties. Medical and surgical oncologists were eligible to participate in the current study. Participants could anonymously complete the questionnaire online or on paper. Four weeks after sending the initial invitation, a reminder was sent to the working parties.

Data analysis

For privacy reasons we could not access data on the size and composition of the working parties; and are unable to estimate the response rate. The proportion of surgical and medical oncologists in our sample was similar to the distribution of the specialties in a reference sample of IKNL-working parties across The Netherlands. Participants who only partially completed the online questionnaire were included in the analyses if they had answered at least the questions on the (dis)advantages of RPM in general. Descriptive analyses were performed, as well as comparisons between groups, using Chi Squared or Fisher's Exact Tests for categorical variables and Student's T-test for continuous variables, all using SPSS 20.

In the results we will focus on the RPM that the majority of oncologists use most frequently, illustrate oncologists' views on and how they use RPM in general. Further, we will present quotes from the interviews and online focus groups to illustrate the quantitative findings.

Results

Fifty-one participants were included (Figure 1) and 77% of them completed all questions. There were no significant differences between the participants who had fully or partly completed the questionnaire (Appendix Table 1). On average the participants were 49 years old, 44% were female, and 82% worked in teaching hospitals (general or university) (Table 1). We found no significant difference in socio-demographic and work-related characteristics between surgeons and medical oncologists.

Familiarity with and use of RPM in clinical practice

The best-known RPM amongst oncologists were Adjuvant! (95%) and MammaPrint (88%). About one-third were familiar with Oncotype Dx and 19% with the Nottingham Prognostic Index. Overall, 71% of surgical oncologists reported to sometimes or regularly use RPM, compared to 100% of medical oncologists (p= 0.004; Fisher's exact test) (Table 2). Of those who use RPM, medical (100%) and surgical (95%) oncologists indicated that they most frequently use Adjuvant!. If MammaPrint was used, in most cases it was to supplement Adjuvant!. For example, if the patient and/or the oncologist were leaning towards foregoing chemotherapy, the MammaPrint results were decisive in determining the probability that forgoing chemotherapy would negatively affect RFS.

We asked participants which estimates, 10-year OS or RFS, they most frequently consulted a) before and b) during consultations with patients. Both surgical (63%) and medical (71%) oncologists reported that they usually consulted both estimates before the consultation. If only one was consulted, it most frequently was OS (21%). The majority indicated that they preferred OS because the main aim of adjuvant systemic treatment is to improve OS. There were also some concerns about the robustness of the relapse estimates, as in Adjuvant! no distinction is made between loco-regional and distant recurrences. One in three oncologists indicated that they habitually showed patients only the OS estimates and about half reported to show patients both the OS and RFS estimates. Oncologists indicated that Adjuvant! estimates are not too difficult to show to patients (Table 3). Some think that estimates from Adjuvant! should always be disclosed to patients, except if the patient strongly objects to hearing this information. Most medical (63%) and surgical (74%) oncologists indicated that one should ask patients if they want to hear Adjuvant! estimates, and if so, provide them with the estimates.

Table 1 Participants' characteristics (N=51)*

	Surgeons *N (%)*	Medical oncologists *N (%)*
Average age in years (range)	50 (37-64)	48 (31-62)
Age unknown	8 (32)	5 (19)
Gender		
Male	12 (71)	10 (48)
Experience with breast cancer care in years		
<5	5 (20)	10 (39)
6-10	9 (36)	9 (35)
>10	11 (44)	7 (27)
Number of consultations with early-stage breast cancer patients per month		
1-5	1 (4)	3 (12)
6-10	7 (7)	12 (46)
>10	17 (68)	11 (42)
Type of hospital		
General teaching hospital	10 (59)	12 (55)
University medical center	4 (24)	6 (27)
General non-teaching hospital	3 (18)	4 (18)
Total	25 (49)	26 (51)

* = Participants do not add up to 51 due to missing data; No significant differences between surgical and medical oncologists, hence p-values not reported.

Of medical oncologists, 42% indicated that they ask patients if they want a printout to take home, compared to 11% of surgical oncologists (p= 0,04); Fisher's exact test). Most surgical oncologists (61%) indicated that they do not actively offer a printout, but provide it if asked. Moreover, many participants (63% of medical and 47% of surgical oncologists) feel that oncologists should disclose Adjuvant! estimates to patients even if they forecast a bleak outlook. As an oncologist said: "Before I disclose Adjuvant!'s estimates I tell patients that the estimates could be quite hard to stomach and check whether they still want to hear it…. if they still do, I discuss them".

Table 2 Frequency of RPM use (in *N (%)*)			
	Surgeons *N= 24**	Medical oncologists *N=25**	P [#]
Never	4 (17)	0	0.007
Ever	3 (13)	0	
Sometimes	9 (38)	7 (28)	
Regularly	8 (33)	18 (72)	

*= Participants do not add up to 51 due to missing data; [#] = Comparison made using Fisher's exact test

Reasons for using RPM for themselves or with patients

More than 90% of oncologists sometimes use Adjuvant! to prepare the consultation; one in four medical oncologists always use Adjuvant! to prepare the consultation. Oncologists predominantly consult Adjuvant! before the consultation, to decide whether or not to recommend chemotherapy alone (87%) or in combination with endocrine therapy (91%). Adjuvant! is also consulted to decide about endocrine monotherapy (60%). Up to one in four oncologists (surgical more often than medical oncologists) also use Adjuvant! to decide about neo-adjuvant systemic therapy. Overall, 85% of surgical and 76% of medical oncologists indicated that their treatment preference sometimes changed after consulting a RPM. If there was a shift in medical oncologists' treatment preference, it was caused by either viewing the results of Adjuvant! alone (42%) or in combination with MammaPrint (58%).

Table 3 Oncologists' views on using Adjuvant! Online (Adjuvant!) during the consultation (in %)						
	Surgical oncologists (*N =19*[$])			Medical oncologists (*N =24*[$])		
Oncologists should:	*Disagree*	*Neutral*	*Agree*	*Disagree*	*Neutral*	*Agree*
not show Adjuvant! estimates to patients as it is too difficult for them	84	16	0	83	17	0
not show Adjuvant! estimates to patients as people cling too much to the estimates	53	47	0	75	21	4
never show Adjuvant! estimates to patients, it is best to use verbal labels[#] instead	42	42	16	71	21	8
not show Adjuvant! estimates to patients if these estimates are too hard to face	47	32	21	63	12	25

Table 3 Oncologists' views on using Adjuvant! Online (Adjuvant!) during the consultation (in %)

	Surgical oncologists ($N = 19^{\$}$)			Medical oncologists ($N = 24^{\$}$)		
Oncologists should:	*Disagree*	*Neutral*	*Agree*	*Disagree*	*Neutral*	*Agree*
only show Adjuvant! estimates to highly educated patients as they are best capable of understanding this information	63	21	16	83	12	4
offer to show Adjuvant! estimates to patients and show the estimates if the patient wants to see it	16	10	74	17	20	63
always show Adjuvant! estimates, unless the patient absolutely does not want to hear this	53	26	21	79	8	13
always show Adjuvant! estimates to breast cancer patients ≤ 40 years, as this information is most relevant for these patients	53	36	11	71	16	13
always show Adjuvant! estimates if the patient asks for information on prognosis	0	32	68	17	8	75

$ Participants do not add up to 51 due to missing data; # Verbal labels are terms used to denote likelihoods, e.g. "small chance that x will happen" or "it is likely that x will happen"; The category "*disagree*" comprises of those that selected either "*totally disagree*" or "*disagree*". And the category "*agree*" comprises of those that selected either "*agree*" or "*totally agree*"; No significant differences between surgical and medical oncologists were found, hence p-values Fisher's exact test are not reported.

Surgical oncologists indicated to regularly use Adjuvant! to help patients decide whether or not undergoing chemotherapy is worthwhile (73%) (Table 4). Medical oncologists stated to use Adjuvant! to provide patients with prognostic information (100%) and/or to help patients decide whether or not to undergo chemotherapy (96%). Additionally, 75% of medical oncologists indicated that they sometimes/regularly use Adjuvant! to convince patients that undergoing chemotherapy is not necessary and 83% also use it occasionally to convince patients of the benefit of their proposed treatment plan.

Medical (96%) and surgical (75%) oncologists reported that the output of RPM not only influenced their own decisions, but also those of their patients. In all, 56% of surgical and 70% of medical oncologists indicated that they frequently observe hesitation with regard to chemotherapy, yet after seeing Adjuvant!'s prognostic estimates patients change their minds.

Over 70% of oncologists think that Adjuvant! helps patients to understand their prog-

nosis better. Conversely, about 14% think that Adjuvant! does not make it easier for patients to understand their prognosis, but makes it easier for them to discuss prognosis with patients.

Views on the (dis)advantages of RPM

The two most frequently cited concerns about RPM were a) estimates only provide insights at a group level (34%) and b) those based on genetic profiles, e.g. MammaPrint or Oncotype Dx, are not yet sufficiently validated for use in clinical practice (36%). Twelve percent of medical oncologists indicated that another important drawback of RPM is that they give patients a false sense of security: "As you can imagine, when people who feel the need to keep a tight grip on their illness or their life find themselves in a situation in which all certainties have been taken away, that they desperately look for something to cling to… it's very hard to get them to put these estimates in perspective".

We asked oncologists to indicate their main concerns with regard to Adjuvant! specifically. They consistently indicated that Adjuvant! is one of the best RPM currently available, but far from perfect. The accuracy of Adjuvant!'s estimates in some patient populations, e.g. in the elderly (>65 years), is possibly suboptimal. Some felt that it would be informative, especially for younger patients and those with hormone receptor positive disease, if Adjuvant! were to provide prognostic estimates up to 20-years follow-up, instead of only 10-year estimates. The majority (85%) indicated that Adjuvant! is currently missing important prognostic factors, particularly her2neu receptor status. Also, preferably Adjuvant! should take the effect of Trastuzumab into account. More than three quarter indicated that the way prognostic factors are categorized in Adjuvant! is not ideal, or that it is unclear how the categories should be interpreted. Many felt the categorization of nodal status too crude (i.e., 0 positive; 1-3 positive; 4-9 positive and > 9 positive nodes). "A patient with one positive node would reasonably be expected to have a better prognosis than a patient with three positive nodes." It is currently unclear how to classify patients with micro-metastases; classifying them as node negative might yield prognostic estimates that are too optimistic, but classifying them as having 1-3 positive nodes seems to be a gross exaggeration.

It was often mentioned as an asset that Adjuvant! takes comorbid conditions into account, but most participants do not know how to interpret the categories Adjuvant! uses (i.e., perfect health; minor problems; average for age; major problem +10; major problem +20 and major problem +30). "If a patient has well-managed diabetes, is that a minor problem or is it a major problem?". Over 80% of oncologists indicated that they tend to use the default setting, namely "minor problems". However, if a patient has significant comorbidities, choosing a comorbidity category is often a bit of guesswork; oncologists try out multiple categories to see what happens with the estimates, and stick with the one they think yields the most realistic survival estimates.

Views on communicating uncertainty around the estimates from RPM
One in three (37%) thought that a confidence interval would be of no added value to them, with most indicating that they assume that Adjuvant!'s estimates are sufficiently accurate because the Dutch breast cancer guidelines are partly based on Adjuvant!. Half (49%) would want to know the width of the confidence intervals to determine for themselves how much credence they should give the estimates.

One in five oncologist are highly reluctant to disclose uncertainty to patients; yet, 95% of surgical and 100% medical oncologists discuss the uncertainty associated with Adjuvant!'s estimates with their patients in general terms. One oncologist said: "Uncertainties are a part of consultations with patients. We should not shy away from communicating them." Using an open-ended question, we asked oncologists to describe how they communicate uncertainty around Adjuvant!'s estimates to patients. The two most frequently reported methods were: a) telling patients that the estimates do not say anything about an individual, they are true at a group level (46%) and b) telling patients the estimates are based on statistics (14%). If they were available, over 75% of oncologists would disclose the confidence interval surrounding Adjuvant!'s estimates to patients, whom they think are capable of understanding this. A medical oncologist pointed out: "Sometimes I think patients can't handle uncertainty, but doctors probably struggle with it even more…".

Discussion

We assessed oncologists' views on RPM and their use of these tools. Adjuvant! is the most frequently used RPM, with many oncologists using it to prepare their consultation and use Adjuvant! in the encounter to inform and/or help patients decide about treatment. About half sometimes use Adjuvant! to convince patients of the merits of the proposed treatment plan. Surgical and medical oncologists' role in decision-making about adjuvant systemic treatment differs, hence we found some differences in frequency and motivation for using RPM.

Unexpectedly, we found that up to a quarter of oncologists also used Adjuvant! to decide about neo-adjuvant systemic therapy. Adjuvant! has not been validated for this purpose, and it is not known whether the estimates hold in the neo-adjuvant setting.

MammaPrint was the best-known RPM based on a gene profile, but was rarely used. Most oncologists indicated that such RPM do not yet have sufficient scientific underpinning to guide treatment decision-making. Many indicated that they are awaiting the results of the Mindact trial[1] and TAILORx trial[2], to know whether high risk patients according to Adjuvant! but low risk according to MammaPrint or Oncotype Dx, respectively can be spared chemotherapy without negatively affecting RFS.

Oncologists expressed concern about the validity of Adjuvant!'s estimates in specific subgroups and felt some key prognosticators were missing, inappropriately categorized or it is difficult to categorize patients into. These views are in agreement with the results of our recent systematic review (1). In spite of these limitations, most felt that Adjuvant! is a helpful tool and that no matter how complete the RPM, it will always be impossible to provide patients with a 100% certainty about disease outcome or treatment effect.

Most felt that using Adjuvant! during consultations helped patients understand their prognosis better. Moreover, in general oncologists did not think that the complex nature of Adjuvant!'s estimates and the fact that these estimates could be hard to hear for patients, are reasons not to use Adjuvant! during consultations. Oncologists even reported high willingness to communicate about the uncertainty surrounding the estimates of RPM to patients.

There are not many studies we can compare our findings to. A study that assessed the communication of uncertainty about risks and benefits of various treatments in

1 The MINDACT (Microarray In Node negative and 1-3 positive lymph node Disease may Avoid ChemoTherapy): http://www.agendia.com/clinical-trials-mindact/; Date last accessed: 27-05-2014.
2 The TAILORx trial (Trial Assigning IndividuaLized Options for Treatment (Rx)): http://www.cancer.gov/clinicaltrials/noteworthy-trials/tailorx; Date last accessed: 27-05-2014.

outpatient clinics found that uncertainty was discussed in about 1% up to 16% of consultations depending on the difficulty of the decision at hand (15). It would be interesting to get insights in how and how often oncologists actually discuss uncertainty in daily practice, since there are no guidelines available on how uncertainty should best be communicated (12). Moreover, it is unclear to what extent patients understand the uncertainty around RPM estimates and how information on uncertainty affects them personally as well as their final treatment decision.

Unfortunately, we were unable to determine our response rate. Also, the number of participants was relatively small. This is partly explained by the fact that we recruited participants via the IKNL-working parties which consist of a highly motivated, yet relatively small subgroup of experienced oncologists.

In conclusion, RPM have found their way into the consultation. It is encouraging that oncologists are driven to obtain the best possible prognostic estimates to guide their own decision-making and to communicate this information to patients, which in turn may facilitate patient participation in decision-making. However, clinicians assume that using RPM during consultations helps patients understand their prognosis better. Studies on patient understanding of prognosis (10,9) suggest that using Adjuvant! does not necessarily facilitate or improve patient understanding. Large observational studies of the communication process between oncologists and patients involving RPM are urgently needed to get insight into whether patients indeed understand the risks communicated during the consultation, and whether this enhances their participation. Additionally, studies assessing patients' understanding and acceptance of communication about uncertainties are needed to guide practice on communicating uncertainties.

Table 4 Oncologists' reasons for using Adjuvant! Online (Adjuvant!) (in %)

	Surgical oncologists (*N* =19[$])					Medical oncologists (*N* =24[$])					
	Never	Rarely	Sometimes	Often	Always	Never	Rarely	Sometimes	Often	Always	P [#]
Oncologists use Adjuvant! before the consultation to:											
prepare for the consultation	11	21	37	26	5	8	8	25	33	25	-
Oncologists use Adjuvant! during the consultation to:											
inform patients	16	16	53	16	0	0	0	38	50	13	< 0.01
inform patients who ask about prognosis	16	16	26	37	5	0	4	21	54	21	-
present the survival probabilities graphically	16	16	47	11	11	4	30	22	39	4	-
convince patients that undergoing chemotherapy is not necessary	42	11	26	21	0	4	21	63	8	4	< 0.01
help patients decide whether or not to undergo chemotherapy	21	5	47	26	0	4	4	25	63	4	0.05
convince patients of the benefits of my treatment plan	32	5	42	21	0	0	17	58	21	4	< 0.05

[$] Participants do not add up to 51 due to missing data; [#] = Comparison made using Fisher's exact test; - = not significant

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Appendix Table 1: Participants' characteristics of by completion of the questionnaire (N=51)

	The questionnaire was:	
	Completed N (%)	Partially completed N (%)
Average age in years (range)	49 (31-64)	unknown
Gender (male)	22 (56)	unknown
Specialty		
Surgeon	17 (44)	8 (67)
Medical oncologist	22 (56)	4 (33)
Experience with breast cancer care in years		
<5	4 (10)	0
6-10	15 (39)	4 (33)
>10	20 (51)	8 (67)
Number of consultations with early-stage breast cancer patients per month		
1-5	11 (28)	4 (33)
6-10	15 (39)	3 (25)
>10	13 (33)	5 (42)
Type of hospital		
General teaching hospital	22 (56)	
University medical center	10 (26)	unknown
General non-teaching hospital	7 (18)	
Total	39 (77)	12 (24)

No significant differences between surgical and medical oncologists, hence p-values Fisher's exact test are not reported

Appendix 1: Oncologists' views on and use of risk prediction models

Fill in date

Please first fill in today's date? (day/month/year)

☐☐/☐☐/☐☐☐☐

1. What is your specialism?

   - ❑ Surgical oncologist
   - ❑ Medical oncologist
   - ❑ Surgical oncologist in training
   - ❑ Medical oncologist in training
   - ❑ Other, namely:

     ……..

2. Approximately how many new breast cancer patients do you see per month, where initially the treatment intent is curative?

   - ❑ 1−2 patients
   - ❑ 3−5 patients
   - ❑ 6−10 patients
   - ❑ 11−15 patients
   - ❑ >15 patients

3. How many years experience do you have treating breast cancer patients?

   - ❑ < 2 years
   - ❑ 2−5 years
   - ❑ 6−10 years
   - ❑ > 10 years

With the following questions we want to ascertain which risk prediction models you are familiar with, which you may use and what you think of them.

4. With which of the risk prediction models below are you familiar?
   (*multiple answers possible*)

   - ❑ Adjuvant! Online
   - ❑ MammaPrint
   - ❑ Nottingham Prognostic Index
   - ❑ Oncotype Dx
   - ❑ Other, namely: ……

Below are a few arguments against the use of risk prediction models that are sometimes made by clinicians. Will you indicate for each statement the extent to which you are in agreement.

5. Information from risk prediction models:

	Totally Disagree	Disagree	Neither disagree nor agree	Agree	Totally Agree
is of no added value to me in the clinic	❑	❑	❑	❑	❑
is not sufficiently scientifically supported for use in the clinic	❑	❑	❑	❑	❑
is not user friendly	❑	❑	❑	❑	❑
gives false assurances, onto which patients unduly cling	❑	❑	❑	❑	❑
does not say anything about individual patients, as it applies to groups	❑	❑	❑	❑	❑
is too complicated	❑	❑	❑	❑	❑
makes patients unnecessarily anxious	❑	❑	❑	❑	❑
based on genetic profiles, such as MammaPrint, is <u>not</u> sufficiently scientifically supported	❑	❑	❑	❑	❑

I (also) have other arguments against the use of risk prediction models, namely:

.....

6. Do you sometimes use a risk prediction model (RPM)?

- ❑ No, I have never used a RPM ☞ **Go to question 28**
- ❑ Yes, I have *ever* used a RPM before
- ❑ Yes, I sometimes use a RPM ☞ **Go to question 7**
- ❑ Yes, I often use a RPM

7. Which of the risk prediction models below do you use or have you used before?
(multiple answers possible)

- ❑ Adjuvant! Online
- ❑ MammaPrint
- ❑ Nottingham Prognostic Index
- ❑ Oncotype Dx
- ❑ Other, namely: .....

8. If you do not use Adjuvant!Online, please indicate here the reasons you do not use Adjuvant!Online?
I do not use Adjuvant! Online because: .....

9. Does your preference for whether or not to give adjuvant systemic therapy ever change in response to the outcome of a risk prediction model?

- ❑ No ☞ **Go to question 12**
- ❑ Yes ☞ **Go to question 10**

10. You have indicated that your preference for adjuvant systemic therapy sometimes changes based on the outcome of a risk prediction model. For which risk prediction model(s) does this apply? *(multiple answers possible)*

- ❑ Adjuvant! Online
- ❑ MammaPrint

- ❑ Nottingham Prognostic Index
- ❑ Oncotype Dx
- ❑ Other, namely: .....

11. To which choice does this usually apply?

- ❑ whether or not to give chemotherapy
- ❑ whether or not to give endocrine therapy
- ❑ whether or not to add chemotherapy to the endocrine treatment

From interviews with oncologists we found that the prediction model Adjuvant! Online is predominantly used in the Netherlands. As you perhaps know, the choice of whether or not to give adjuvant treatment in the Dutch breast cancer guidelines is based on the tables from Adjuvant! Online.

12. Which risk prediction model do you use most frequently?

- ❑ Adjuvant! Online
- ❑ MammaPrint
- ❑ Nottingham Prognostic Index
- ❑ Oncotype Dx
- ❑ Other, namely: .....

13. For which of the treatment decisions (or considerations) below do you (sometimes) use Adjuvant!Online?

	Never	Seldom	Sometimes	Often	Always
Whether or not to give adjuvant chemotherapy?	❑	❑	❑	❑	❑
Whether or not to give adjuvant endocrine therapy?	❑	❑	❑	❑	❑
Whether or not to include adjuvant chemotherapy to adjuvant endocrine treatment?	❑	❑	❑	❑	❑
Which adjuvant chemotherapy regime gives the highest survival gains?	❑	❑	❑	❑	❑
Which adjuvant endocrine therapy (or combination of) gives the highest survival gains?	❑	❑	❑	❑	❑
Whether or not to give neo-adjuvant chemotherapy?	❑	❑	❑	❑	❑
Whether or not to give neo-adjuvant endocrine therapy?	❑	❑	❑	❑	❑

14. Below you find a few statements about the use of Adjuvant! Online. Please indicate for each statement the extent to which it applies to you?

I currently use Adjuvant! Online:

	Never	Seldom	Sometimes	Often	Always
to prepare for the consultation	❑	❑	❑	❑	❑
during the consultation in order to inform patients	❑	❑	❑	❑	❑
to inform patients *if* they ask for information about their prognosis	❑	❑	❑	❑	❑
to convince patients about the usefulness of the treatment plan I am proposing	❑	❑	❑	❑	❑
to convince patients that chemotherapy is not necessary	❑	❑	❑	❑	❑
if I think that patients can cognitively and emotionally deal with the prognosis estimates	❑	❑	❑	❑	❑

to also present the chances graphically	❑	❑	❑	❑	❑
to help patients to make a decision on whether or not to undergo chemotherapy	❑	❑	❑	❑	❑

Will you indicate the extent to which you think Adjuvant! Online influences the patient's therapy preference?

Adjuvant! Online influences patients in their preference of whether or not to undergo systemic therapy	❑	❑	❑	❑	❑

Will you indicate how often the situations below occur in clinical practice?
A patient who according to the guideline is eligible to receive chemotherapy:

Wants to undergo chemotherapy, but after looking at Adjuvant! Online she does not want to undergo chemotherapy anymore	❑	❑	❑	❑	❑
does not want to undergo chemotherapy, but after looking at Adjuvant! Online she does want to undergo chemotherapy	❑	❑	❑	❑	❑

I use Adjuvant! Online (also) for other reasons, namely:

.....

.....

15. The estimates from Adjuvant! Online can be helpful when communicating prognosis to patients. But, how do you determine which patients you do or do not show the estimates from Adjuvant! Online to? Below you find a few statements from clinicians about this.
Please indicate for each statement the extent to which you are in agreement?

Regarding the estimates from Adjuvant! Online, clinicians should:

	Totally Disagree	Disagree	Neither disagree nor agree	Agree	Totally Agree
always show them, unless patients absolutely do not want this	❑	❑	❑	❑	❑
offer them to patients and show Adjuvant! Online depending on whether the patient wants to know or not	❑	❑	❑	❑	❑
always show them if patients ask about prognosis	❑	❑	❑	❑	❑
not show them if they are too hard to hear	❑	❑	❑	❑	❑
not show them, they are better off using verbal labels (e.g. possible, probable, seldom) to explain prognosis	❑	❑	❑	❑	❑
always show younger breast cancer patients (younger than 50 years old), because these figures are most informative for them	❑	❑	❑	❑	❑
not show them, it is too difficult for patients	❑	❑	❑	❑	❑
not show them, because the majority of patients get hung up on the numbers	❑	❑	❑	❑	❑
only show them to the higher educated patients, because they can at least understand them	❑	❑	❑	❑	❑

The questions below refer specifically to the prognostic factors upon which Adjuvant! Online bases its estimates.

16. In your opinion, does Adjuvant! Online include all the important prognostic factors?

    - ❑ Yes
    - ❑ No, I miss specifically:

      .....

      .....

17. Almost all the prognostic factors in Adjuvant! Online are split into categories. Are the categories used, in your opinion, clinically relevant categories?

    - ❑ Yes
    - ❑ No, the following prognostic factors and/or category segments are *not relevant*, *incomplete* or *incorrect*:

      .....

      .....

18. How do you fill in the variable about comorbidity?

    - ❑ I always let the variable about comorbidity remain on the default setting (i.e. minor problems)
    - ❑ Patients with severe comorbidity are not referred for adjuvant systemic therapy, therefore the variable on morbidity is not relevant.

    Unless the patient has severe comorbidity, whereby I need to estimate for myself into which category she best fits, I always set the comorbidity variable on:

    - ❑ Perfect health
    - ❑ Minor problems
    - ❑ Average for age

The questions below refer specifically to the output from Adjuvant! Online.

19. Which results do you usually look at?

    - ❑ Mortality estimates
    - ❑ Relapse estimates
    - ❑ Both

20. If you do not usually look at the relapse estimates, for what reason(s) don't you look at the output?

    - ❑ I am not convinced of the accuracy of the relapse estimates
    - ❑ By adjuvant systemic treatment the mortality estimates are the most relevant
    - ❑ Other, namely: .....

21. Which output do you let patients see?

    - ❑ I don't show the output
    - ❑ Mortality estimates (usually)
    - ❑ Relapse estimates (usually)
    - ❑ Both (usually)

22. Do you give out a printout of the Adjuvant! Online output?

    - ❑ No, never
    - ❑ Yes, if the patient asks for it
    - ❑ Yes, if I think the patient is interested in it
    - ❑ Yes, I always ask patients if they would like to take it with them
    - ❑ Other, namely:

      .....

.....

Do you have suggestions to improve Adjuvant! Online's output?

.....

.....

For some patients it can be difficult to understand risk information. How can you actually check if the patient has understood the information out of Adjuvant! Online during the consultation? Is it necessary to check patient understanding?

23. During the consultation my method of determining whether the patient has understood the information is:

.....

.....

24. Below you find a few statements from clinicians about checking patient understanding. *Please indicate for each statement the extent to which you are in agreement*.

Checking whether patients have understood the information from Adjuvant! Online:

	Completely disagree	Disagree	Neutral	Agree	Completely agree
is not necessary, because I only show Adjuvant! Online if I think she will understand the information	❑	❑	❑	❑	❑
is not necessary if I take the time to explain everything to her	❑	❑	❑	❑	❑
is not necessary, because if she doesn't ask questions then it is clear	❑	❑	❑	❑	❑
cannot be done, clinicians can tell whether a patient has understood the information	❑	❑	❑	❑	❑
I do it by asking her if she has understood everything	❑	❑	❑	❑	❑
I do it by asking her to repeat the information in her own words	❑	❑	❑	❑	❑

25. In your opinion, does using Adjuvant! Online make it easier for patients to understand the information about prognosis?

- ❑ No, it does not become easier with Adjuvant! Online
- ❑ It does not become easier for patients to understand the information, but it is easier for the clinician to clearly present the information
- ❑ Yes, Adjuvant! Online usually makes it easier for the patient to understand the information about prognosis
- ❑ Other, namely: .....

Risk prediction models, such as Adjuvant! Online, quantify the chance of a recurrence and of survival. On the one hand, this can give more insight into the prognosis of an individual patient. However, these are estimates surrounded a confidence interval. Adjuvant! Online, for example, does not report the confidence intervals around its estimates.

26. Would you personally want to know the confidence intervals around the estimates from Adjuvant! Online?

- ❑ No, it is of no added value to me because we do not currently have better estimates anyway
- ❑ No, I know that it involves estimates. How wide the confidence intervals are is not important
- ❑ No, the recommendations in the national breast cancer guideline are based on this, therefore I assume that the estimates are accurate (enough)
- ❑ Yes, then I can determine how much I can rely upon Adjuvant! Online's estimates
- ❑ Yes, that is important to know because the recommendations in the national breast cancer guideline are based on this
- ❑ Other, namely:.....

27. Supposing Adjuvant! Online would indeed provide the confidence intervals around its estimates. Would you show this to patients?

- ❑ No, absolutely not. That is too complex for most patients
- ❑ Sometimes, if I think that patients could understand it
- ❑ Yes, along with my explanation most patients could understand this
- ❑ Other, namely:.....

Regardless of whether you use a risk prediction model or not:

28. If you communicate prognosis estimates to the patient, do you talk about the uncertainty around these estimates?

- ❑ Never ☞ **Go to question 30**
- ❑ Sometimes
- ❑ Often ☞ **Go to question 29**
- ❑ Always

29. You indicated that you (sometimes) discuss the uncertainty around the prognosis estimates with your patients. Can you briefly indicate below how you explain this?
I then say: .....

Each doctor has his/her own preference when it comes to making treatment decisions, and everyone has their own way of dealing with the uncertainty which comes with patient care. We would really like to know your thoughts about this. With the following two questions, we gain further insight into how you prefer to make decisions and how you deal with uncertainty.

30. After being informed about their illness and the possible treatment, some patients prefer to let the doctor make the treatment decision, others would prefer to jointly decide. Which statement best fits your ideal?

- ❑ The doctor should decide based on everything that is known about the treatments
- ❑ The doctor should decide, but also seriously take the patient's opinion into account
- ❑ The doctor and the patient should decide together, as equals
- ❑ The patient should decide, but also seriously take the doctor's opinion into account
- ❑ The patient should decide based upon everything that the patient knows or has heard about the treatments

31. Will you indicate for the questions below the extent to which you are in agreement?

	Disagree			Agree		
	Strongly	moderately	slightly	slightly	moderately	strongly
When physicians are uncertain of a diagnosis, they should share this information with their patients.	❑	❑	❑	❑	❑	❑
I always share my uncertainty with my patients	❑	❑	❑	❑	❑	❑
If I shared all of my uncertainties with my patients, they would lose confidence in me	❑	❑	❑	❑	❑	❑
Sharing my uncertainty improves my relationship with my patients	❑	❑	❑	❑	❑	❑
I prefer patients not know when I am uncertain of what treatments to use	❑	❑	❑	❑	❑	❑

Your answers will be analyzed anonymously. For the research it is important to have insight into the characteristics of the participants. Therefore, we ask you to fill in the questions below.

32. In which region do you practice?

- ❑ Regio North (i.e. Groningen, Friesland, Drenthe)
- ❑ Regio East (i.e. Gelderland, Overijssel, Flevoland)
- ❑ Regio West (i.e. Noord-Holland, Zuid-Holland, Utrecht)
- ❑ Regio South (i.e. Zeeland, Brabant, Limburg)
- ❑ I prefer not to disclose this

33. What is your gender?

- ❑ Male
- ❑ Female

34. What is your age? .....years

35. In what type of hospital do you work?

- ❑ General hospital (non-teaching)
- ❑ General hospital (teaching)
- ❑ University medical center
- ❑ Specialized oncology center
- ❑ Other, namely .....

If you have any comments, please leave them below.