

*Supplementary material for Engelhardt EG, et al. Breast cancer specialists' views on and use of risk prediction models in clinical practice: A mixed methods approach. Acta Oncol 2015;54:361–367.*

## **Supplementary Appendix 1 Oncologists' views on and use of risk prediction models**

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### **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	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
is not sufficiently scientifically supported for use in the clinic	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
is not user friendly	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
gives false assurances, onto which patients unduly cling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
does not say anything about individual patients, as it applies to groups	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
is too complicated	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
makes patients unnecessarily anxious	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
based on genetic profiles, such as MammaPrint, is <u>not</u> sufficiently scientifically supported	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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
- Yes, I have *ever* used a RPM before
- Yes, I sometimes use a RPM
- Yes, I often use a RPM

☞ **Go to question 28, on page 12**

☞ **Go to question 7**

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?	<input type="checkbox"/>				
Whether or not to give adjuvant endocrine therapy?	<input type="checkbox"/>				
Whether or not to include adjuvant chemotherapy to adjuvant endocrine treatment?	<input type="checkbox"/>				
Which adjuvant chemotherapy regime gives the highest survival gains?	<input type="checkbox"/>				
Which adjuvant endocrine therapy (or combination of ) gives the highest survival gains?	<input type="checkbox"/>				
Whether or not to give neo-adjuvant chemotherapy?	<input type="checkbox"/>				
Whether or not to give neo-adjuvant endocrine therapy?	<input type="checkbox"/>				

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	<input type="checkbox"/>				
during the consultation in order to inform patients	<input type="checkbox"/>				
to inform patients <i>if</i> they ask for information about their prognosis	<input type="checkbox"/>				
to convince patients about the usefulness of the treatment plan I am proposing	<input type="checkbox"/>				
to convince patients that chemotherapy is not necessary	<input type="checkbox"/>				
if I think that patients can cognitively and emotionally deal with the prognosis estimates	<input type="checkbox"/>				
to also present the chances graphically	<input type="checkbox"/>				
to help patients to make a decision on whether or not to undergo chemotherapy	<input type="checkbox"/>				

**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	<input type="checkbox"/>				
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**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	<input type="checkbox"/>				
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does not want to undergo chemotherapy, but after looking at Adjuvant! Online she does want to undergo chemotherapy	<input type="checkbox"/>				
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**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:**

	<b>Totally Disagree</b>	<b>Disagree</b>	<b>Neither disagree nor agree</b>	<b>Agree</b>	<b>Totally Agree</b>
<u>always</u> show them, unless patients absolutely do not want this	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
offer them to patients and show Adjuvant! Online depending on whether the patient wants to know or not	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>always</u> show them if patients ask about prognosis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
not show them if they are too hard to hear	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
not show them, they are better off using verbal labels (e.g. possible, probable, seldom) to explain prognosis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Totally Disagree	Disagree	Neither disagree nor agree	Agree	Totally Agree
<u>always</u> show younger breast cancer patients (younger than 50 years old), because these figures are most informative for them	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
not show them, it is too difficult for patients	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
not show them, because the majority of patients get hung up on the numbers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>only</u> show them to the higher educated patients, because they can at least understand them	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**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	<input type="checkbox"/>				
is not necessary if I take the time to explain everything to her	<input type="checkbox"/>				
is not necessary, because if she doesn't ask questions then it is clear	<input type="checkbox"/>				
cannot be done, clinicians can tell whether a patient has understood the information	<input type="checkbox"/>				
I do it by asking her if she has understood everything	<input type="checkbox"/>				
I do it by asking her to repeat the information in her own words	<input type="checkbox"/>				

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
  - Sometimes
  - Often
  - Always
- ☞ Go to question 30
- ☞ Go to question 29

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?

	Strongly disagree	moderately disagree	slightly disagree	slightly agree	moderately agree	strongly agree
When physicians are uncertain of a diagnosis, they should share this information with their patients.	<input type="checkbox"/>					
I always share my uncertainty with my patients	<input type="checkbox"/>					
If I shared all of my uncertainties with my patients, they would lose confidence in me	<input type="checkbox"/>					
Sharing my uncertainty improves my relationship with my patients	<input type="checkbox"/>					
I prefer patients not know when I am uncertain of what treatments to use	<input type="checkbox"/>					

**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

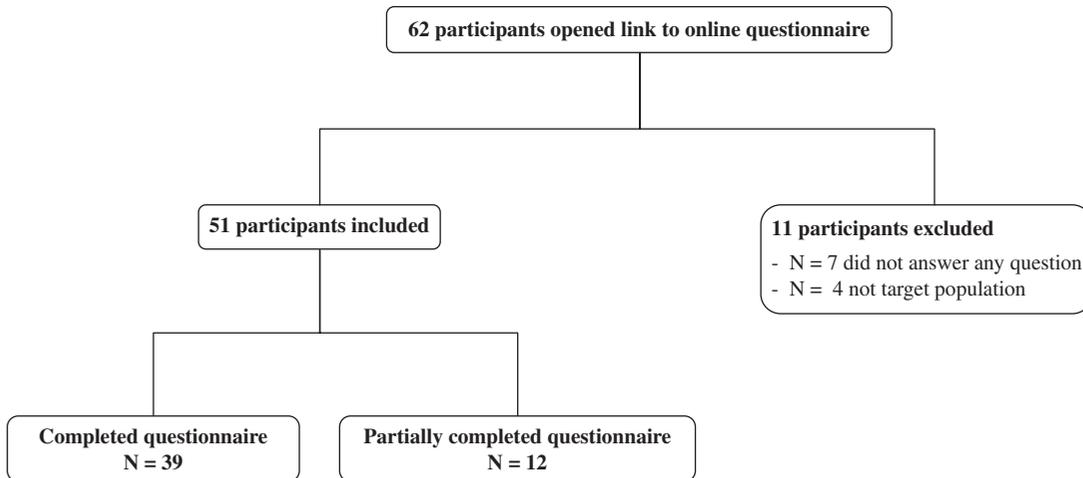
34. What is your age? .....years

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.

**This is the end of the questionnaire. Thank you for your participation!**



Supplementary Appendix 2. Flowchart of participants.

Supplementary Appendix 3. 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)

- = not applicable.

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