

# Perceived facilitating and limiting factors for healthcare professionals to adopting a patient decision aid for breast cancer aftercare: A cross-sectional study

Linda A. Klaassen<sup>a,\*</sup>, Jolanda H.H.M. Friesen-Storms<sup>b,c</sup>, Gerrie J.J.W. Bours<sup>d,e</sup>,  
Carmen D. Dirksen<sup>f</sup>, Liesbeth J. Boersma<sup>g</sup>, Ciska Hoving<sup>h</sup>

<sup>a</sup> Maastricht University, Department of Radiotherapy/GROW School for Oncology and Developmental Biology/CAPHRI Care and Public Health, Research Institute, P. O. Box 616, 6200 MD Maastricht, the Netherlands

<sup>b</sup> Zuyd University of Applied Sciences, Zuyd Health, Research Centre Autonomy and Participation for Persons with a Chronic Illness, Nursing Department, Heerlen, the Netherlands

<sup>c</sup> Maastricht University, Department of Family Medicine/CAPHRI Care and Public Health, Research Institute, Nieuw Eyckholt 300, 6419 DJ Heerlen, Maastricht, the Netherlands

<sup>d</sup> Zuyd University of Applied Sciences, Zuyd Health, Research Centre for Community Care, Nursing Department, Heerlen, the Netherlands

<sup>e</sup> Maastricht University, Department of Health Services Research/CAPHRI Care and Public Health Research Institute, Nieuw Eyckholt 300, 6419 DJ Heerlen, Maastricht, the Netherlands

<sup>f</sup> Maastricht University Medical Centre +, Department of KEMTA/CAPHRI Care and Public Health Research Institute, P.O. Box 5800, 6202 AZ Maastricht, the Netherlands

<sup>g</sup> Department of Radiation Oncology (MAASTRO Clinic)/GROW School for Oncology and Developmental Biology, Maastricht University Medical Centre +, P.O. Box 3035, 6202 NA Maastricht, the Netherlands

<sup>h</sup> Maastricht University, Department of Health Promotion/CAPHRI Care and Public Health Research Institute, P. O. Box 616, 6200 MD Maastricht, the Netherlands

## ARTICLE INFO

### Article history:

Received 7 December 2018

Received in revised form 30 June 2019

Accepted 23 July 2019

### Keywords:

Intention to adopt  
Patient decision aid  
Breast cancer aftercare  
Healthcare professionals

## ABSTRACT

**Objective:** Effective healthcare innovations are often not adopted and implemented. An implementation strategy based on facilitators and barriers for use as perceived by healthcare professionals could increase adoption rates. This study therefore aimed to identify the most relevant facilitators and barriers for use of an innovative breast cancer aftercare decision aid (PtDA) in healthcare practice.

**Methods:** Facilitators and barriers (related to the PtDA, adopter and healthcare organisation) were assessed among breast cancer aftercare health professionals (n = 81), using the MIDI questionnaire. For each category, a backward regression analysis was performed (dependent = intention to adopt). All significant factors were then added to a final regression analysis to identify the most relevant determinants of PtDA adoption.

**Results:** Expecting higher compatibility with daily practice and clinical guidelines, more positive outcomes of use, higher perceived relevance for the patient and increased self-efficacy were significantly associated with a higher intention to adopt. Self-efficacy and perceived patient relevance remained significant in the final model.

**Conclusions:** Low perceived self-efficacy and patient relevance are the most important barriers for health professions to adopt a breast cancer aftercare PtDA.

**Practice implications:** To target self-efficacy and perceived patient relevance, the implementation strategy could apply health professional peer champions.

© 2019 Published by Elsevier B.V.

## 1. Introduction

In the Netherlands the number of women eligible for aftercare after completing curative treatment for breast cancer has increased in the last decade [1]. Within the national breast cancer guidelines it is recommended to personalize aftercare based on individual patients' issues, preferences and goals in an individual

\* Corresponding author.

E-mail addresses: [l.klaassen@maastrichtuniversity.nl](mailto:l.klaassen@maastrichtuniversity.nl) (L.A. Klaassen), [jolanda.friesen@zuyd.nl](mailto:jolanda.friesen@zuyd.nl) (J.H.H.M. Friesen-Storms), [gerrie.bours@zuyd.nl](mailto:gerrie.bours@zuyd.nl) (G.J.J.W. Bours), [C.Dirksen@mumc.nl](mailto:C.Dirksen@mumc.nl) (C.D. Dirksen), [liesbeth.boersma@maastro.nl](mailto:liesbeth.boersma@maastro.nl) (L.J. Boersma), [c.hoving@maastrichtuniversity.nl](mailto:c.hoving@maastrichtuniversity.nl) (C. Hoving).

cancer survivorship plan [2–4]. To ensure patient involvement in decision making processes such as these, Shared Decision Making (SDM) is often used with healthcare professionals. SDM is a form of patient–healthcare professional communication in which the patient and the healthcare professional reach decisions concerning healthcare or treatment on an equal basis. It has been shown that patient decision aids improve the process of SDM and reduce decisional conflict in treatment choices [5].

To support SDM in breast cancer patients choosing their aftercare [6–8], an aftercare Patient Decision Aid (PtDA) has been developed by our group [9]. The PtDA was tested in a pilot study and the results showed a small improvement in perceived SDM, with more patients choosing less intensive aftercare options after PtDA-usage [9]. However, using the PtDA during the consultation increased consultation time significantly [9]. Based on the results, the PtDA was developed further to make it more attractive for healthcare professionals to implement into clinical practice. The PtDA was adjusted so it could be used before the consultation in an effort to save actual consultation time.

It is known from the literature that many health interventions and innovations like the above-mentioned aftercare PtDA are being developed but are hardly ever used in clinical practice, not even if their relevance to the healthcare field has been shown [10]. This is disadvantaging the patients seen as PtDAs are shown to improve patient health outcomes through improved SDM, increase patient knowledge and decrease patient passiveness during consultations [11]. Research showed that many of the barriers for implementation of an innovation are specific to the healthcare professionals involved [12]. Therefore, to help implement the PtDA, an effective implementation strategy is necessary, taking into account facilitators and barriers for adoption in the healthcare setting [13,14] by healthcare professionals, such as surgeons, radiation oncologists, medical oncologists, breast care nurses, nurse practitioners and physician assistants.

Fleuren, Wiefferink, and Paulussen [13] developed a framework to provide an overview of determinants (facilitators and barriers) of general innovation processes in healthcare organizations. The framework combines determinants derived from several implementation theories, social cognitive theories and practical empirical studies and orders them into different categories. The first category contains determinants related to the innovation. Most of these determinants are derived from Roger's diffusion of innovation theory [15]. Among others the determinants in this category are complexity of the innovation, and the relevance of the innovation to the implementers and users.

The second category contains determinants related to the adopter. Fleuren et al. [13] based these determinants for the largest part on social cognitive theories and they describe the characteristics and behavior of the adopter. Determinants derived from these theories are for instance self-efficacy [16] and attitude [17].

The third category of the theoretical framework [13] contains determinants related to the organization and socio-political context. Determinants related to the organization are related to the decision making processes in the organization. With the socio-political context, rules and regulations related to the innovation are meant. A determinant related to the organization can be for instance the necessary monetary funds to implement the innovation. A determinant related to the socio-political context can be the extent to which the innovation adheres to the national clinical guidelines. Based on this framework the Measurement Instrument for Determinants of Innovations (MIDI) [18] has been developed to measure the determinants in all categories of the framework. Although the MIDI is successfully used in several adoption and implementation studies [19–21] to identify determinants for implementation of health innovations in healthcare settings, is based on socio-cognitive theories was composed by

experts in a Delphi study [13] and has shown to be successful in explaining intermediary implementation readiness, the instrument has not been validated.

O'Donnell & Cranney [22] performed research in the cancer care setting on the determinants for specific implementation of Decision Aids. The relevant determinants that O'Donnell et al. [22] and other studies [23–25] identified were: relevance of the innovation (in the determinants associated with the innovation category), self-efficacy (in the determinants associated with the adopter category) and the extent to which the innovation can be incorporated into the existing care processes in the hospital especially regarding time aspects (in the determinants associated with the organization and socio-political context category). Furthermore, research [26,27] has shown cosmopolitanism as an important adopter-related factor; cosmopolitan individuals are more willing to embrace changes in work methods (e.g. adopting an innovation) and looking outside of the own organization and country for ways to improve work methods [28].

In summary, to facilitate implementation of the PtDA for aftercare, an implementation strategy that focusses on the most important facilitators and barriers for the adoption of the PtDA in clinical practice is necessary. These facilitators and barriers (determinants) for the intention to adopt need to be identified, since intention is the best predictor for behavior [17] and thus considered a plausible proxy measure [29]. Therefore, the aim of the current study is to identify the determinants for the intention to adopt the PtDA by healthcare providers in the hospital setting, using the framework of Fleuren et al. [13].

## 2. Methods

### 2.1. Procedure and design

A cross sectional survey study was performed. The surveys were distributed across the Netherlands, except for the region in which previously the PtDA pilot study was conducted. Surgeons, medical oncologists, radiation oncologists, nurses and nurse practitioners that are involved in breast cancer aftercare, and who are possible adopters of the PtDA, were approached via e-mail through the research association for breast cancer professionals in the Netherlands (BOOG).

The e-mail consisted of a short explanation about the purpose and aim of this adoption study. Also, two links were included; one link to the online PtDA and one link to the online questionnaire. All adopters were asked to view the PtDA online before filling out the questionnaire as many questions were about the PtDA and its content.

Criteria for study inclusion (i.e. reviewing the PtDA using the included hyperlink and having a good understanding of the Dutch language) and exclusion (not being employed in a Dutch hospital, not conducting aftercare consultations) were explained in the e-mail. Screening questions were inserted into the online questionnaire to make sure these criteria were met. Furthermore, to reach as many relevant adopters as possible, each adopter was asked to forward the e-mail to other professionals meeting the inclusion criteria (i.e. snowball recruitment).

### 2.2. The PtDA

The current PtDA consists of five consecutive steps (Fig. 1). Step one contains information about the primary treatment and potential late side-effects of these treatments as potential side-effects may influence patient's choices for an aftercare trajectory. Step two contains questions, from two validated screening inventories [30,31], about problems that patients might experience after primary treatment in four domains of their life [32,33]. Step three contains questions to assess the patient's preferences

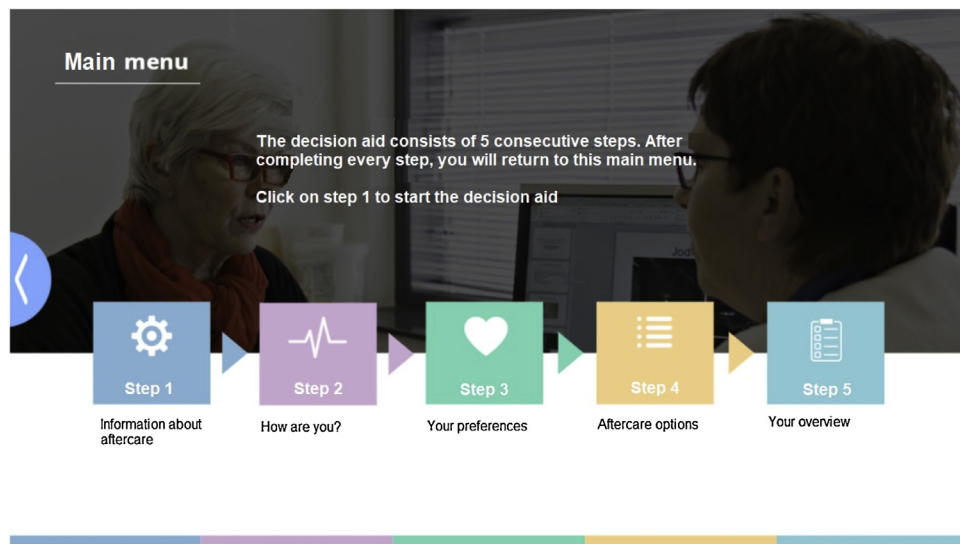


Fig. 1. Screenshot of the main menu of the PtDA; depicting all five steps.

for characteristics related to the available aftercare options. Step four contains a brief explanation of each of the options followed by an assessment of the patient's first impression of each option. Step five provides the patients with two overviews. The first combines the patient's preferences regarding option characteristics and patient's first impression. The overview shows the extent to which each option matches the patient's preferences and first impressions. The second generates a visual discussion template [32,33] with the problems experienced by the patient on the four domains of life.

Both overviews can be used during an aftercare consultation to decide patient goals and the content of the aftercare trajectory together. For example, if a patient is experiencing loss of physical condition and wants to improve this condition to be able to walk to work again, then evidence-based aftercare options are that the patient exercises her/himself or with a physical therapist or in cancer rehabilitation.

### 2.3. The outcome variable

The outcome variable in the current study was the intention to adopt the PtDA into clinical practice. A question for this study with five response categories was formulated to measure the extent to which the adopters have had the intention to adopt the PtDA: 'definitely will', 'likely will', 'neutral', 'likely will not' or 'definitely will not'. Based on their answer to this question the adopters were divided into two groups: the intenders (definitely will, likely will adopt) and the non-intenders (neutral, likely will not, definitely will not adopt).

### 2.4. The independent variables

Demographic characteristics were measured (age in years, employment in years, frequency of breast cancer aftercare consultations per month, profession (e.g. surgeon, nurse practitioner, radiation oncologist)). The other independent variables were derived from the MIDI [18] and are depicted in Table 1.

### 2.5. Analyses

For an adopter to be included in the analyses 90% or more of the questions on the questionnaire had to be completed and the

adopter had to meet the inclusion criteria. Then, the background characteristics of intenders and non-intenders were compared using t-tests and chi-square tests. Results were deemed significant if  $p < .05$ . The background characteristics on which the two groups differed significantly were included in the logistic regressions as confounders.

To assess which specific determinants were important with regard to the adoption of the PtDA within each determinant category (i.e. innovation, adopter and organization/social-political context), three logistic regressions were performed using the backward likelihood ratio procedure ( $P_{in} = .05$ ;  $P_{out} = .10$ ). The determinants that were left in the last step of each regression were then included together in one logistic regression using the one-step ENTER procedure, to identify which determinants were most important overall.

## 3. Results

### 3.1. Sample

In total 122 adopters participated in the study; 89 adopters had completed 90% or more of the questions, and of these 89, 81 adopters met the inclusion and exclusion criteria. In total, 81 adopters were included in the analyses: 44 intenders and 37 non-intenders. Intenders and non-intenders did not differ on personal characteristics, such as age or years of employment (Table 2). Also, professions were more or less equally distributed across the two groups with nine surgeons, three medical oncologists, seven radiation oncologists, three nurses, and ten nurse practitioners in the intender group and ten surgeons, two medical oncologists, eight radiation oncologists, two nurses and, ten nurse practitioners in the non-intender group.

### 3.2. Determinants of adoption

The first backward logistic regression performed to analyse determinants associated with the PtDA resulted in two significant determinants in the fifth step (Table 3). Both compatibility and perceived relevance for the patient were significantly positively associated with the intention to adopt.

The second backward logistic regression analysis on determinants associated with the adopting person resulted in

**Table 1**

Determinants investigated in the current study, based on the MIDI [18].

Determinants associated with the innovation	
<b>Correctness</b> (the extent to which the information in the PtDA is correct)1	<b>Completeness</b> (the extent to which the information in the PtDA is complete)1
<b>Complexity</b> (the extent to which the PtDA is complex to use)2	<b>Compatibility</b> (the extent to which the PtDA is compatible with the work methods)1
<b>Observability</b> (the extent to which the effects of the PtDA are visible)1	<b>Relevance for the client</b> (the extent to which the PtDA is relevant for the patient)1
Determinants associated with the adopter	
<b>Personal benefits/drawbacks</b> (benefits/drawbacks from PtDA-usage)2	<b>Outcome expectations</b> (the outcome expectations of the adopter from working with the PtDA)5
<b>Patient satisfaction</b> (the extent to which the adopter feels the patient will be satisfied)1	<b>Patient cooperation</b> (the extent to which the adopter feels the patient will cooperate in working with the PtDA)1
<b>Social support</b> (the extent to which the adopter expects support from co-workers)2	<b>Descriptive norm</b> (the extent to which the adopter expects working with the PtDA will be the norm in his/her hospital)2
<b>Subjective norm</b> (the extent to which the adopter expects co-workers to use the PtDA)2	<b>Self-efficacy</b> (the extent to which the adopter feels capable to work with the PtDA)4
<b>Knowledge</b> (the extent to which the adopter has working-with-the-PtDA-knowledge)1	<b>Cosmopolitanism (added question)</b> (the extent to which the adopter is open to changes in work methods)3
Determinants associated with the organization/ socio- political context	
<b>Financial resources</b> (the extent to which monetary funds are available for the implementation of the PtDA)1	<b>Time available</b> (the extent to which time is available for the implementation of the PtDA)1
<b>Adherence to Dutch clinical guidelines</b> (the extent to which the PtDA adheres to Dutch clinical guidelines)1	

1 = 1 question with Likert-scale answer: 1 (completely disagree)- 5 (completely agree), 2= Combined score from 2 questions with Likert-scale answers: 1 (completely disagree)- 5 (completely agree), 3= Combined score from 4 questions with Likert-scale answers: 1 (completely disagree)- 5 (completely agree), 4= Combined score from 5 questions with Likert-scale answers: 1 (completely disagree)- 5 (completely agree) and 5= Combined score from 6 questions with Likert-scale answers: 1 (completely disagree)- 5 (completely agree). For all determinants with combined scores from multiple questions a reliability analysis was performed. For all determinants Cronbach's  $\alpha > .60$ .

**Table 2**

Characteristics of the respondents in the intender and non-intender group.

Characteristic	Intender group (N = 44)	Non-intender group (N = 37)	F-value	p-value
Age (years), mean (SD)	47.34 (7.56)	48.46 (7.99)	.19	.52
Employment(years), mean(SD)	10.74 (6.31)	13.43 (8.20)	3.61	.11
Breast cancer aftercare consultations per month, mean (SD)	47.81 (54.16)	37.31 (45.91)	1.44	.35

**Table 3**

Results on the backward logistic regression analysis for determinants associated with the PtDA.

	OR (Odds Ratio)	95% Confidence Interval		p-value	R <sup>2</sup>
		Lower	Upper		
<b>Step 5 of analysis of determinants associated with the PtDA:</b>					
<b>Compatibility</b>	<b>2.08</b>	<b>1.14</b>	<b>3.80</b>	<b>.02</b>	<b>.43</b>
<b>Perceived relevance for the patient</b>	<b>16.73</b>	<b>2.54</b>	<b>17.86</b>	<b>.00</b>	
<b>Step 6 of analysis of determinants related to the adopter:</b>					
<b>Outcome expectations</b>	<b>48.22</b>	<b>3.18</b>	<b>731.39</b>	<b>.01</b>	<b>.60</b>
Social Support	2.92	.78	10.99	.11	
Descriptive norm	1.73	.99	3.04	.06	
Subjective norm	.25	.06	1.07	.06	
<b>Self-efficacy</b>	<b>10.34</b>	<b>1.25</b>	<b>85.82</b>	<b>.03</b>	
<b>Step 4 of analysis of determinants related to the organisation/ the socio-political context:</b>					
<b>Adherence to guidelines</b>	<b>3.37</b>	<b>1.42</b>	<b>8.01</b>	<b>.01</b>	<b>.15</b>

two determinants in step six that were significantly positively associated with the intention to adopt. These determinants were self-efficacy and outcome expectations (Table 3).

The third and final backward logistic regression analysis focussed on determinants related to the organization and socio-political context and resulted in one remaining significant determinant positively related to the intention to adopt in step four. This determinant was adherence to the guidelines (Table 3).

All the determinants that remained in the final step across all three categories were analysed together in a logistic regression analyses with the ENTER procedure. This resulted in two significantly and positively associated determinants with the

intention to adopt, which were: perceived relevance for the patient and self-efficacy (Table 4).

## 4. Discussion

### 4.1. Discussion

The current study aimed to identify determinants for the intention to adopt the PtDA by healthcare providers in the hospital setting. For determinants associated with the PtDA, compatibility and perceived relevance for the patient had a significant positive association with the intention to adopt. For determinants

**Table 4**

Results on the logistic regression analysis with ENTER procedure with the most important determinants from all three determinant categories.

	OR (Odds Ratio)	95% Confidence Interval		p-value	R <sup>2</sup>
		Lower	Upper		
<b>Determinants in the analysis:</b>					
Compatibility	1.33	.57	3.12	.51	.70
<b>Perceived relevance for the patient</b>	<b>7.40</b>	<b>1.85</b>	<b>29.58</b>	<b>.01</b>	
Outcome expectations	14.77	.76	285.23	.08	
Social support	3.67	.69	19.47	.13	
Subjective norm	.39	.08	1.91	.25	
<b>Self-efficacy</b>	<b>14.56</b>	<b>1.09</b>	<b>194.09</b>	<b>.04</b>	
Descriptive norm	1.78	.85	3.69	.13	
Adherence to the guidelines	.71	.21	2.37	.57	

associated with the adopter self-efficacy and outcome expectations were significantly related. For determinants associated with the organization and the socio-political context, only adherence to the guideline had a significant positive association with the intention to adopt. When all determinants were analyzed together only self-efficacy and perceived relevance for the patient remained significantly associated with the intention to adopt.

A previous study [25] showed that a barrier is the concern that an innovation might not have added value to the patient as the healthcare provider is more able to provide the necessary information than the PtDA [25]. However, the aftercare PtDA proved relevant to personalize aftercare for curatively treated breast cancer patients in the pilot study [9]. This point may have to be accentuated in the implementation strategy to increase the likelihood of adoption of the aftercare PtDA into clinical practice. Self-efficacy was also significantly associated with the intention to adopt, which is consistent with findings in previous studies examining the implementation of PtDAs into clinical practice. Therefore one of the focus points in the implementation strategy has to be increasing the self-efficacy of the adopters, e.g. by developing e-learning models.

The second significantly positively related variable with the intention to adopt in the category of determinants associated with the PtDA was compatibility. Earlier research has shown that the ability to insert the innovation into the current workflow increases the chances of implementation into clinical practice [25]. This result is replicated for the aftercare PtDA. Furthermore, previous research indicated that usability or complexity for the patient is important [23–25]. In this research this was not one of the main determinants for intention to adopt. The IPDAS checklist was developed with guidelines to take into account during the development of a PtDA [34]. These guidelines recommend strategies to make information in the PtDA accessible and comprehensible, resulting in a less complex program. Both health professionals that did and did not intend to adopt the PtDA rated program complexity as low and the PtDA as comprehensible for patients. During the development of the current PtDA these IPDAS guidelines were followed possibly resulting in complexity of the PtDA not to be a possible barrier for the intention to adopt.

In the category of determinants related to the adopter, two determinants had a significant positive relationship with the intention to adopt. These determinants were outcome expectations and self-efficacy. The more positive the outcome expectations were, the higher the chance of implementation of the PtDA. It has been known from behavioural change studies since many years that outcome expectations influence intention. Researchers found the same result in a study for the implementation of a computerized lifestyle change innovation [35]. In the pilot study testing the effects of the aftercare PtDA positive results were found. The aftercare PtDA increases Shared Decision Making slightly and the PtDA seems to have a positive effect on patient choice for aftercare with more

patients choosing less intensive aftercare after PtDA-usage [9]. Presenting these positive outcomes to adopters may influence their outcome expectations and consequently increase the chance of implementation of the aftercare PtDA.

Health professionals interested in adopting the PtDA also reported higher levels of self-efficacy to use the PtDA in their practice. Self-efficacy is often found to be a relevant determinant of intention to act [22]. By offering potential adopting health professional a trial period with the PtDA so they can familiarize themselves with the PtDA and master working with it, self-efficacy could be improved [36], possibly resulting in a higher PtDA adoption rate. Adherence to the guidelines was the only determinant, from the category of determinants associated with the organization and socio-political context, significantly positively associated with the intention to adopt. Therefore, in creating the implementation strategy it may be effective to stress that PtDA-usage adheres to the Dutch clinical guidelines currently in place for mamma carcinoma aftercare. A determinant in the same category is time. This determinant did not have a significant association with the intention to adopt although this was expected seen as previous research did identify time as a barrier [22–25,27]. It was made clear in the current study that the PtDA was meant to be used before instead of during the consult, hence time was possibly no longer a barrier for the adoption of the PtDA.

#### 4.2. Strengths and limitations

Several strengths can be identified related to this study. Firstly, representatives from a variety of disciplines were included (e.g. nurses, radiation oncologists, medical oncologists, surgeons). Even though, we did not have the statistical power to assess determinants for adoption for each discipline individually, this study does provide insight into barriers and facilitators of a breast cancer aftercare PtDA as reported by a broad spectrum of health professionals breast cancer patients might encounter during their treatment and aftercare decision making.

Secondly, the analyses were performed with an intender group that consisted of adopters that had the intention to adopt the PtDA (i.e. that answered either “will probably adopt” or “will definitely adopt”); all adopters that answered neutrally were included in the non-intender group, applying a more conservative approach to identifying determinants of adoption. However, it can potentially be a limitation as well, while it is unclear if adopters that answered neutral were more inclined to adopt or to not adopt the PtDA. If they were more inclined to adopt, the results found may not be representative. To form two groups with a comparable number of respondents, it was necessary to include the neutral answering adopters in the non-intenders group as only 9 respondents answered with “will probably not” adopt or “will definitely not adopt”; which we take as a positive sign for the adoption of the PtDA into clinical practice.



However, limitations of the study should also be noted. The study had a cross-sectional design, so no inferences about causality or predictability can be made based on these results which can be viewed as a limitation. Nevertheless, it provides an overview of barriers and limitations that are of influence at this time. Since the PtDA is meant to be implemented at this time it is not a very big limitation. To study if the found determinants in the current study were really involved in the implementation of the PtDA, further research is necessary. For instance a process evaluation study on the implementation of the PtDA could be useful to determine if the same determinants are found and at the same time provide an insight of the implementation strategy used.

#### 4.3. Conclusions

The most important determinants to intention to adopt the PtDA were self-efficacy and perceived relevance for the patient. Therefore, this is where the emphasis of the implementation strategy should be on. Other determinants that were positively related to the intention to adopt were compatibility, outcome expectations and adherence to the clinical guidelines.

#### 4.4. Practice implications

The implementation strategy should focus on increasing self-efficacy of the adopter and stressing the relevance of the PtDA for the patient. One method to increase self-efficacy is vicarious learning. It entails seeing peers using the PtDA so potential adopters feel more able to work with the PtDA themselves. In healthcare settings “champions”, which are healthcare providers that promote usage of health innovations to improve work methods [37,38] are already used. Seeing this “champions” work with and promote working with the PtDA, thereby modelling PtDA-usage might increase self-efficacy of the adopters and increase the likelihood of implementation. Vicarious learning can potentially also influence compatibility [15,39]. The champions can teach by using the PtDA that it can be compatible or even improve current work methods.

The other focus point of the implementation strategy should be to stress the relevance of the PtDA for the patient. This might be achieved by presenting the positive results of the pilot study of the effects of the PtDA on patient choice [9]. It shows that patients that used the PtDA were more likely to choose another form of aftercare than the standard option, thereby personalizing their aftercare. These results might be presented in training for the PtDA for adopters. Furthermore, a training can inform the adopters that the PtDA adheres to the current clinical guidelines which can improve implementation likelihood. Furthermore, the online training can use the results of the pilot study [9] also to increase the outcome expectations of the adopters.

#### Funding

This research was supported by Alpe d'HuZes (Dutch Cancer Society: KWF MAC 2014-7024) and Netherlands Organisation for Scientific Research doctoral grant for teachers [grant number: 023.002.031].

#### Acknowledgements

We would like to thank Prof. Dr. C.A.J. Klaassen, emeritus at the University of Amsterdam for providing statistical advice and support.

#### References

- [1] L. Klaassen, C. Dirksen, L. Boersma, C. Hoving, of the Bbg, Developing an aftercare decision aid: assessing health professionals' and patients' preferences, *Eur. J. Cancer Care* (2017) e12730.
- [2] Integraal kankercentrum Nederland [Comprehensive Cancer Centre the Netherlands] (IKNL), NABON Richtlijn Mammacarcinoom [NABON Guideline Mammacarcinoma] Revised, Retrieved from, (2017) . <https://www.oncoline.nl/index.php>.
- [3] Integraal Kankercentrum Nederland [Comprehensive Cancer Centre the Netherlands] (IKNL), Richtlijn Herstel na Kanker [Guideline Cancer Survivorship Care] Retrieved from, (2011) . <http://www.oncoline.nl/herstel-na-kanker>.
- [4] Integraal Kankercentrum Nederland [Comprehensive Cancer Centre the Netherlands] (IKNL), Richtlijn Medische Specialistische Revalidatie bij Oncologie. [Guideline Medical Specialist Oncological Rehabilitation] Retrieved from, (2017) . [https://richtlijndatabase.nl/uploaded/docs/Oncologie/RL\\_Medisch\\_Specialistische\\_Revalidatie\\_bij\\_Oncologie\\_voor\\_autorisatie\\_def.pdf](https://richtlijndatabase.nl/uploaded/docs/Oncologie/RL_Medisch_Specialistische_Revalidatie_bij_Oncologie_voor_autorisatie_def.pdf).
- [5] D. Stacey, F. Legare, K. Lewis, M.J. Barry, C.L. Bennett, K.B. Eden, et al., Decision aids for people facing health treatment or screening decisions, *Cochrane Database Syst. Rev.* 4 (2017) Cd001431.
- [6] J. Belkora, S. Volz, M. Loth, A. Teng, M. Zarin-Pass, D. Moore, et al., Coaching patients in the use of decision and communication aids: RE-AIM evaluation of a patient support program, *BMC Health Serv. Res.* 15 (2015) 209.
- [7] T.L. Woodard, A.S. Hoffman, L.C. Crocker, D.A. Holman, D.B. Hoffman, J. Ma, et al., Pathways: patient-centred decision counselling for women at risk of cancer-related infertility: a protocol for a comparative effectiveness cluster randomised trial, *BMJ Open* 8 (2) (2018) e019994.
- [8] M. Quigley, M.P. Dillon, S. Fatone, Development of shared decision-making resources to help inform difficult healthcare decisions: an example focused on dysvascular partial foot and transtibial amputations, *Prosthet. Orthot. Int.* (2018) 309364617752984.
- [9] L.A. Klaassen, C.D. Dirksen, L.J. Boersma, C. Hoving, A novel patient decision aid for aftercare in breast cancer patients: a promising tool to reduce costs by individualizing aftercare, *Breast* 41 (2018) 144–150.
- [10] T. Greenhalgh, J. Wherton, C. Papoutsis, J. Lynch, G. Hughes, C. A'Court, et al., Beyond adoption: a new framework for theorizing and evaluating nonadoption, abandonment, and challenges to the scale-up, spread, and sustainability of health and care technologies, *J. Med. Internet Res.* 19 (11) (2017) e367.
- [11] D.L. Alden, J. Friend, M.B.J. Chun, Shared decision making and patient decision aids: knowledge, attitudes, and practices among Hawai'i physicians, *Hawaii J. Med. Public Health* 72 (11) (2013) 396–400.
- [12] T. Siyam, A. Shahid, M. Perram, I. Zuna, F. Haque, M.C. Archundia-Herrera, et al., A scoping review of interventions to promote the adoption of shared decision-making (SDM) among health care professionals in clinical practice, *Patient Educ. Couns.* 102 (6) (2019) 1057–1066.
- [13] M. Fleuren, K. Wierfink, T. Paulussen, Determinants of innovation within health care organizations: literature review and Delphi study, *Int. J. Qual. Health Care* 16 (2) (2004) 107–123.
- [14] R. Baker, J. Camosso-Steinovic, C. Gillies, E.J. Shaw, F. Cheater, S. Flottorp, et al., Tailored interventions to address determinants of practice, *Cochrane Database Syst. Rev.* (4) (2015) Cd005470.
- [15] E.M. Rogers, Diffusion of preventive innovations, *Addict. Behav.* 27 (2002) 989–993.
- [16] A. Bandura, Self-efficacy: the Exercise of Control, W H Freeman/Times Books/Henry Holt & Co, New York, NY, US, 1997 ix, 604–ix, p.
- [17] I. Ajzen, From intentions to actions: a theory of planned behavior, in: J. Kuhl, J. Beckmann (Eds.), *Action Control: From Cognition to Behavior*, Springer Berlin Heidelberg, Berlin, Heidelberg, 1985, pp. 11–39.
- [18] M.A.H. Fleuren, T.G.W.M. Paulussen, P. Van Dommelen, S. Van Buuren, Towards a measurement instrument for determinants of innovations, *Int. J. Qual. Health Care* 26 (5) (2014) 501–510.
- [19] D.G.E. Kolkman, M.A.H. Fleuren, M. Wouters, C.J.M. de Groot, M.E.B. Rijnders, Barriers and facilitators related to the uptake of four strategies to prevent neonatal early-onset group B haemolytic streptococcus disease: a qualitative study, *BMC Pregnancy Childbirth* 17 (1) (2017) 139.
- [20] L.M. Verberne, M.C. Kars, S.A. Schepers, A.Y.N. Schouten-van Meeteren, M.A. Grootenhuis, J.J.M. van Delden, Barriers and facilitators to the implementation of a paediatric palliative care team, *BMC Palliat. Care* 17 (1) (2018) 23.
- [21] S.A. Schepers, S.M. Sint Nicolaas, L. Haverman, M. Wensing, A.Y.N. Schouten van Meeteren, M.A. Veening, et al., Real-world implementation of electronic patient-reported outcomes in outpatient pediatric cancer care, *Psychooncology* 26 (7) (2017) 951–959.
- [22] S. O'Donnell, A. Cranney, M.J. Jacobsen, I.D. Graham, A.M. O'Connor, P. Tugwell, Understanding and overcoming the barriers of implementing patient decision aids in clinical practice, *J. Eval. Clin. Pract.* 12 (2) (2006) 174–181.
- [23] E.H. Wang, C.P. Gross, J.C. Tilburt, J.B. Yu, P.L. Nguyen, M.C. Smaldone, et al., Shared decision making and use of decision AIDS for localized prostate cancer: perceptions from radiation oncologists and urologists, *JAMA Intern. Med.* 175 (5) (2015) 792–799.
- [24] L.J. Caldon, K.A. Collins, M.W. Reed, S. Sivell, J. Austoker, A.M. Clements, et al., Clinicians' concerns about decision support interventions for patients facing

- breast cancer surgery options: understanding the challenge of implementing shared decision-making, *Health Expect.* 14 (2) (2011) 133–146.
- [25] M.A. O'Brien, C. Charles, P. Lovrics, F.C. Wright, T. Whelan, M. Simunovic, et al., Enablers and barriers to using patient decision aids in early stage breast cancer consultations: a qualitative study of surgeons' views, *Implement. Sci.* 9 (2014) 174.
- [26] J. Veldwijk, C. Hoving, B.M. van Gelder, T.L. Feenstra, Potential reach of effective smoking prevention programmes in vocational schools: determinants of school directors' intention to adopt these programmes, *Public Health* 126 (4) (2012) 338–342.
- [27] M.E. Ellen, G. Leon, G. Bouchard, M. Ouimet, J.M. Grimshaw, J.N. Lavis, Barriers, facilitators and views about next steps to implementing supports for evidence-informed decision-making in health systems: a qualitative study, *Implement. Sci.* 9 (2014) 179.
- [28] M.H. Becker, Factors affecting diffusion of innovations among health professionals, *Am. J. Public Health* 60 (2) (1970) 294–304.
- [29] M.P. Eccles, S. Hrisos, J. Francis, E.F. Kaner, H.O. Dickinson, F. Beyer, et al., Do self-reported intentions predict clinicians' behaviour: a systematic review, *Implement. Sci.* 1 (2006) 28.
- [30] J. Lynch, F. Goodhart, Y. Saunders, S.J. O'Connor, Screening for psychological distress in patients with lung cancer: results of a clinical audit evaluating the use of the patient Distress Thermometer, *Support. Care Cancer* 19 (2) (2011) 193–202.
- [31] A.P. Braeken, L. Lechner, F.C. van Gils, R.M. Houben, D. Eekers, T. Ambergen, et al., The effectiveness of the Screening Inventory of Psychosocial Problems (SIPP) in cancer patients treated with radiotherapy: design of a cluster randomised controlled trial, *BMC Cancer* 9 (2009) 177.
- [32] S.A. Lenzen, Het vier bollen model [The four circle model] Retrieved from <http://www.zuyd.nl/onderzoek/lectoraten/autonomie-en-participatie/media/Files/Onderzoek/Kenniskring%20Autonomie%20en%20participatie%20van%20chronisch%20zieken/Het%204-%20bollen%20model%20voor%20website%20121015.pdf>, (2015) .
- [33] J.H.H.M. Friesen-Storms, G.J.J.W. Bours, I.C.G. Sijnders, T. van der Weijden, K.-S. G. Jie, A.J.H.M. Beurskens, A conversation approach based on shared goal-setting and shared decision-making for nurses in cancer aftercare: a developmental study, *Eur. J. Oncol. Nurs.* 35 (2018) 107–116.
- [34] R.J. Volk, A. Coulter, Advancing the science of patient decision aids through reporting guidelines, *BMJ Qual. Saf.* 27 (5) (2018) 337–339.
- [35] S. Carlford, M. Lindberg, P. Bendtsen, P. Nilsen, A. Andersson, Key factors influencing adoption of an innovation in primary health care: a qualitative study based on implementation theory, *BMC Fam. Pract.* 11 (2010) 60.
- [36] K.M. Turner, J.M. Nicholson, M.R. Sanders, The role of practitioner self-efficacy, training, program and workplace factors on the implementation of an evidence-based parenting intervention in primary care, *J. Prim. Prev.* 32 (2) (2011) 95–112.
- [37] S. Dopson, L. FitzGerald, E. Ferlie, J. Gabbay, L. Locock, No magic targets! Changing clinical practice to become more evidence based, *Health Care Manag. Rev.* 35 (1) (2010) 2–12.
- [38] J. Hendy, J. Barlow, The role of the organizational champion in achieving health system change, *Soc. Sci. Med.* 74 (3) (2012) 348–355.
- [39] A. Soni, A. Amin, D.V. Patel, N. Fahey, N. Shah, A.G. Phatak, et al., The presence of physician champions improved Kangaroo Mother Care in rural western India, *Acta Paediatr.* 105 (9) (2016) e390–395.