Sexual rehabilitation after treatment for gynaecological cancer

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Sexual rehabilitation after treatment for gynaecological cancer

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Contents

Chapter 1	General introduction	8
Part I	**Sexual distress and related needs after treatment**	14
Chapter 2	Sexual distress and associated factors among cervical cancer survivors: A cross-sectional multi-centre observational study	16
Chapter 3	Cervical cancer survivors' and partners' experiences with sexual dysfunction and psychosexual support	30
Part II	**Prevention of treatment-induced vaginal changes**	46
Chapter 4	A controlled study on vaginal blood flow during sexual arousal among early stage cervical cancer survivors treated with conventional radical or nerve-sparing surgery with or without radiotherapy	48
Chapter 5	Sexual rehabilitation after pelvic radiotherapy and vaginal dilator use: Consensus using the Delphi method	60
Chapter 6	Qualitative accounts of patients' determinants of vaginal dilator use after pelvic radiotherapy	76
Part III	**Developing a sexual rehabilitation intervention for patients treated with radiotherapy**	90
Chapter 7	A nurse-led sexual rehabilitation programme after radiotherapy for gynaecological cancer	92
Chapter 8	General Discussion	112
	References	122
	Summary	136
	Nederlandse samenvatting	142
	Authors and their affiliations	150
	List of publications	152
	Curriculum vitae	158
	Dankwoord	160

General introduction

CHAPTER 1

Gynaecological cancers: epidemiology and treatment

Gynaecological cancers originate in the female reproductive organs. They comprise cancers of the ovary, the uterus, the uterine cervix, and vaginal and vulvar cancers. Histological (sub)types, epidemiological factors, characteristics and risk factors vary greatly between the specific cancer types. In the Netherlands, each year about 4500 women are diagnosed with gynaecological cancers. Among these cases, 1900 are endometrial cancers, followed by 1300 ovarian cancers, 700 cervical cancers, 300 vulvar cancers, and 50 vaginal cancers.[1] Incidence rates for endometrial cancer are rising with ageing of the population and increased rates of obesity, while those of ovarian, cervix and vulvar cancers have been more or less stable. Cervical cancer in particular concerns a predominantly young population with a peak age between 30 and 40 years.[1,2] With screening and prevention, especially HPV vaccination, the incidence of cervix cancer is expected to decrease in future decades.[3,4]

Mainstay of treatment of most gynaecological cancer is surgery, while about 35% of patients with gynaecological cancers are treated with radiation therapy, either as primary or post-surgical treatment.[5,6] Patients with early stage cervical cancers are primarily treated with radical hysterectomy in combination with pelvic lymphadenectomy (RHL), and sparing of the ovaries. Fertility sparing approaches for very young women include uterine conserving measures such as trachelectomy. In case of lymph node metastases, close or involved surgical margins, or high-risk factors found after cervix cancer surgery, postoperative external-beam radiation therapy (EBRT) is indicated, often combined with concurrent chemotherapy and (in case of close vaginal margins) with a vaginal brachytherapy (BT) boost.[7,8] Postoperative EBRT is also indicated in patients with endometrial and vulvar cancers in case of risk factors and/or lymph node metastases, with or without chemotherapy and vaginal BT boost, depending on pathological findings. For patients with early stage endometrial cancer with high-intermediate risk factors, vaginal BT alone is used, with the advantages of minimal morbidity and high local control.

Patients with more advanced stages of cervical cancer, and with the more infrequent cases of vaginal cancer, are treated with primary pelvic EBRT, concurrent cisplatin chemotherapy, and intrauterine and vaginal BT.[5,6] The purpose of BT is to deliver a high dose to the centre of the residual tumour, while sparing surrounding tissues. Image-guided approached to BT have increased pelvic control and survival rates, while reducing the risk of major toxicity.[9,10] For BT, MRI-compatible applicators

are placed in the uterus and vagina, and after MRI scanning an individual treatment plan is made to conform the high-dose region to the tumour volume and keep the dose to normal organs within set limits.

Treatment-induced long-term morbidity and sexual problems

Improved screening methods and effective treatment options have resulted in a substantial number of gynaecological cancer survivors.[11] As a consequence, quality-of-life issues have increasingly gained attention.[12] Gynaecological cancer treatment may induce long-term morbidity such as urinary and defecation problems, fatigue and lymphedema, but also early menopause and the loss of fertility in young women, coping, psychological and social issues related to cancer treatment.[13–16] Furthermore, an important part of the impact of gynaecological cancers and their treatment concerns the women's sexual functioning. Sexual problems have been reported by 23% to 70% of the gynaecological cancer survivors and their partners .[15,17–24] Multiple questionnaires studies showed that the majority of reported problems after treatment concerned a tightened and/or shortened vagina, diminished lubrication, dyspareunia (painful intercourse), post-coital bleeding, reduced intensity of the orgasm, but also decreased sexual activity, interest, desire and satisfaction .[15,18,19,21,22,25–33] A large number of these reported sexual problems can be attributed directly to the vaginal consequences of treatment. Treatment with RHL, for example, sometimes leads to shortening of the vagina and damaged pelvic autonomic nerves may lead to vaginal dryness.[13,18,22,31,34–36] Furthermore, primary EBRT with BT delivers a relatively high dose to the upper vaginal region, which results in atrophy (thinning) of the vaginal mucosa with decreased lubrication and telangiectasia. It also results in adhesions and fibrosis with consequential shortening, and tightening of the upper vagina, and loss of flexibility.[37–44] Furthermore, when sexual problems cause survivors to personally experience significant sexual distress this may lead to the diagnosis of a sexual dysfunction.[45]

In order to investigate and reduce the impact of gynaecological cancer treatment on sexual problems and functioning, the studies described in this thesis have been done to explore what forms of patient support and education and/or specific rehabilitation measures are needed, to improve survivors' sexual recovery. Although surgery has a major impact on sexual functioning, the changes and symptoms caused by intensive EBRT and BT combinations are more profound.[13,15,25,29,31,40–42,46–49] Therefore, the studies have been mainly focused on patients with (advanced) cervical cancer, who are most often treated with primary EBRT and BT, and a predominantly young population.[1]

Sexual distress and related needs after treatment

To date, research into sexual problems of gynaecological cancer survivors has mainly focused on vaginal changes caused by treatment. Only few studies have, however, investigated which factors are associated with the experience of sexual distress that is reported by about one third of the survivors.[18,26,32,50] From a biopsychosocial point-of-view, higher levels of sexual distress can be related, not only to

higher levels of physical problems, such as treatment-induced vaginal symptoms, but also to the higher levels of psychological distress.[51–53] Anxiety and depression after cancer treatment are often reported, as well as and interpersonal problems.[15,24,29,54] Also, even though vaginal symptoms are frequent among cervical cancer survivors, it should be explored why these symptoms do not necessarily induce sexual distress to all survivors.

As a result of treatment consequences and sexual distress, gynaecological cancer survivors may have psychosexual health care needs. From quantitative studies it is known that some survivors hardly received such support from their healthcare providers.[55] Moreover, survey studies showed that many more survivors experience psychosexual healthcare needs compared to the number of women who actually seek help and few studies have focused on the partner's perspective.[21,56,57] Also, sexually distressed survivors' needs may differ from to those who do not experience sexual distress. Therefore, insight is needed in the survivors' and their partners' perspective on sexuality after treatment, current psychosexual support and their unmet needs.

Preserving the vaginal blood flow response

In addition to investigations into sexual distress and supportive care needs among gynaecological cancer survivors, it is important to study whether treatment-induced vaginal changes can be diminished. In recent years, it has been investigated if a nerve-sparing modification of the RHL for cervical tumours could prevent damage to the pelvic autonomic nerves and the sexual problems, possibly associated with this damage.[58,59] In the Netherlands, such a nerve-sparing RHL technique has been developed and used in Leiden since 2000.[59,60] However, empirical evidence that women treated with a nerve-sparing RHL suffer less from a reduced vaginal perfusion response during sexual stimulation compared to women treated with conventional RHL is still lacking. Furthermore, since radiation also leads to impaired function of the vaginal mucosa by causing damage to the microvasculature, it should be examined whether postoperative EBRT obviates any preserved vaginal perfusion response after a nerve-sparing RHL.

Preventing radiation-induced vaginal stenosis

Therapy that minimizes the impact of vaginal radiation damage may also improve the sexual recovery of the cervical cancer survivors. The regular use of a vaginal dilator has been associated with a reduction and prevention of the vaginal shortening and/or tightening, and vaginal adhesions.[39,48,61–66] Notwithstanding the fact that more empirical evidence is needed, dilator use has already become worldwide an essential component of gynaecological cancer survivors' sexual rehabilitation after treatment with radiotherapy.[44,65,67]

The content of patient education on vaginal dilator use, however, varies between articles and guidelines.[65] It is most important to provide a consistent and uniform, evidence-based counselling.[68–70] In two survey studies from the UK and Australia

there was consensus among professionals that women undergoing pelvic RT for gynaecological malignancies should receive information about vaginal dilation.[71,72] There was no consensus regarding the type of health care provider needed to provide support, the most appropriate time interval after RT, the frequency and duration of dilator use, and the content of instructions regarding patients' sexual rehabilitation. Consensus on these aspects is also warranted in order to further investigate the efficacy of a standardized procedure of sexual rehabilitation and dilator use after RT.

Despite the proposed benefits of a regular long-term vaginal dilator use, women have difficulties following the instructions and therefore compliance is poor. Research showed that only 1% to 35% of the gynaecological cancer survivors used a dilator twice a week within the first 12 months following EBRT/BT.[43,64,73–76] According to prior studies, survivors experienced barriers, such as painful insertion or reliving their treatment, and facilitating factors, such as concern about the development of vaginal adhesions.[64,69,75,77] It remains unidentified, however, what determined the compliant survivors to continue and maintain long-term regular dilator use.

Interventions during sexual recovery and vaginal dilator use

Education, instructions, as well as additional support during rehabilitation are needed to help survivors experience less problems during long-term dilator use and while gradually resuming sexual activity, however no published effective methodologies are known.[78,79] A few psychological interventions indicated to be feasible and moderately effective in reducing sexual concerns after gynaecological cancer treatment, but these studies were non-controlled or provided insufficient information to calculate the effect size with.[80–82] There are indications from two small Canadian trials that two psychologist-led group sessions after gynaecological cancer treatment increased dilator use compliance compared to "care as usual" in the short term.[73,74] The interventions, however, did not result in significant differences with regard to sexual functioning and research should aim to enhance efficacy of sexual rehabilitation interventions.

Outline of the thesis

In this thesis experimental, quantitative and qualitative research data is gathered to explore what kind of education and/or support is needed to minimize the impact of gynaecological cancer treatment on sexual functioning, and to improve the survivors' sexual recovery.

In the first part of this thesis, we examine gynaecological cancer survivors' experience with sexual recovery after treatment and unmet needs. In order to gain insight in how to reduce sexual distress it is investigated what biopsychosocial factors are associated with sexual distress by conducting a cross-sectional questionnaire study among cervical cancer survivors in **chapter 2**. Furthermore, since qualitative research can complement and amplify the available quantitative data an interview study among cervical cancer survivors, and partners is described in **chapter 3**. Their unmet needs for psychosexual support are explored.

The second part of this thesis explores the prevention of treatment-induced vaginal changes among gynaecological cancer survivors. In **chapter 4** the vaginal blood flow response during sexual arousal among early-stage cervical cancer survivors after treatment with different types of surgery and/or postoperative radiotherapy is experimentally assessed in a controlled study. To prevent sexual problems due to radiation-induced vaginal changes it is important to provide consistent and uniform, evidence-based counselling with regard to sexual rehabilitation and dilator use. Therefore, in **chapter 5** consensus regarding what patient information and support is needed, is sought using the Delphi-method among expert professionals from all Dutch gynaecological cancer centres. Furthermore, in **chapter 6** an interview study among gynaecological cancer survivors identifies what determines their intention, initiation and maintenance of long-term regular dilator use after treatment with radiotherapy.

In the third part of this thesis, a sexual rehabilitation intervention in combination with a patient information booklet was developed based on the study results described in the previous chapters and by involving all relevant end-users. In **chapter 7** the results of a pilot study to assess the interventions' acceptability and clinical feasibility are reported. Finally, a summary of the results, its limitations and conclusions is discussed in **chapter 8**. Both research and clinical implications for future reference are provided.

Part I

Sexual distress and related needs after gynaecological cancer treatment

Sexual distress and associated factors among cervical cancer survivors: A cross-sectional multi-centre observational study

Rinske M. Bakker, Gemma G. Kenter, Carien L. Creutzberg, Anne M. Stiggelbout, Marloes Derks, Willeke Mingelen, Cor D. de Kroon, Willemijn M. Vermeer, Moniek M. ter Kuile.

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CHAPTER 2

Abstract

Objectives

To assess whether sexual distress among cervical cancer (CC) survivors is associated with frequently reported vaginal sexual symptoms, other proposed biopsychosocial factors, and whether worries about painful intercourse mediates the relation between vaginal sexual symptoms and sexual distress.

Methods

A cross-sectional study was conducted among 194 sexually active partnered CC survivors aged 25-69 years. Sexual distress, vaginal sexual symptoms, sexual pain worry, anxiety, depression, body image concerns, and relationship dissatisfaction, and the socio-demographic variables age, time since treatment, and relationship duration, were assessed using validated self-administrated questionnaires.

Results

In total, 33% (n = 64) of the survivors scored above the cut-off score for sexual distress. Higher levels of sexual distress were shown to be associated with higher levels of vaginal sexual symptoms, sexual pain worry, relationship dissatisfaction, and body image concerns. Furthermore, the results showed that sexual pain worry partly mediated the association between vaginal sexual symptoms and sexual distress, when controlling for relationship dissatisfaction and body image concerns.

Conclusions

Appropriate rehabilitation programs should be developed for CC survivors, to prevent and reduce not only vaginal sexual symptoms, but also sexual pain worry, relationship dissatisfaction and body image concerns, in order to reduce sexual distress.

Background

Improved screening and treatment options for cervical cancer (CC) have resulted in a substantial number of survivors.[11] Early-stage CC is mainly treated with radical hysterectomy with pelvic lymphadenectomy (RHL). In the case of adverse risk factors, postoperative radiotherapy, consisting of pelvic external beam radiotherapy (EBRT) sometimes combined with vaginal brachytherapy (BT) is recommended. More advanced tumours are treated primarily with EBRT/BT.[5] Quality-of-life issues among CC survivors, such as impact of treatment on sexuality, have increasingly gained attention.[12]

Thus far, sex research has mainly focused on vaginal consequences of CC treatment. Results showed that CC survivors reported more vaginal sexual symptoms, such as a shortened and tightened vagina, vaginal dryness, and dyspareunia, compared to their pre-treatment situation as well as compared to healthy controls.[18,22,30] Most studies showed that the negative effects were more pronounced when treatment included radiotherapy, as compared to RHL alone.[15,29,49] Furthermore, questionnaire studies indicated that around one third of the CC survivors experienced distress and sexual dissatisfaction due to vaginal sexual symptoms, particularly dyspareunia.[18,26,32,54]

Studies among the normal population have shown that sexual distress was related, not only to physical problems, such as vaginal symptoms, but also to psychological (e.g. anxiety or depression) and interpersonal problems (e.g. relationship dissatisfaction).[53,83,84] This is in line with the biopsychosocial perspective that female sexuality is multidimensional.[51] However, to date, very little research has considered biopsychosocial associates of sexual distress among CC survivors. Survivors reported more anxiety and depression than control groups, and these symptoms have been shown to be related to survivors' sexual distress.[15,29,54] Furthermore, it is unknown whether the body image concerns, such as feeling less feminine and less sexually confident, or the relationship dissatisfaction that CC survivors reported after treatment, contributed to experiencing sexual distress.[15,24,29,54]

It is important to note that vaginal sexual symptoms do not necessarily induce sexual distress among all CC survivors. Bergmark et al. (1999) showed that of all CC survivors reporting vaginal sexual symptoms, about half experienced moderate to severe distress about it.[18] It is possible that some participants did not report distress because they were sexually inactive or did not position coital sex as their primary sexual activity, for example due to a homosexual orientation.[85] Another possible explanation is that the association between vaginal sexual symptoms and sexual distress is mediated by the amount of worry about sexual pain. According to the pain literature, women who respond with catastrophic worry when confronted with pain experience more distress.[86,87] Identical results have been found among breast cancer and lung cancer survivors.[88,89] In our earlier qualitative study some CC patients reported experiencing worrying about sexual pain as very distressing.[90]

In this cross-sectional questionnaire study we expected that higher levels of sexual distress would be associated with the higher levels of physical (vaginal sexual symptoms), psychological (sexual pain worry, anxiety, depression, body image concerns) and interpersonal (relationship dissatisfaction) problems that have previously been reported by CC survivors. Secondly, it was expected that sexual pain worry among CC survivors would mediate the association between vaginal sexual symptoms and sexual distress.

Methods

Participants and recruitment

Eligible women were treated between January 2000 and June 2011 at Leiden University Medical Centre (LUMC) or Centre for Gynaecological Oncology Amsterdam, with either RHL (with or without adjuvant radiotherapy) or primary EBRT/BT. Women were excluded if they were not cancer free in the previous year, older than 70 years (see Supplemental Information 1, page 28), not able to complete a Dutch questionnaire, living abroad, or had received treatment other than RHL and/or EBRT/BT. Invitation letters were sent to all eligible women asking them to participate in a study investigating sexual functioning and quality of life after cervical cancer treatment. Women who did not respond within 1 month were sent a reminder and were contacted by telephone 1 week later.[57] The LUMC Medical Ethics Committee approved the protocol. The current study only investigated participants that were in a partner relationship.

Measurements

Higher scores indicated more symptom burden or dissatisfaction on all measures.

Sexual distress

Sexual distress was measured with the 12-item *Female Sexual Distress Scale* (FSDS).[28] Scores of ≥ 15 indicate sexually related personal distress. The FSDS has been used previously with cancer survivors.[91] Cronbach's α = .97 within the current sample.

Vaginal sexual symptoms

The four-item Sexual/Vaginal Functioning scale of the *European Organization for Research and Treatment of Cancer Quality of Life Questionnaire* (EORTC QLQ-CX24) was used to measure vaginal dryness, shortening or tightening, and pain during sexual intercourse (Cronbach's α = .85 within this sample).[92] The scale could only be completed by participants who reported having been sexually active during the previous 4 weeks. The items were converted to a 0–100 scale.

Sexual pain worry

The single-item *Sexual Worry* scale of the QLQ-CX24 was used to measure "worries about painful sexual intercourse".[92] The items were converted to a 0–100 scale.

Anxiety and depression

Anxiety and depression symptoms were measured using the *Hospital Anxiety and Depression Scale* (HADS) containing the subscales Anxiety and Depression (Cronbach's α's = .91, .87 and .85 respectively within the current sample).[93]

Body image concerns

Body image was measured using the three-item *Body Image* subscale from the EORTC QLQ-CX24 (Cronbach's α = .88 within the current sample).[92] The scales were converted to a 0–100 scale.

Relationship dissatisfaction

The 10-item subscale *Marital (Mal)adjustment of the Maudsley Marital Questionnaire* (MMQ) was used to measure relationship dissatisfaction (Cronbach's α = .94 within the current sample).[94]

Socio-demographic and treatment variables

Items measuring socio-demographic characteristics that were included were sexual activity, relationship duration, and age. Treatment and disease data were gathered from participants' medical records. CC treatment modalities were grouped in four categories: treatment with 1) RHL alone; 2) RHL and adjuvant EBRT; 3) both RHL and EBRT/BT, or 4) primary EBRT/BT. The time interval between treatment and completion of the questionnaire in months was taken into account. Furthermore, the *International Federation of Obstetrics and Gynaecology* (FIGO) stages of the carcinomas were categorized as 1) stage IA; 2) stage IB and IIA; 3) stage IIB-IVA; 4) unknown.

Statistical analyses

Chi-square tests (χ^2) and independent samples t-tests were used to compare women who had declined participation with the participants for age, treatment modality, time since treatment, FIGO stage and medical centre. Furthermore, descriptive statistics of all participants with a partner were calculated and differences were determined between sexually active and inactive participants. Given the fact that the vaginal sexual symptoms scale was only completed by sexually active participants, the sexually inactive participants are described separately.

Analyses were conducted in several steps using IBM SPSS version 20 (Armonk, NY, USA). At step one, univariate statistics were conducted to describe whether sexual distress was associated with one of the treatment categories, psychosocial variables (vaginal sexual symptoms, sexual pain worry, anxiety, depression, body image concerns, and relationship dissatisfaction) or socio-demographic variables (age, relationship duration, and time since treatment). At step two, the variables that were significantly correlated with sexual distress ($p < .05$) were entered stepwise in a hierarchical multivariate regression analysis with sexual distress as the dependent variable.

At step three, mediation analyses were performed to assess whether sexual pain worry mediated the relationship between vaginal sexual symptoms and sexual dis-

tress. A (partial) mediation effect was expected and considered statistically significant at the probability level if at least: 1) the number of vaginal sexual symptoms was associated with sexual pain worry, 2) sexual pain worry was related to the amount of sexual distress, 3) when the mediation effects' 95% confidence interval did not contain zero as a value.[95] The SPSS macro developed by Preacher and Hayes was used to generate estimates for the mediated effects and the standard error of the mediated effect was bootstrapped taking 5000 bootstrap samples.[96] A significance level of 5% was used in all analyses.

Results

Participant selection

Out of 764 eligible women, 540 (71%) responded of whom 342 (63%) completed the questionnaire. The remaining 198 women declined participation because the topic was too intimate or confronting, or for other unstated reasons. Women who declined participation were significantly older (mean (*M*) = 51, standard deviation (± *SD*) = 10 years) than participating women (*M* = 48 ± 9), *t* (542) = -2.23, *p* = .026. In total, 252 (74%) of the women reported being in a partner relationship and were selected to participate in the current study, see Figure 1 (page 22).

Participant characteristics

Sexual distress was reported by 38% of all participants according to the cut-off score (*n* = 95). On average, the total group of participants was treated 6 years previously (range: 1 to 12 years). Furthermore, 18% of the women were treated with primary EBRT/BT (*n* = 46). Of all women treated with RHL (*n* = 206), 82% were treated with RHL alone (*n* = 157), 13% received postoperative EBRT/BT (*n* = 26) and 11% EBRT (*n* = 23).

Among the 252 participants, 194 (77%) reported being sexually active. They were on average 46.2 (± 8.2) years old and in a relationship for 17.0 (± 11.7) years. Two thirds had completed secondary education (*n* = 124, 64%). Also, three participants (2%) completed a modified questionnaire for participants with a female sexual orientation. Sexually inactive participants reported significantly higher levels of sexual distress, according to the cut-off score, sexual pain worry and body image concerns compared to sexually active participants. Furthermore, sexually inactive participants were significantly older, in a relationship for a longer period of time, relatively more often diagnosed with FIGO stage IIB or higher, and treated with RT more often, than sexually active participants (see Table 1, page 22).

It is noteworthy that the severity of vaginal sexual symptoms reported by sexually active participants was found to significantly differ between the treatment categories (*F* (3, 194) = 7.66, *p* < .001). Post-hoc analyses indicated that participants treated with EBRT/BT reported significantly more vaginal sexual symptoms (*M* = 38.71 ± 32.46) than participants treated with RHL (*M* = 16.28 ± 19.68, *p* = .004) and RHL/EBRT (*M* = 15.35 ± 16.49, *p* = .008), but not compared with those treated with RHL/

EBRT/BT (*M* = 25.59 ± 30.91, *p* = n.s.). Participants treated with RHL did not report more or fewer symptoms than participants treated with RHL/EBRT or RHL/EBRT/BT (*p*'s = n.s.).

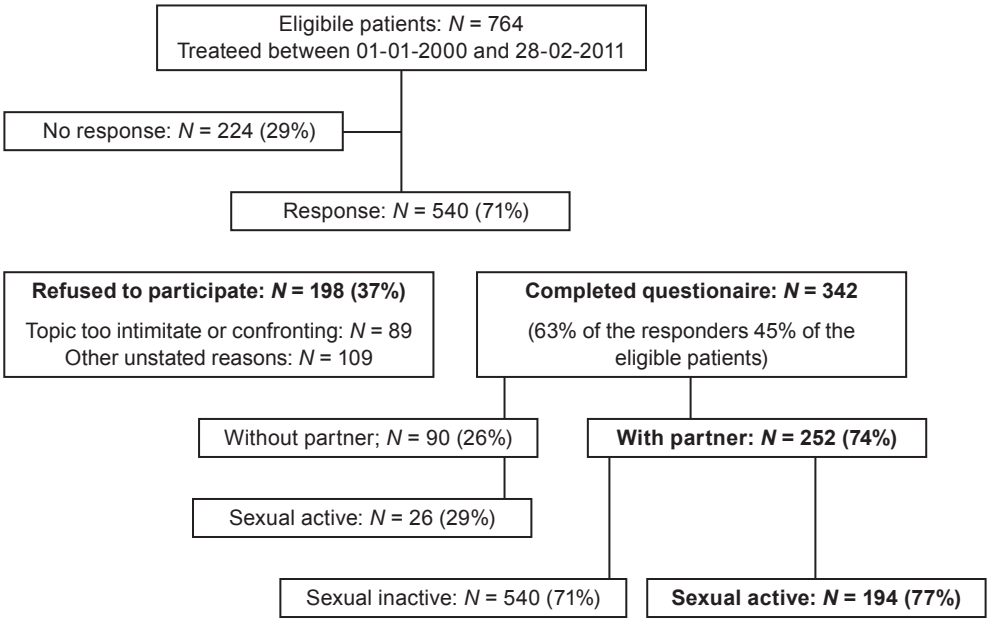


Figure 1. Flow chart of the participant selection.

Table 1
Descriptive characteristics of all participants with a partner.

		All women	Sexually active	Sexually inactive	
		***n* = 252**	***n* = 194**	***n* = 58**	
Treatment-related					
			***N* (%)[1]**		**χ^2 -value**
FIGO stage[3]	IA	5 (2)	5 (3)	0	8.47*
	IB-IIA	218 (87)	172 (89)	46 (79)	
	IIB-IVA	28 (11)	16 (8)	12 (21)	
Treatment[4]	RHL	206 (82)	163 (84)	43 (74)	2.92
	RT	95 (38)	64 (33)	31 (53)	7.96**
	EBRT/BT	72 (29)	45 (23)	27 (47)	3.21
	EBRT	23 (9)	19 (10)	4 (7)	3.21

Socio-demographic characteristics				
	Mean (± *SD*)[2]			***t*-value**
Relationship duration (years) (n = 247)	18.3 (12.2)	17.0 (11.7)	22.8 (12.8)	3.24**
Age (years)	47.5 (8.6)	46.2 (8.2)	51.7 (8.6)	4.36***
Time since treatment (years)	5.9 (3.1)	6.0 (3.2)	5.4 (2.9)	-1.34
	***N* (%)**			**χ^2 -value**
Sexual orientation (n = 251) Male	245 (98)	190 (98)	55 (95)	2.50
Female	6 (2)	3 (2)	3 (5)	
Educational level (n = 248) Primary	6 (2)	5 (3)	1 (2)	.16
Secondary	162 (64)	124 (64)	38 (66)	
Tertiary	80 (32)	61 (31)	19 (33)	
Biopsychosocial variables[5]				
	Mean (± *SD*)[2]			***t*-value**
Sexual distress cut-off score ≥15	*n* = 95 (38%)	*n* = 64 (33%)	*n* = 31 (54%)	8.57** (χ^2)
Sexual distress	12.7 (12.4)	11.1 (11.4)	18.5 (13.9)	6.13***
Vaginal sexual symptoms		20.44 (24.1)		
Sexual pain worry	17.7 (29.0)	15.3 (25.9)	26.1 (37.2)	2.01*
Anxiety	5.7 (4.3)	5.6 (4.4)	5.8 (4.0)	.36
Depression	3.3 (3.6)	3.2 (3.6)	3.7 (3.5)	.97
Body image concerns	20.5 (25.4)	18.7 (24.1)	26.6 (28.6)	2.09*
Relationship dissatisfaction	14.3 (14.2)	14.0 (14.1)	15.3 (14.6)	.59

[1]*N*(%): number and percentage of participants to which characteristic is applicable. Due to rounding percentages may not add to one hundred.
[2]*SD* = Standard deviation.
[3]FIGO: *International Federation of Gynecology and Obstetrics*.
[4]RHL: radical hysterectomy with pelvic lymphadenectomy; RT: radiotherapy; EBRT: pelvic external beam radiotherapy; BT: brachytherapy.
[5]Measured with: FSDS: *Female Sexual Distress Scale. Sexual/Vaginal Functioning and Body Image* scales of the EORTC QLQ-CX24: *European Organization for Research and Treatment of Cancer Quality of Life Questionnaire* module CX24. Subscales *Anxiety and Depression* of the HADS: *Hospital Anxiety and Depression Scale*. Subscale Marital (Mal)adjustment of the MMQ: *Maudsley Marital Questionnaire.*
*p < .05, **p < .01, ***p < .001

Univariate associated variables of sexual distress

Among sexually active participants, sexual distress correlated significantly with levels of vaginal sexual symptoms, sexual pain worry, anxiety, depression, body image concerns, and relationship dissatisfaction. See Table 2, page 24. Age, relationship duration and time since treatment were not associated with sexual distress (r = .13, .07 and -.09 respectively, p's = n.s.). Furthermore, the four treatment categories

(RHL, RHL/EBRT, RHL/EBRT/BT and EBRT/BT) were also not associated with sexual distress (F(3, 194) = 0.73, p = .534, M = 10.55 ± 10.66, M = 11.06 ± 14.36, M = 9.13 ± 9.42, and M = 14.25 ± 13.46 respectively).

Table 2
Univariate associations between sexual distress and biopsychosocial variables among sexually active CC survivors (n = 194)[1].

	Sexual distress	Vaginal sexual symptoms	Sexual pain worry	Anxiety	Depression	Body image concerns
Vaginal sexual symptoms[3]	.48***	-				
Sexual pain worry[3]	.48***	.60***	-			
Anxiety[4]	.33***	.22**	.30**	-		
Depression[4]	39***	.23**	.34***	.66***	-	
Body image concerns[3]	41***	.21**	.25***	.33***	.35***	-
Relationship dissatisfaction[5]	36***	.11**	.13***	.30***	.41***	.32***

[1]Pearsons correlation coefficients.
[2]*Female Sexual Distress Scale* (FSDS)
[3]*Sexual/Vaginal Functioning, Sexual Worry* and *Body Image* scale of the EORTC QLQ-CX24 (*European Organization for Research and Treatment of Cancer Quality of Life Questionnaire module CX24*)
[4]*Hospital Anxiety and Depression Scale* (HADS)
[5]*Maudsley Marital Questionnaire* Subscale *Marital (Mal)adjustment* (MMQ)
*p < .05, **p < .01, ***p < .001.

Multivariate associated variables of sexual distress

Variables that were significantly correlated with sexual distress were added stepwise in a multivariate regression analysis. Variables associated with higher levels of sexual distress, and entered stepwise in the model in the following sequence were: higher levels of sexual pain worry (β = .24, ΔR^2 = .22, F(1, 188) = 54.70, p < .001), relationship dissatisfaction (β = .23, ΔR^2 = .09, F(1, 187) = 24.15, p < .001), vaginal sexual symptoms (β = .27, ΔR^2 = .05, F(1, 186) = 14.32, p < .001), and body image concerns (β = .22, ΔR^2 = .04, F(1, 185) = 12.18, p < .001). The model explained 40% of the total variance (F(4, 189) = 31.14, p < .001). Anxiety and depression did not make an additional and independent contribution to sexual distress in addition to the other variables (β = .07 and .11 respectively, p's = n.s.). See Supplemental Information 2, page 28.

Sexual pain worry as a possible mediator in the association between vaginal symptoms and sexual distress

In order to test whether sexual pain worry mediated the association between vaginal symptoms and sexual distress, sexual distress was regressed upon sexual pain worry and vaginal symptoms. In this mediation analysis, the related variables - body image concerns and relationship dissatisfaction - were entered as control variables. When including the proposed mediator sexual pain worry in the equation, the asso-

ciation between vaginal sexual symptoms and sexual distress decreased in strength from β = .40 (t = 6.80, p < .001) to β = .27 (t = 3.79, p < .001). Bootstrapping the indirect effect of sexual pain worry on sexual distress, sexual pain worry proved to be a significant mediator of sexual distress, while controlling for body image concerns and relationship dissatisfaction. These findings indicate that the association between vaginal sexual symptoms and sexual distress is partly mediated by sexual pain worry (see Figure 2).

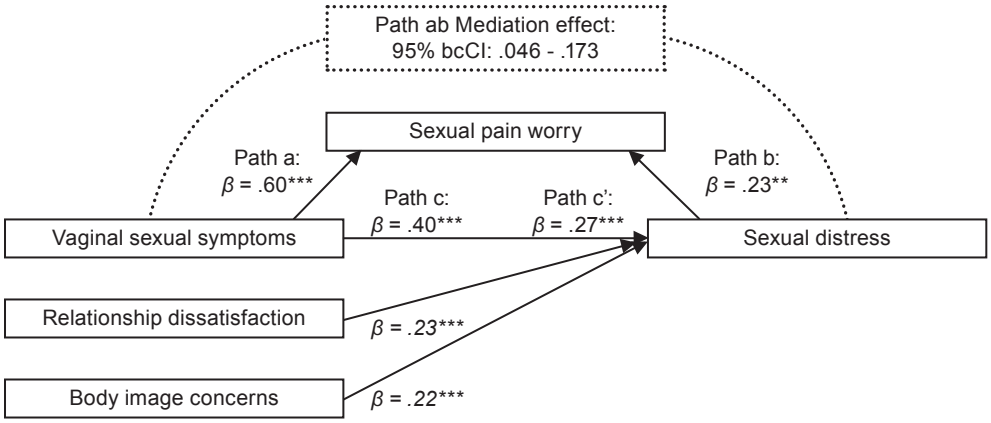


Figure 2. Model of sexual worry as a mediator in the relationship between vaginal sexual symptoms and sexual distress. Final mediation model: R^2 = .40***. Note: the indirect effect is depicted in dotted lines. *p < .05; **p < .01; ***p < .001

Discussion

In this study about one third of the sexually active CC survivors reported clinically relevant levels of sexual distress. Higher levels of sexual distress were associated with higher levels of vaginal sexual symptoms, sexual pain worry, relationship dissatisfaction, and body image concerns. Furthermore, the results contributed to those of previous studies by showing that the relation between vaginal sexual symptoms and higher levels of sexual distress was partly mediated by experiencing more sexual pain worry.

The number of CC survivors who reported clinical levels of sexual distress in this study was comparable to previous results.[18,26,32] Furthermore, in line with the biopsychosocial approach, sexual distress was related, not only to the physical variable vaginal sexual symptoms, but also to the psychological variables sexual pain worry and body image concerns, and the interpersonal variable relationship dissatisfaction.[15,24,29] However, the multivariate results showed that the psychological variables anxiety and depression did not account for a significant proportion of the amount of sexual distress. In contrast, the questionnaire study conducted by Bradford et al. (2015) suggested that depression was associated with sexual distress, over and

above relationship adjustment problems.[54] Also, the population-based studies indicated that the most important correlates of sexual distress were relationship function, anxiety and depression, over and above physiological symptoms.[53,83,84] The mixed results concerning the contribution of anxiety and depression may be explained by the fact that, compared with the normal population, CC survivors are mostly distressed about the physical sexual symptoms and specifically anxious about painful intercourse (sexual pain worry). This may, despite the univariate correlation of anxiety and depression with sexual distress, explain why more general psychological variables did not make an additional and independent contribution to sexual distress. In line with this explanation, Bergmark found that CC survivors perceived higher levels of distress in relation to the physical sexual symptom dyspareunia, compared to an age-matched group of women without a history of cancer.[18,32] Future research is encouraged to gain insight into relationship dynamics, for example by including partner variables, and concerns about body image since these factors seemed to be related to sexual distress across different kinds of populations.[53,83,84]

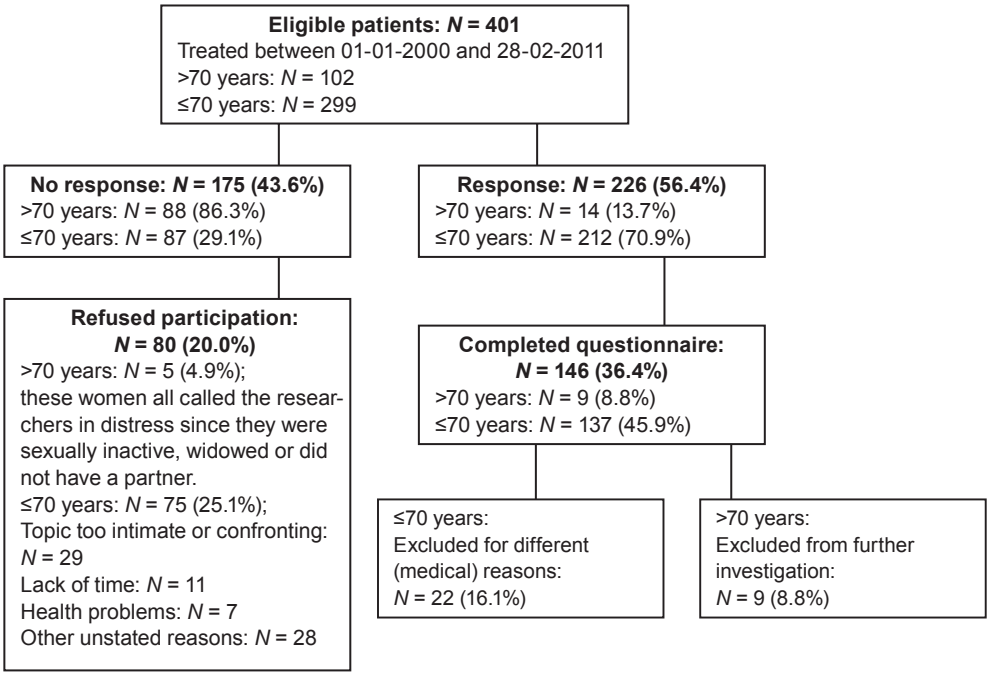
In this study, higher levels of sexual distress among CC survivors with vaginal sexual symptoms depended on the amount of worry about sexual pain. These findings are in line with a proposed circular model of sexual pain for healthy women with sexual pain disorders.[97] In this circular model, it is assumed that worry about sexual pain may induce decreased sexual arousal during sexual activity and therefore results in increased vaginal dryness and/or inadequate pelvic-floor muscle tone. This reaction may lead to friction between the penis, finger(s) or other penetrative objects and vulvar skin, which can result in sexual pain or failed attempts.[98] Thus, over and above vaginal sexual symptoms, worry about sexual pain may have contributed to increased pain and/or failed attempts among CC survivors in this study.

Previous studies among women with sexual pain disorder found a positive association between higher levels of sexual pain fear, sexual avoidance and sexual dissatisfaction.[99,100] This may apply to CC survivors as well in view of our finding that the sexually inactive participants' had higher levels of sexual pain worry and sexual distress, compared with sexually active participants. The amount of worry about sexual pain among sexually inactive participants may have led to avoidance of sexual activity as a coping strategy and thus, subsequently, to higher levels of sexual distress.[99] This was in line with the previous qualitative result that worry about painful intercourse was a reason for CC survivors to avoid or discontinue sexual activity, and experience distress after treatment.[90] However, we have to keep in mind that the sexually inactive participants were treated with RT more often, so they may have experienced more treatment-related vaginal sexual symptoms as well. To investigate whether higher levels of sexual distress among sexually inactive CC survivors can be explained by more worry about sexual pain and/or vaginal sexual symptoms it is important for future research to address these issues. Prospective designs should be used to exclude alternative explanations e.g. being unable to renegotiate sexual practices to include less distressing non-penetrative sex, sexual inactivity long prior to treatment, inactivity due to more advanced tumours, treatment progress or relationship changes.

An important limitation of this study was that the measurements could not be compared to an age-matched group of women without a history of CC. Thus, we do not know whether our findings could be specifically attributed to CC (treatment). Also, no prospective or baseline measurements were conducted, which makes it impossible to draw conclusions about what factors predict future sexual distress. Furthermore, a selection bias may have occurred: in addition to finding the topic too intimate, women that had more negative experiences during sexual rehabilitation after treatment may have declined participation more often. Therefore, our study may underestimate the levels of sexual distress in CC survivors. Furthermore, even though the EORTC QLQ-CX24 is one of the most commonly used questionnaires to assess sexual functioning among CC survivors, the subscale regarding vaginal sexual symptoms excludes information from women that have been sexually inactive during the previous 4 weeks. Also, the item regarding sexual pain worry focusses on sexual intercourse, instead of all forms of sexual contact, and may exclude women practicing non-coital sex or with a female sexual orientation. In the current study, however, all women with a female sexual orientation completed this item.

Health care professionals should be well mindful of sexual distress among CC survivors. Also, it is important for professionals to allocate time and the privacy needed to address sexual distress irrespective of type of treatment and sexual activity.[101] Furthermore, to prevent sexual distress among CC survivors, it may be particularly important to target and have due regard for vaginal sexual symptoms, for example by providing psycho-education and practical advice. Supplemental health care should aim to reduce worry about painful intercourse, decrease sexual avoidance, prevent relationship dysfunction and address concerns about body image. There are indications that psychological interventions addressing these issues, such as online psycho-educational support and mindfulness-based cognitive behavioural interventions, were able to reduce sexual distress among gynaecological cancer survivors with sexual problems.[80,102,103] Further research was required to determine efficacy and generalizability.

Supplemental Information 1
Flow chart of the participant selection at the first medical centre stratified between women older than 70 (*n* = 102), and 70 years or younger (*n* = 299). N.B. Percentages are based on the total number of eligible participants.
Due to the results, and in consultation with the Medical Ethics Committee, women older than 70 were excluded in the current study to avoid distressing the survivors, low response rates and blank questionnaires of women who were not sexually active anymore.



Supplemental Information 2
Final model of the stepwise hierarchical regression of biopsychosocial variables associated with sexual distress among sexually active CC survivors (*n* = 190).

	B	*SE B*	*β*	ΔR^2
Sexual pain worry	.17	.05	.24**	.22***
Relationship dissatisfaction	.27	.07	.23***	.09***
Vaginal sexual symptoms	.21	.06	.27***	.05***
Body image concerns	.16	.05	.22**	.04***

SE: Standard error. R^2 = .402, F (4, 189) = 31.14, p <.001.
*p < .05, **p < .01, ***p < .001.

Cervical cancer survivors' and partners' experiences with sexual dysfunction and psychosexual support

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Abstract

Objectives

To assess experiences with sexual dysfunctions, psychosexual support, and psychosexual healthcare needs among cervical cancer survivors (CCSs) and their partners.

Methods

Semi-structured interviews were conducted with CCSs (*n* = 30) and their partners (*n* = 12).

Results

Many participants experienced one or more sexual dysfunctions often causing feelings of distress. Most participants reported having been asked about their sexual functioning, although attention for sexual functioning was often limited and medically oriented. Considering sexuality a taboo topic hampered some participants to seek help. Many participants desired information about treatment consequences for sexual functioning, practical advice on dealing with dysfunctions, and reassurance that it is common to experience sexual dysfunction. A website was generally considered a useful and accessible first resource for information about sexual functioning after cancer.

Conclusions

Sexual dysfunctions are often distressing. Many patients and partners experience psychosexual healthcare needs, but the provided information and care is generally limited. Psychosexual support should go beyond physical sexual functioning, and should take aspects such as sexual distress, relationship satisfaction, and the partner perspective into account. Additionally, offering more practical and reassuring information about sexuality after cervical cancer would be valuable for both CCSs and their partners.

Introduction

Attention to cancer and treatment side effects is increasingly becoming part of survivorship care.[104] Cervical cancer (CC) has a yearly incidence rate of around 700 in the Netherlands, and a ten-year survival of 60%.[1] Sexual dysfunctions (e.g. vaginal dryness, pain at intercourse, decreased interest in sex) are an important treatment side effect and studies show that 23% to 70% of the cervical cancer survivors (CCSs) report problems with their sexual functioning.[18,19,21,22,27,31,105] Distress, such embarrassment, guilt or sadness, is a common consequence of sexual dysfunctions.[29,32]

Relatively little is known about how sexual dysfunctions affect quality of life and relationship satisfaction. Additionally, few studies have focused on how patients perceive existing psychosexual support and which needs they have. From quantitative studies it is known that many more gynaecological cancer survivors (GCSs) report psychosexual healthcare needs compared to the number of women who actually seek help.[21,106] For instance, a recent study demonstrated that only one third of the CCSs with a need for psychosexual support had actually initiated a conversation with a professional.[57] Interviews with women treated for ovarian cancer, demonstrated that they hardly received psychosexual support from their healthcare providers .[107] Not yet well established are differences in psychosexual support needs between women experiencing sexual distress versus those who do not. Finally, more insight is needed into the partner perspective. Quantitative studies into the impact of cancer on partner's sexual satisfaction show conflicting results,[108-112] and few qualitative studies into sexuality after GC have incorporated the partner perspective.[113,114]

This qualitative study aimed to build upon the existing research by assessing CCSs' desired sexual-health-related services while distinguishing between women who are sexually distressed and women who are not, and by incorporating both the survivor and the partner perspective. The research questions were: 1) How do CCSs and partners experience sexual dysfunctions that have occurred as a result of the treatment?; 2) How do CCSs and partners experience the information and care provision with respect to sexual functioning after CC?; and 3) What are survivors' and partners' psychosexual healthcare needs, how do these relate to sexual distress, and what are their attitudes towards different modes of delivery of interventions targeting sexual dysfunctions?

Methods

Participants and recruitment procedures

A purposive sampling strategy was used aiming to recruit about 30 participants from a sample of CCSs who had expressed their willingness to participate in future studies during their participation in a multi-centre cross-sectional questionnaire study.[57] Sampling took place until no new relevant themes emerged (data saturation).

A random sample of 54 eligible women (treated at the Leiden University Medical Centre (LUMC) or the Academic Medical Centre Amsterdam (AMC) in the past 1 to 12 years who had indicated to have at least once experienced a need for information or help) was invited for the study. Women who did not respond to the invitation were telephoned two weeks later. Out of all CCSs who were invited for the study, 30 (56%) agreed to be interviewed (referred to as 'participants'). The most frequently mentioned reasons for not participating were that the topic was too intimate or intimidating. All participants with a partner were requested to ask their partner to participate. Out of the 26 participants with a partner, 12 partners (33%) participated (referred to as 'partners'). The LUMC Medical Ethical Committee approved the study.

Data collection and interview topics

The face-to-face interviews were conducted by WV and RB either in a private room at the hospital or at the participant's home. The interviews took approximately 65 minutes for the participants and 56 minutes for the partners. We chose to conduct the interviews with the participants and their partners separately, to facilitate participants to speak freely about their individual experiences. All interviews were audio taped and transcribed verbatim. Topics that were discussed were the impact of the cancer treatment on sexual functioning, the information and care provision, psychosexual healthcare needs, and attitudes towards different modes of information and intervention delivery (see Table 1, page 34). For the topics related to the impact of the treatment on sexual functioning and received information and support, a Life History Calendar (LHC) method was used. A LHC is a matrix with time units horizontally (i.e. one year before diagnosis, diagnosis, treatment, 3, 6, 12 months after diagnosis, until 5 years after diagnosis) and domain cues (i.e. work, relational status, important life events, holidays, disease and treatment, sexual functioning, received information and care) listed vertically. The LHC is a reliable method for collecting retrospective information.[115]

Based on the interviews with the first 19 participants (and seven partners), the development of a psychoeducational website about sexuality after CC seemed an acceptable intervention to the participants. To further study the feasibility of this specific intervention it was decided for the remaining interviews to ask participants to comment more extensively on the website instead of on each intervention delivery mode. Lastly, demographic characteristics and treatment information were retrieved from previously collected data and medical records.

Data analyses

The data were coded and analysed with NVivo using the framework approach.[116] This approach allowed us both to make use of already existing knowledge about this topic and insights that emerged directly from the data.[117] After familiarization with the data, WV made a first version of a coding scheme that was based on the interview guide. RB and WV independently coded a random sample of three interviews and compared their coding. New codes that emerged from the data were discussed and, if deemed of added value, added to the codebook. Any discrepancies in coding were resolved through discussion. WV and RB repeated this procedure five times until 15 interviews were coded. WV continued to code the remaining interviews while RB

Table 1
Interview guide.

Theme	Topics
Introductory questions	Living situation, job status, partner status, having children, relevant life events, description of period of cancer diagnosis and treatment.
Experiences with respect to sexual dysfunctions	- Pelvic floor functioning (miction, defecation, incontinence), lymphedema, fertility in relation to sexual functioning. - Sexuality now and a year before diagnosis (using the Life History Calendar method) with respect to: (sexual) partner, sexual functioning (i.e. desire/libido, lubrication, sexual intercourse and/or masturbation, pain or other complaints, orgasm), body image, intimacy, sexual satisfaction, and sexual distress. - Impact of cervical cancer (treatment) on the relationship and the perception of the partner. - Coping with (possible) sexual complaints. - Communication about sexual issues between partners.
Experiences with information and care provision	- Received information and care. - Initiator of the information and care provision. - Experiences with the information and care provision. - Personal and practical barriers of seeking information and professional help.
Healthcare needs and attitudes towards modes of intervention delivery and attitudes towards interventions targeting sexual dysfunctions	- Needs with respect to information and care provision. - Attitudes towards partner involvement in information and care provision. - Attitudes towards different forms of information and care provision (written information, online support, face-to-face consult with gynecologist, sexologist, nurse, or general practitioner).[1]

[1]Until interview 19 (and in the case of the partners until interview 7) participants were asked to comment on each mode. After that, participants were only explicitly asked how they thought about a psycho-educational website about sexuality after cervical cancer without systematically addressing the other modes.

independently coded every third interview. To promote reliability, WV and RB discussed these doubled coded interviews to cross-check and - if needed - complement the coding.[118]

Results

Participant characteristics

Table 2 (page 35) gives an overview of the participant and partner characteristics. The average age of the 30 participants was 47 years (*SD* = 8; range: 34-68). Twenty-five participants had a male and one had a female partner. The average time since treatment was 6 years (*SD* = 3). The mean age of the 12 participating partners was 46 years (*SD* = 8; range: 31-54). Eleven of the partners were male and one was female (all partners will however be addressed as 'he'). A synthesis of the findings will be given structured around the research questions with Table 3 (page 40) providing an overview of exemplary quotes.

Table 2
Participant characteristics (*n* = 30 CC survivors and *n* = 12 partners).

		N (%)	Mean (± *SD*)
Age patient (years)			47 (8)
Age partner (years)			46 (8)
Time since treatment (years)			6 (3)
Having children		19 (63)	
Having a partner		26 (87)	
Male partner		25 (96)	
Relationship duration (years)			13 (9)
New relationship since treatment (patient)[1]		7 (27)	
New relationship since treatment (participating partner)		4 (33)	
Educational level (patient)	Primary	1 (3)	
	Secondary	16 (53)	
	Tertiary	13 (43)	
FIGO ≤ stage IIA		27 (90)	
Radiotherapy (RT)		16 (53)	
Chemotherapy (CT)		10 (33)	
Surgery		27 (90)	
Menopause as a result of cancer treatment[2]		7 (39)	

Note. Percentages may not add up to 100 due to rounding.
[1]Out of *n* = 26 women with a partner.
[2]Out of *n* = 18 with whom this topic was discussed.

Experiences with respect to sexual dysfunctions

Factors related to sexuality after CC

Almost half of the participants stated having become infertile by their treatment. For many this had led to feelings of grief and had affected their feelings of womanhood (quote 1). About two thirds of the participants stated having incontinence or bowel problems. For some women sex had become less spontaneous as a consequence of worrying about urine leakage during sexual activity (quote 2). Almost half of the women reported having lymphedema, which caused swelling of the legs and sometimes forced them to wear compression stockings. Two thirds of the participants said that surgery and/or RT had caused physical changes to the vagina (e.g. shortening or narrowing). For about half of the participants their bodily changes had led to a negative body image or feelings of insecurity (quote 3). Although it was not a part of the interview guide, four participants mentioned the Human Papilloma Virus (HPV) as a cause of their disease or as a reason to be fearful resuming sexual activity.

Sexual functioning and distress

More than half of the participants experienced a decreased interest in sex since their treatment (quote 4). Some of them also explained their loss of libido as a result of relationship duration, age or sexuality having become less important. Seven participants had a new partner since their treatment, which had often evoked a renewed interest in sexual contact. Some partners of women with a decreased interest in sex felt an unchanged desire whereas others had noticed that their libido had decreased as well (quote 5).

About two thirds of the participants mentioned that their vagina had become dry since their treatment. More than half of the participants stated having (had) pain during intercourse or mentioned experiencing an anxiety of pain or penetration irrespective of actual experiences of pain. The (anxiety for) pain made participants avoid sexual intercourse (quote 6). Many partners said that they were more inhibited because they feared hurting their spouse or noticed her (anxiety for) pain (quote 7).

About half of the participants expressed an ability to cope with sexual dysfunctions or considered their sexual functioning as matching with their age or relationship duration. This did not prevent half of the participants from (also) expressing feelings of sexual distress. Some participants had a sense of loss because their sexual functioning was impaired by the cancer treatment. Other participants indicated experiencing feelings of guilt towards their partners because of their decreased interest in sex. Based on the expressed feelings of distress, 13 participants could be qualified as sexually distressed (quote 8). For two of the three single participants their history of cancer was a barrier to start a new relationship (quote 9).

Six of the seven partners, who were already in a relationship before the onset of the disease, reported some degree of problems in their sexual relationship. For all, this (currently or previously) induced negative emotions, such as experiencing a distance from their spouse or a sense of loneliness in the sexual relationship (quote 10). One man mentioned that before treatment, sexuality could serve as a means to reduce tension that was not available anymore. None of the partners who started their relationship after the treatment experienced sexual problems with their spouse.

Relationship functioning and communication about sexuality

For about half of the participants, the cancer (treatment) or the sexual dysfunction had negatively affected their previous or current (sexual) relationship (quote 11). Some participants stated talking openly about sexuality with their partner and/or that he was sensitive to their sexual needs and limitations (quote 12). Other participants experienced communication difficulties. According to some of them, their partner avoided sexual contact and/or seemed to have lost his sexual interest. In contrast, some others felt pressured by their partner being sexually active, or were aware that their partner had difficulties accepting her sexual limitations. Partners generally felt that they communicated openly about sexual issues with their spouses. When discussing how they coped with their partner's sexual dys-

function, some wanted to leave the initiative for sexual contact to her. One partner however said that he was afraid that if he would do that, he would end up having no sexual contact at all (quote 13).

Experiences with information and care provision

As a result of the time interval between the cancer diagnosis and the interview, almost half of the participants acknowledged having difficulties remembering the content of the information about sexuality that was provided. There were also some participants who did not recall having received any information at all. Half of the participants said that they were not focused on their sexual functioning during treatment and recovery (quote 14). Nevertheless, they appreciated having received information about it. With respect to the time window when psychosexual support was desired most, about half of the participants with whom the topic was discussed said that this was the case between six and twelve months after treatment.

About one third remembered having received information about the impact of the treatment on sexual functioning. Specific pieces of information that were mentioned were for instance possible physical changes of the vagina, the importance of keeping the vagina accessible, and wound care after treatment. Some participants were not satisfied with the received information, considering it contradictory or incomplete, communicated in a too technical or upfront manner, or not tailored to their needs.

More than half of the participants said that during follow-up their healthcare provider (mostly the gynaecologist) asked them about sexuality, although in the majority of the cases this was only a brief question with a focus on physical aspects (quote 15). About one third of the participants had either been referred to or had initiated a consultation with a psychologist or sexologist. Six participants felt that their healthcare provider was accessible if they had sexual concerns. Six participants (three of which could be qualified as sexually distressed) indicated having received none or very little professional help for sexual concerns.

Two participants complained that the healthcare provider had insufficiently involved their partner in the information and care provision. When discussing this topic with the partner, two thirds said having been involved. One partner however added that the professional had a too feminine focus on sexuality.

Healthcare needs and attitudes towards modes of intervention delivery

Needs

When asking participants and partners about their psychosexual support needs, they most frequently mentioned a need for information (about consequences of the treatment, vaginal changes etcetera), followed by a need for receiving practical advice about coping with (their spouse's) sexual dysfunctions (quote 16). Distressed participants more often expressed a need for practical advices, being reassured that it was common to experience sexual complaints (quote 17), tal-

king more extensively with a professional about sexual concerns (quote 15), and healthcare providers taking more initiative addressing sexual matters. Participants who were not distressed more often reported a need for general information and a more optimistic approach, for instance by communicating that sexual dysfunctions can improve over time.

Barriers to seek professional help

About one third of the participants indicated not experiencing any barriers to seek help or to consider these barriers as less important than the benefits of seeking help. Other participants were reluctant to seek help because they felt that they ought to solve sexual concerns on their own, or considered it a taboo to talk about sexual dysfunctions (quote 18). Some participants stated that (a combination of) time, transportation and costs were practical barriers to seek professional help.

According to the large majority of the participants, partners should be involved so as to provide them with information, teach them how to support their spouse in case of sexual concerns, or address a possible need for support on their side. One participant was more sceptical about partner involvement, because she believed that it could be more difficult discussing sexual concerns in the presence of the partner (quote 19). Generally, partners were in favour of being involved in the information and care provision, and would like receiving (practical) advice about communicating about sexual dysfunction and supporting their spouse.

Attitudes towards delivery mode of information and care

About half of the participants had positive attitudes towards written information. Advantages according to the participants were that it was practical to have a written overview and that it prevented them from a confrontation with an overload of (negative) information (quote 20).

Two thirds of the participants and more than half of the partners mentioned positive attributes of a website (with or without tailored advice), for instance that it was an easily accessible and practical source of information. Websites were particularly considered useful as a first resource in the case of sexual concerns. For more complex problems, face-to-face contact was considered more desirable (quote 21). Three partners stressed that the website should originate from a reliable source (e.g. the government or a hospital) and that doctors should refer to the site. Participants who were not sexually distressed were more likely to consider a website a suitable source of practical information. Sexually distressed participants on the other hand more often stated that a website provided information that was too general and therefore not sufficiently helpful. Many participants had positive attitudes towards websites offering tailored advice.

Participants' attitudes towards (online) support groups varied. Half of the women were reluctant to be confronted with other women's (negative) narratives. On the other hand, about one third of the participants were (also) interested in hearing possibly informative and useful patient narratives from other women. About one third of the participants thought that information from a professional would be

more useful than from peers, or stressed the importance of a content manager checking the accuracy of the information provided. Partners were not interested in narratives from other CCSs or their partners (quote 22).

Since gynaecologists were generally the primary care provider during treatment and follow-up, participants considered them specialized, familiar, and hence the obvious professionals to consult for sexual concerns (quote 23). A few participants thought that gynaecologists were not sufficiently skilled to provide support in the case of complex and psychological sexual dysfunctions. The most frequently mentioned advantage of seeking help from sexologists was that they were specialized in this matter and could provide support with relational matters (quote 24). Some distressed participants were reluctant to seek help from a sexologist and considered it too confronting; participants who were not distressed did not mention this. Lastly, a few participants mentioned practical barriers of going to a sexologist (having to make a separate appointment, time, transportation, costs). The most frequently mentioned advantages of contacting a nurse or general practitioner for psychosexual support was that they were considered accessible and empathetic. On the other hand, participants questioned if they were sufficiently knowledgeable about sexuality (quote 25).

Table 3
Interview themes and exemplary quotes.

Theme or topic		Example quote
Experiences with respect to sexual dysfunctions		
Fertility	1	Woman, partnered, 47 years – Maybe I can see it separately from all the medical things that have happened, but I cannot disentangle it from the impact on my femininity. Interviewer – What do you mean by that? Woman – Am I attractive? So, in that sense is has had an impact, but I think that this is especially a result of not having had children, and not so much a result of the surgery. I really had to explore: what for a woman am I? So, I don't have children, what do I have?
Urinary incontinence	2	Woman, partnered, 40 years – Sex is less spontaneous, because you always reckon with: well I have to make sure that my bladder is empty, I have to pee before. […] When I have intercourse, then I feel an urge to urinate or sometimes a false urge, because if I go to the toilet nothing comes. All these things, like take away the spontaneity.
Body image	3	Woman, partnered, 47 years – Well, up to my breasts everything is fine. Everything between my breasts until my knees, that's awful. I consider that sort of a block, and I just don't want to see it or feel it.
Loss of libido	4	Woman, partnered, 40 years – Yes, then I noticed that, also because of the lack of energy, I just don't feel like it. I have been so busy all day, and for me… Yes, in that sense men and women are truly different. For men it's pure relaxation, and for me it's an effort. And after a busy day, it may sound stupid, but then I prefer to lie down on the couch. Yes, that is, that is very dull, but yes.
	5	Partner (male), 53 years – It (referring to sexual activity) is absolutely not spontaneous any more. Opposite to former times that I saw her walking or sitting or that we took a bath together, and that I was suddenly very aroused. That is gone. Interviewer – That spontaneity is… Partner – That is gone. I still can get aroused, but I cannot act on it. So the arousal is gone, not completely of course, but not comparable with before.
Pain	6	Woman, partnered, 53 years – Since the treatment, it (referring to her sexual functioning) hasn't been good. In that sense that I basically don't want. That I am afraid of it, and in pain. [..] And then, I have sort of given up, like 'forget it', don't feel like it anymore. Or maybe I do feel like it, but the door has sort of been closed, and probably it won't open again.
	7	Partner (male), 53 years – Sexually spoken, I'm not a very wild man. I am not into very harsh sex, on the contrary. But the male act, to penetrate, not like an idiot, but in a normal masculine manner, that is

		enjoyable for a man, at least for me. That has not been possible any more. Until now, it always has to be cautious, very cautious. Certain positions that we used to do and that we both enjoyed are hardly possible any more. She is always in pain.
Sexual distress	8	Woman, partnered, 47 years – For me it is very difficult to have sex. Interviewer – Yes, and by that you mean having intercourse? Woman – Yes, but touching is very difficult for me too, it is completely different. Well, comparable with urinating, it feels completely different. I have difficulty, because I cannot relax …, even thinking about sex or touching is difficult for me. I hardly want it. It is very difficult for me, as well as for my partner.
Finding a new partner	9	Woman, single, 45 years – Really, to seek out for intercourse, that's an anxiety. But also the, the insecurity on the side of the men. So, then I start thinking, when do I have to tell. Do I have to tell? How… yes, you cannot act like nothing happened, because you notice. I mean, of course it (referring to her vagina) is shortened and it doesn't lubricate without help. So yes, something needs to happen or to be said. Dealing with that is too much hassle, so then I leave it.
Partner's sexual satisfaction	10	Partner, 53 years – After the disease I have not been sexually together with X as it used to be. Sexually, I have become lonelier, even when I am making love with her. I cannot get as close as I used to.
Relationship functioning	11	Woman, partnered, 42 years – Well, it is simply not good, it's not good for your relationship. I mean my partner and I have talked about it in broad, that it is simply unfortunate, very unfortunate. Because he did expect other things from his life compared to how it is now. And of course for me too. Physically, I am not bothered that we don't have sex, but he needs that […]. Our relation is under pressure. While we absolutely want to stay together, but we do experience a lot of pressure from this.
Partner's attitude towards sexual problems (patient and partner perspective)	12	Woman, partnered, 55 years – That I could talk about it (referring to sexuality), but also the sensitivity when it came to making love. That he was very careful, and asked: "Is this OK like this? If it's not, please say so." And I am quite expressive and able to say so.
	13	Partner (male), 41 years – What I didn't realize, is that apparently I was nagging and that itdrove X (referring to partner) crazy sometimes. But if I don't nag, then nothing happens, and that the status quo that we have now. I don't want to make her unhappy by pressuring her [...] So, what we do is very classic. Sometimes, I look very obtrusively to another woman, and then she thinks: "He is in need". That's the balance we have.
Experiences with information and careprovision		
Not focused on sexual functioning during treatment and recovery	14	Woman, partnered, 49 years – Well, you are sitting at a table with a doctor who is telling you about the surgery and its consequences. And of course it is being told, that it can have an impact on sexuality, that it can all become less sensitive or that sort of things. And you hear that, but at that moment you are absorbed with the operation and with the cancer. About sexuality, you think, we'll see about that later.

Routine questions about sexual functioning during follow-up	15	Woman, single, 45 years – Well in my case, they asked: "well how is it with your sexuality?" I said: "I am not sexually active, because I don't have a partner", and then that was it. So yes, there was an answer and that was written down, and that's it. "I don't have intercourse." "OK" […]. But well, at that moment you don't say: "But I would like to have sex, but I experience problems having it" or you know. So, there is perhaps a task, even it has been a while, to inquire more profoundly. Not only: "Do you have intercourse?"
Psychosexual healthcare needs		
Need for practical advice	16	Woman, partnered, 53 years – If somebody would tell me that it is normal if it (referring to sexual intercourse) doesn't feel pleasant. And that you can do certain things, and outlines a number of scenarios, like: "You just do absolutely nothing and leave it for a while. You're not ready yet" or "You should now start to actively explore what else you can do to regain your pleasure in sexuality".
Need to be reassured that it is normal to have complaints	17	Woman, partnered, 49 years – Well that (referring to a website providing information about sexuality after CC) could take away the insecurity that I do experience as a result of the complaints. Like, well OK, I am not the only one and it's normal, and there are things that I can do.
Personal barriers	18	Woman, partnered, 53 years – Yes, it is a hurdle. Of course, anyhow it is something… It is a difficult topic. I find it a difficult topic. […]. Of course, it is easy to do nothing […], but I do realize that in that case I deny myself something -and not only myself- and that life could be much more fun. I do know that. But it's easier to do nothing.
Partner involvement	19	Woman, partnered, 42 years – If he had been present there (referring to a follow-up consultation with gynaecologist discussing sexuality), and sexuality was problematic, then it is very difficult to raise that. Interviewer – So, actually you say that is more complicated having your partner present? Woman – Yes, in that case it is.
Attitudes towards interventions targeting sexual dysfunctions		
Written information	20	Woman, partnered, 40 years – So yes a brochure, that seems to me like a very pleasant, demarcated form of information, without the … horrible stories.
Starting with website, face-to-face for more complex or severe sexual concerns	21	Woman, partnered, 34 years – I think that I would start with looking it op on the Internet, because there is much available there and if I would not find it, then I would […], well OK, it's not on the Internet, I am done with it. Then I would go for face-to-face contact with a well-informed professional.
(Online) support groups	22	Partner (male), 33 years – Yes, those (referring to support groups) are low on my list. Because, yes, that might be very egoistic, but I'm not interested in hearing other people's experiences. Because you experience it differently than I do. So, you may talk about it very negatively, while that might not at all be how I feel about it. I am not so into support groups.

Face to face with gynaecologist	23	Woman, partnered 42 years – Yes, because you already are at the gynaecologist during follow-up. So, then you don't have to make an appointment. Then it immediately becomes an issue, like: "Well, that bothers me, I am going to make an appointment, and I am going to the General Practitioner". Then it becomes an issue on its own. While, at the gynaecologist you can naturally raise it, while you're there anyway.
Face to face with sexologist	24	Woman, partnered, 36 years – And I think that it also depends on the nature of the problem. So, if it's purely physical, I would be inclined to first see a gynaecologist. And if I notice, well that relational aspects play a role, for instance we cannot talk about it or it remains being a problem, then I would go to a sexologist.
Face to face with nurse	25	Woman, partnered, 53 years – With respect to nurses, I think: "Well, they would say something to comfort me." And with the gynaecologist, I would think: "Well, I might get some assistance". Maybe, that's the difference.

Discussion

A decreased interest in sex and (fear of) pain were experienced by more than half of the participants. For some participants and partners, pain during intercourse lead to avoidance of sexual activity or feeling inhibited during intercourse. Furthermore, about half of the women and partners reported feelings of sexual distress such as guilt, grief, or feeling lonely in the sexual relationship. Interestingly, much less sexual distress was observed in couples that had started their relation more recently. A study among healthy participants demonstrated that women's sexual desire was negatively associated with relationship duration.[119] This, and the results of the present study, suggests that the impact of sexual dysfunctions on sexual distress and sexual satisfaction is not only related to physical sexual dysfunction.

Most participants reported having been asked about their sexual functioning or felt that, if needed, healthcare professionals were accessible. This was generally appreciated. Participants considered professionals' attention for sexual functioning often concise and medically oriented, which has also been demonstrated in other studies.[120]

In line with other studies, receiving information and practical advices were the most widely supported psychosexual support needs of participants and partners.[107,120–122] Furthermore, both participants and partners generally thought that it was valuable to involve partners.

Many participants and partners considered a website a useful and accessible first resource for information about sexual functioning after cancer. In case of sexual distress, more complex or severe sexual concerns, participants preferred face-to-face contact with a professional. Attitudes towards online support groups varied from an interest in patient narratives to concerns about unreliable information or a confrontation with negative stories. With respect to face-to-face contact, gynaecologists were generally perceived as the primary professional to contact in case of sexual concerns. Sexologists were perceived to be suitable for more complex problems, whereas nurses and general practitioners were more specifically appreciated because of their empathy and accessibility

A limitation that is worth considering is that CCSs and partners being relatively at ease talking about sexuality or having more pronounced experiences with or opinions about the provision of psychosexual support, were more likely to have participated in this study. Furthermore, a general difficulty with needs assessments is that people do not always have very specific ideas about their needs. Former Apple CEO Steve Jobs described this as following: 'It's really hard to design products by focus groups. A lot of times, people don't know what they want until you show it to them'.[123] During the interviews we noticed that participants' narratives were more vivid and flowing when they talked about their experiences with sexual dysfunctions and received psychosexual support, than when discussing their attitudes towards hypothetical interventions. Nevertheless, we do believe that asking survivors and

their partners about their ideas with respect to future psychosexual support services is valuable because it gives a clear impression of which interventions are acceptable and which are not, and what possible obstacles should be kept in mind.

All in all, the lives and relationships of many CCSs and their partners are negatively affected by sexual dysfunctions. Psychosexual support should go beyond physical sexual functioning, and should take aspects such as sexual distress, relationship satisfaction, and the partner perspective into account. Additionally, offering more practical and reassuring information about sexuality and relationship consequences after cervical cancer would be valuable for both CCSs and their partners.

Part II

Prevention of treatment-induced vaginal changes

A controlled study on vaginal blood flow during sexual arousal among early stage cervical cancer survivors treated with conventional radical or nerve-sparing surgery with or without radiotherapy

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Abstract

Objectives

Sexual problems among cervical cancer survivors may in part be caused by reduced vaginal blood flow due to damaged hypogastric nerves during radical hysterectomy with pelvic lymphadenectomy, and/or by radiation-induced vaginal changes after pelvic radiotherapy. A nerve-sparing modification of radical hysterectomy (NSRH) may preserve vaginal blood flow. Vaginal blood flow during sexual arousal was compared between different treatment modalities.

Methods

We investigated pre-menopausal women treated for early-stage cervical cancer with radical hysterectomy (*n* = 29), NSRH (*n* = 28), NSRH with radiotherapy (*n* = 14), and controls (*n* = 31). Genital and subjective sexual arousal in response to sexual stimuli were measured using vaginal photoplethysmography, and a questionnaire. Results were compared by using a between (treatment groups) by within (stimulus) study-design.

Results

Participants were 29-51 (mean: 42) years old and included 1-14 (mean: 5) years after treatment. Measured vaginal blood flow in women treated with NSRH was similar to controls. Women treated with radical hysterectomy had a significantly lower vaginal blood flow compared to controls overall and lower compared to the NSRH group during sexual stimulation. Women treated with radiotherapy had a vaginal blood flow intermediate between the other groups without significant differences. The erotic films were equally effective in enhancing subjective sexual arousal among treatment groups.

Conclusions

Sexual dysfunctions are often distressing. Many patients and partners experience psychosexual healthcare needs, but the provided information and care is generally limited. Psychosexual support should go beyond physical sexual functioning, and should take aspects such as sexual distress, relationship satisfaction, and the partner perspective into account. Additionally, offering more practical and reassuring information about sexuality after cervical cancer would be valuable for both CCSs and their partners.

Introduction

In the Netherlands early-stage (FIGO IA2 – IIA) cervical cancer patients are primarily treated with radical hysterectomy with pelvic lymphadenectomy (RH). The conventional surgical RH procedure for stage IB and IIA cervical cancer is a modified Wertheim operation with adaptations by Meigs and/or Okabayashi.[124] Since 2000, nerve-sparing modifications of the RH (NSRH) have been developed in Leiden.[59,60] This modification aims to prevent damage to the pelvic autonomic nerves and reduce the risk of sexual problems.[18,22,31,59,125] For approximately one third of women surgery is followed by adjuvant radiotherapy if lymph node metastases and/or other risk factors are found.[7]

Although RH for early stage cervical cancer leads to good survival, sexual morbidity due to treatment is still a matter of concern. Frequently reported sexual problems are diminished lubrication, dyspareunia, vaginal shortening and/or tightening, and subsequent sexual distress. Cervical cancer survivors (CCS) reported significantly more sexual problems, both compared to their situation prior to treatment, and to healthy controls.[13,18,31]

The vaginal blood flow response to sexual stimuli, and subsequent vaginal lubrication, is a reflex innervated by the hypogastric nerve.[126-129] During RH the pelvic autonomic hypogastric plexus may become damaged, leading to reduced vaginal blood response and subsequent vaginal dryness during sexual arousal.[34,35,126,130] This mechanism possibly causes various sexual problems experienced by CCS.[13,18,31] Maas et al. (2004) found that the vaginal blood flow response to sexual stimuli to be lower in CCS after RH, both compared to women who had undergone a simple hysterectomy and to healthy controls.[125]

In a previous pilot study we explored whether conducting a NSRH prevents the reduction in vaginal blood flow response. We compared ten women after NSRH to 13 women after RH and 14 healthy controls. According to the results there was a trend for a lower vaginal blood flow response after RH compared to NSRH.[131] Vaginal blood flow in women treated with NSRH was similar to healthy controls.[131] A larger study was needed before conclusions as to the efficacy of NSRH could be drawn.

Pelvic radiotherapy (RT) may lead to vaginal fibrosis, stenosis and mucosal atrophy with vaginal dryness, and can induce sexual morbidity.[30,49] Women who were treated with RT more often reported vaginal shortening and/or tightening, decreased lubrication, and dyspareunia compared to women treated with RH alone.[30,49] A small study indicated that the vaginal blood flow response was reduced after RT as well.[132] Therefore, it should be evaluated whether treatment with postoperative RT counteracts the expected preserved vaginal blood flow response after NSRH.

This psychophysiological, controlled study is an extension of our pilot study.[131] It was investigated whether women treated with NSRH have a less disrupted vaginal blood flow response during sexual stimulation than women treated with RH, and whether it

is similar compared to age-matched healthy controls. Also, it was explored whether treatment with postoperative RT is associated with a decreased vaginal blood flow response after NSRH.

Methods

Participant recruitment

For this study we recruited women to enlarge the groups of our original pilot study using an identical procedure. We enlarged the groups who had undergone RH, NSRH, and the healthy controls that were recruited by Pieterse et al. before 2008.[131] The effect of postoperative RT was investigated by including a fourth treatment group of women treated with NSRH and RT (NSRH/RT).

CCS were selected from medical files at Academic Medical Centre Amsterdam (AMC) and Leiden University Medical Centre (LUMC). The age-matched control women were recruited through advertisements in diverse media. Eligible women received information about the study by mail. Women that were interested to participate were subsequently screened on in- and exclusion criteria by telephone.

Eligible CCS were treated for early stage cervical cancer (FIGO IA2 – IIA); treated with RH using the Okabayashi method at AMC, or NSRH-Swift procedure, with or without RT, at LUMC. All eligible women had to be between 18 and 51 years of age and at least 12 months after treatment.

Exclusion criteria for CCS were signs of recurrent or metastatic cervical cancer; removed ovaries during surgery; and treatment with neoadjuvant chemotherapy and/or postoperative chemoradiation. Control women were excluded if they had a history of cancer; a history of abdominal or pelvic surgery; were pregnant; or had participated in research regarding sexual arousal during the past year. Women were excluded from all treatment groups if they were not able to understand Dutch; or had undergone other perineal, pelvic or abdominal surgery. Furthermore, as our pilot study and previous literature demonstrated that post-menopausal women had a lower vaginal blood flow response compared to premenopausal women, women older than 51 years and/or with post-menopausal status were excluded from all treatment groups to control for confounding.[131,133] When eligible women between 40 to 51 years of age reported menopausal complaints, a blood sample was taken to measure their follicle stimulation hormone (FSH) and estradiol levels. Women were considered postmenopausal when serum-FSH > 40 IU/l and/or estradiol ≤ 20 pg/ml.[134] In case of doubt, women were classified as postmenopausal and excluded. Since pelvic RT induces menopausal changes, and as in none of the current participants an ovary had been transposed, these exclusion criteria were not applied to the women treated with NSRH/RT.[16]

Participants received a financial compensation of 45 euros and compensation for travel expenses. This study was approved by the LUMC Medical Ethics Committee.

Measurements

Genital arousal

Vaginal pulse amplitude (VPA) in response to sexual stimuli was measured by a vaginal photoplethysmograph: a menstrual tampon-sized device containing an orange-red light source and a photocell. The light source illuminates the capillary bed of the vaginal wall and the phototransistor responds to the light backscattered by the vaginal wall and the blood circulating within it. When the signal is connected to an alternating current (AC) amplifier, vaginal pulse amplitude (VPA) is measured, which reflects the phasic changes in vaginal engorgement accompanying each heartbeat, with larger amplitudes reflecting higher levels of vaginal vasocongestion.[135–138] VPA is a sensitive, specific, and reliable measure of vaginal vasocongestion, and has been used in earlier studies that observed diminished vaginal blood flow in women with neurological damage and in women after RH. VPA was recorded continuously during the experimental session.

The procedure and stimulus material was identical to our previous study. After a 5-minute baseline period, during which a neutral film (a non-erotic documentary film excerpt) was shown and baseline measurements of genital response were collected, the first 5-minute erotic film was shown. Subsequently, again a 5-minute neutral film was shown followed by the second 5.5-minute erotic film. The two erotic film excerpts (consisting of videos depicting cunnilingus and intercourse) were taken from women-made, female-centred erotic videotapes.[139]

Subjective arousal

Subjective sexual arousal was assessed after each neutral and each erotic film by one item asking participants to indicate their feelings of sexual arousal on a 7-point Likert scale (ranging from 1 “not at all” to 7 “very strong”).[140]

Participant characteristics

Items measuring socio-demographic characteristics that were included were age (in years), having a partner (yes/no), educational level (primary/secondary/tertiary), negative sexual experience (yes/no) and being sexually active (yes/no). Treatment data, time since treatment (months) and hormone use (as part of hormone replacement therapy after RT, or oral or hormonal intrauterine contraception in control participants) (yes/no) were gathered from CCS’ medical records. Sexual functioning was assessed using the 19-item *Female Sexual Function Index* (FSFI) (Cronbach’s α = .97 within the current sample).[91] Higher scores indicate better sexual functioning. Furthermore, sexually related personal distress was assessed with the 12-item *Female Sexual Distress Scale* (FSDS) (Cronbach’s α = .92 within the current sample).[91,141] Higher scores indicate higher levels of sexual distress.

Experimental procedure

Participants were asked to complete the questionnaires prior to their visit. During the first part of the participants’ visit they were instructed about the genital device and their informed consent and questionnaires were obtained. Participants privately

inserted the vaginal device and further instructions were presented on a monitor in the participant room. It was emphasized that the participant could stop the experiment at any time without having to provide a reason. One trained female researcher (RB), not blinded to the treatment group, tested all participants.

Statistical analysis

A software program (VSRRP98; developed by the Technical Support Department of Psychology, University of Amsterdam) was used to analyse the genital data. VPA was sampled at 20 Hz across baseline and subsequent trails. A two-pass algorithm for automatic artefact removal (©Molenkamp Technical Support Group University of Amsterdam) was used to analyse the VPA data. After artefact deletion the peak-to-trough amplitude was calculated for each remaining pulse and averaged over 60 seconds epochs.

Prior to analysis, all dependent variables were examined for fit between their distributions and the assumptions using univariate analyses. In order to reduce positive skewness of the VPA data, all VPA data were logarithmically transformed ($\log_{10}$). For each stimulus (two neutral stimuli and two erotic stimuli), a $\log_{10}$ VPA mean score were calculated by averaging all epochs of the specific stimulus. To analyse differences in the $\log_{10}$ VPA mean scores between four groups for the four stimuli, the $\log_{10}$ VPA mean scores were submitted to a 4 (treatment group) X 4 (stimulus) repeated measurements ANOVA. Furthermore, to control for baseline differences in VPA, the $\log_{10}$ VPA mean scores were also submitted to a 4 (group) x 2 (erotic stimulus) repeated ANCOVA, using each individual's $\log_{10}$ mean baseline score of the first neutral stimulus as covariate.

To analyse differences in the subjective sexual arousal between the four groups for the four stimuli the mean subjective arousal scores were submitted to a 4 (treatment group) x 4 (stimulus) repeated measures ANOVA. To assess differences in participant's characteristics and dependent variables between the four groups one-way ANOVA's or chi-squared tests were used. The outcomes of the subjective measurements and the objective measurement were compared and used to describe the subject populations in detail. In case of significant differences in participant characteristics between groups, their influence on genital arousal was evaluated by conducting covariance analysis.

All data was analysed using IBM SPSS version 20 (Armonk, NY, USA) and a significance level of 5%. Effect sizes were reported as d, ηp^2 and V, and classified as small (d = 0.2; ηp^2 = .01; V = .10), medium (d = 0.5; ηp^2 = .06; V = .30), or large ($d \geq 0.8$; ηp^2 = .14; V = .50).[142] With an alpha value of 0.05, a power of 80% and an effect size of d = 0.8, a minimum of 26 women for each treatment group was needed.[142]

Results

Participant population

The RH group (n = 29) consisted of 12 women who were recruited before 2008 by Pieterse et al. (2008) and 17 women recruited at the AMC in the current extended phase of the study.[131] One woman treated with RH recruited before 2008 was 52 years old at the time of measurement and excluded from further analyses. The NSRH group (n = 28) consisted of 10 women who were recruited before 2008 and 18 women after 2008. Furthermore, in this phase of the study we recruited 14 women treated with NSRH/RT. In total, 327 out of 429 (76%) eligible CCS did not participate, due to lack of time (n = 48), no interest because of a lack of sexual problems (n = 36), intrusive nature of the experiment (n = 70), a negative association with the cancer (n = 17), travel distance to the hospital (n = 7), or unstated reasons (n = 149).[131] Lastly, the healthy control group (n = 31) consisted of 12 women who were recruited before 2008 and 19 women that were willing to participate after 2008. Two controls who were recruited before 2008 were 52 years old and excluded.

Participant characteristics

Women in the RH group were treated about twice as long ago in comparison to women treated with NSRH with and without RT (see Table 1, page 56). Furthermore, women treated with NSRH were educated at secondary level relatively more often compared to the other three groups. As expected, the moment of participant inclusion (before or after 2008) differed between treatment groups, since none of the women treated with RT were recruited before 2008. Due to the inclusion criteria, women treated with NSRH/RT reported to use hormone replacement therapy more often, compared to the other three participant groups.

Univariate results indicated that, among sexually active participants, there was a non-significant trend for different levels of sexual dysfunction between groups, while explorative post-hoc analyses showed no significant differences between groups (F(3, 87) = 2.19, p = .096, ηp^2 = .07, post-hoc p = .426 to 1.000). However, women in the NSRH/RT group reported higher levels of sexual distress compared to the other three groups (F(3, 97) = 5.85, p = .001, ηp^2 = .16). No significant differences between groups were found with regard to age as intended, having a partner, having had negative sexual experiences or sexual activity.

Since treatment groups differed with regard to several characteristics, the influence of these characteristics on our primary outcome, vaginal blood flow, were analysed. The VPA mean scores throughout the experimental session were not influenced by the moment of inclusion of participants (F(1, 100) = 2.38, p = .126, ηp^2 = .02), hormone use (F(1, 96) = 0.36, p = .552, ηp^2 = .004), time since treatment while controlling for treatment group (β = -.11, t(1, 70) = -.70, p = .486), or sexual distress (β = -.003, t(1, 96) = -.73, p = .468). Therefore, the following analyses were not controlled for participant characteristics.

Genital arousal

Figure 1 shows the VPA responses of the treatment groups throughout the experimental session. The overall VPA mean scores were significantly different between the four treatment groups ($F(3, 102) = 6.55$, $p = .001$, $\eta p^2 = .17$); the RH group had an overall lower VPA mean score than the NSRH group ($p = .005$) and control group ($p < .001$), but not compared to the NSRH/RT group ($p = .115$). The NSRH groups with and without RT, and control group did not significantly differ from each other ($p = 1.000$). Also, the VPA mean scores were significantly different between the four stimuli (film fragments) ($F(3, 102) = 147.22$, $p < .001$, $\eta p^2 = .60$). The VPA mean scores during the two erotic stimuli were significantly higher than the VPA mean scores during the two neutral stimuli. Also, the VPA mean scores during the second neutral and erotic films were significantly higher than during the first neutral, and erotic films ($p <.001$). See Table 2, page 57.

An interaction effect was found and the treatment groups showed significantly different VPA responses to the four film fragments ($F(9, 294) = 2.91$, $p = .003$, $\eta p^2 = .08$). During the first neutral film fragment, at baseline, the four groups significantly differed ($F(3, 102) = 4.02$, $p = .010$, $\eta p^2 = .11$); the RH group had a lower VPA mean score (3.34 ± 0.41) compared to the controls (3.68 ± 0.41) ($p = .009$, $d = 0.84$), but a non-significant trend compared to the NSRH group (3.60 ± 0.36) ($p = .100$, $d = 0.69$) and no difference compared to the NSRH/RT group (3.63 ± 0.45) ($p = .176$, $d = 0.66$). The NSRH groups with and without RT,

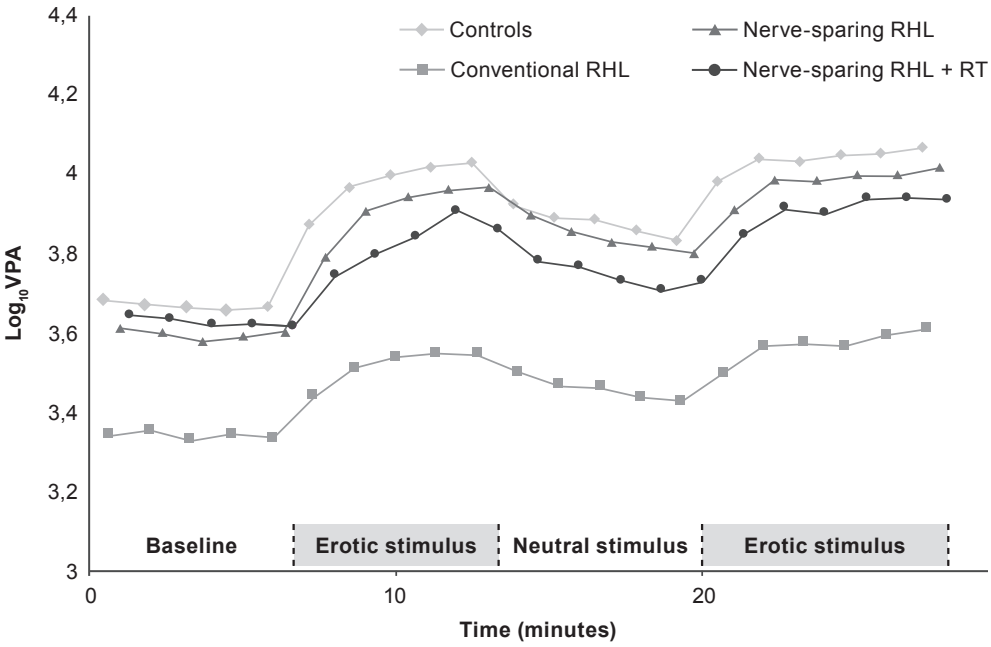

Figure 1. Change in logarithmically transformed mean vaginal pulse amplitude (log_{10} VPA) during the experimental session: Neutral stimulus 1 (baseline assessment) (1-5 min), Erotic stimulus 1 (6-10 min), Neutral stimulus 2 (11-15 min), Erotic stimulus 2 (16-21 min). Controls $n = 31$; Conventional RHL $n = 29$; Nerve-sparing RHL $n = 28$; Nerve-sparing RHL + RT $n = 14$. RHL = radical hysterectomy with pelvic lymphadenectomy; RT = postoperative radiotherapy.

Table 1
Descriptive characteristics of all participants.

		Controls	Conventional RHL	Nerve-sparing RHL	Nerve-sparing RHL with EBRT	F / χ^2	Effect-size[4]
		n = 31	*n* = 29	*n* = 28	*n* = 14		
Socio-demographic							
Treatment centre	LUMC	N/A	12 (41)	28 (100)	14 (100)	32.37***	.68
	AMC	N/A	17 (59)	N/A	N/A		
Time of inclusion	<2008[1]	12 (39)	12 (41)	10 (36)	N/A	8.32*	.29
	>2008	19 (61)	17 (59)	18 (64)	14 (100)		
Age (years)		41.42 ± 5.54	43.62 ± 6.15	40.68 ± 4.71	43.07 ± 5.15	1.69	.05
Time since treatment (months) (*n* = 75)		N/A	88.55 ± 43.06 [a]	30.68 ± 16.02 [b]	37.08 ± 19.76 [b]	28.16***	.45
Educational level	Secondary	15 (48)	17 (59)	23 (82)	7 (50)	8.10*	.28
	Tertiary	16 (52)	12 (41)	5 (19)	7 (50)		
Partner (yes)		23 (74)	20 (69)	22 (79)	11 (79)	0.84	.09
Hormone use (yes) (n = 98)		5 (16)	2 (7)	0 (0)	11 (79)	41.89***	.65
Negative sexual experience (yes) (*n* = 97)		4 (15)	6 (21)	4 (14)	2 (14)	0.54	.08
Sexually active		28 (90)	27 (93)	22 (79)	11 (79)	3.68	.19
Questionnaires							
Sexual functioning (FSFI)[2]		29.71 ± 4.83	29.76 ± 4.88	27.13 ± 5.01	26.30 ± 6.56	2.19	.07
Sexual distress (FSDS)[3]		6.94 ± 6.46 [a]	8.34 ± 8.09 [a]	9.92 ± 9.97 [a]	18.62 ± 11.58 [b]	5.85**	.16

LUMC: Leiden University Medical Centre; AMC: Amsterdam Medical Centre Amsterdam; RHL: radical hysterectomy with pelvic lymphadenectomy; RT: postoperative radiotherapy. Data are displayed as: Average ± standard deviation; Number and percentage of participants to which characteristic is applicable. Due to rounding percentages may not add to one hundred. [1] Recruited by Pieterse et al. (2008). [2] FSFI: *Female Sexual Function Index*; results among sexually active participants. [3] FSDS: *Female Sexual Distress Scale*. [4] Effect-sizes V for χ^2-tests and ηp^2 for F-tests; classified as small (ηp^2 = .01; V = .10), medium (ηp^2 = .06; V = .30), or large (ηp^2 = .14; V = .50) (Cohen 1988). *p < .05, **p < .01, ***p < .001. [a b c] Significantly different from other group(s) with p < .05.

and healthy controls did not significantly differ from each other (p = 1.000).

While controlling for the VPA differences at baseline, the VPA mean scores were significantly different between the four treatment groups during the first erotic film (F(3, 102) = 4.87, p = .003, ηp^2 = .13) and during the second erotic film (F(3, 102) = 4.53, p = .005, ηp^2 = .12). The RH group showed a lower VPA mean score both compared to the NSRH group (p = .009 and p = .007 respectively) and the controls (p = .017 and p = .020 respectively), but not compared to the NSRH/RT group (p = 1.000 and p = .802 respectively). The NSRH groups with and without RT, and healthy controls did not significantly differ from each other during both erotic films (p = .316 to 1.000).

Subjective arousal

The four treatment groups reported comparable levels of subjective sexual arousal throughout the experiment (F(3, 102) = 0.78, p = .510, ηp^2 = .02). Furthermore, participants reported significantly higher levels of subjective sexual arousal erotic film 1 and 2 compared to during neutral film 1 and 2 (F(3, 102) = 332.05, p < .001, ηp^2 = .77). These results indicated that the erotic films were equally effective in enhancing subjective sexual arousal among the treatment groups. See Table 2.

Table 2
The untransformed vaginal pulse amplitude mean scores and subjective arousal scores during the four stimuli for the four groups.

	Controls	**Conventional RHL**	**Nerve-sparing RHL**	**Nerve-sparing RHL with EBRT**
	***n* = 31**	***n* = 29**	***n* = 28**	***n* = 14**
Objective report: VPA (mV) [1]				
Neutral stimulus 1	1.96 ± 1.34	1.00 ± 0.76	1.70 ± 1.37	2.07 ± 1.95
Erotic stimulus 1	4.13 ± 2.37	1.69 ± 1.56	3.53 ± 2.33	3.22 ± 3.03
Neutral stimulus 2	3.35 ± 1.98	1.24 ± 0.87	2.99 ± 2.14	2.61 ± 2.19
Erotic stimulus 2	4.73 ± 2.62	1.84 ± 1.64	4.07 ± 2.81	3.87 ± 3.67
Subjective report: sexual arousal (Likert scale)				
Neutral stimulus 1	1.19 ± 0.40	1.34 ± 0.72	1.50 ± 1.00	1.14 ± 0.36
Erotic stimulus 1	3.77 ± 1.43	3.66 ± 1.37	3.61 ± 1.17	3.57 ± 0.85
Neutral stimulus 2	1.26 ± 0.63	1.34 ± 0.61	1.14 ± 0.36	1.07 ± 0.27
Erotic stimulus 2	4.74 ± 1.46	4.41 ± 1.27	3.82 ± 1.31	4.00 ± 0.68

Data are displayed as: Average ± standard deviation. [1] VPA: Vaginal Pulse Amplitude; mV: millivolt.

Discussion

In this extended study we have enlarged the NSRH, RH, and control groups of our pilot study, and also added a fourth treatment group of cervix cancer survivors treated with NSRH and postoperative RT.[131] It was found that premenopausal women treated with NSRH showed a vaginal blood flow that was comparable to healthy controls, both at rest and in response to sexual stimulation. Women treated with conventional RH, however, showed a significantly lower vaginal blood flow compared to control women, both at rest and during sexual stimulation. Compared to women who had undergone NSRH, those treated with RH had a significantly lower response during sexual stimuli. The vaginal blood flow of women treated with postoperative RT did not differ from the other three groups. The erotic films that were used were equally effective in enhancing subjective sexual arousal among groups.

The results were in line with previous VPA research conducted by Maas et al. (2004), showing that RH was associated with a lower vaginal blood flow response in comparison to healthy controls.[125,131] Furthermore, our preliminary indications that the vaginal perfusion response among women treated with NSRH was better preserved than after RH, and similar to the response of the control women, were also confirmed.[131] These results support the hypotheses that the nerve-sparing modification of RH may better preserve the vaginal blood flow by reducing the denervation of the vaginal wall. The vaginal perfusion response differences between the treatment groups were also found after controlling for the individual baseline differences and, thus, not critically dependent on the baseline vaginal blood flow at rest.[131]

RT-induced fibrotic changes and damage to the micro-vascularity in the vaginal wall was expected reduce the vaginal blood flow among women treated with NSRH/RT.[44,132] However, in our small sample of NSRH/RT participants we could not confirm the previous hypothesis of Pras et al. (2003) that RT induces would reduce vaginal blood flow.[132] Moreover, the autonomic nerves, innervating the reproductive organs, are responsive to circulating steroids such as oestrogen. Both a change in the number of autonomic nerves due to RH, and lower levels of oestrogen due to radiation-induced menopause, may reduce vaginal blood flow.[143,144] However, the majority of our NSRH/RT sample used hormone replacement therapy.[145] Therefore, in order to draw conclusions regarding the impact of RT on vaginal blood flow and its subsequent impact on sexual functioning among survivors, further investigation is needed.

Despite their vaginal blood flow differences, the surgery groups did not differ with regard to their levels of sexual dysfunction or subjective sexual arousal throughout the experiment. This is in line with other studies reporting an absence of differences in sexual functioning between women treated with respectively without nerve-sparing intention.[13,131,146] The research results from Brotto et al. (2012) also showed that vaginal blood flow and sexual functioning are not necessarily associated.[103] Their mindfulness-based intervention for sexual concerns improved gynaecological cancer survivors' sexual functioning, and increased subjective sexual arousal during erotic film, while their physiological genital arousal remained unchanged.[103] Taken

together, the results indicated that the vaginal blood flow response after treatment is not the most important determinant of experienced sexual concerns among CCS. Sexuality after cancer treatment is a biopsychosocial phenomenon associated with both physical factors, such as fibrosis, anatomical changes and vaginal denervation, but also psychological and interpersonal factors, such as worry about pain or relationship dissatisfaction.[51,147] Therefore, it remains unknown to what extent conducting a nerve-sparing modification contributes to the prevention of patient-reported postoperative sexual morbidities in comparison to psychological or interpersonal interventions.

Several limitations of this study should be taken into account. While analysing the differences between the women treated with surgery and control groups with regard to our outcome measurements, the power to detect large effects was sufficient (84-86%).[142] However, due to the sample sizes of these groups, the power to find medium or small effects was lower (46-48% and 12% respectively). This may have been a reason that only a non-significant trend was found for a lower vaginal blood flow at rest in the RH group compared to the NSRH group. Furthermore, since the NSRH/RT group was relatively small, the power to detect large (66-68%), medium (32-33%) or small effects (0.09%) when comparing this group to the others was even smaller. Therefore, the inability to find differences in the vaginal blood flow response between women treated with or without RT may be due to the limited power of the analyses. Furthermore, the difficulty we found when recruiting women for our study may be due to the invasive and possibly confronting nature of the experiment. This may have introduced bias as women who had more negative experiences during (sexual rehabilitation after) treatment may have declined participation more often.

In conclusion, our study confirms for the first time that the reduction of vaginal blood flow caused by conventional RH for early-stage cervical cancer, can be avoided by conducting a nerve-sparing modification of RH. The current study has clarified the impact of surgery for early-stage cervical cancer on the physical aspects of sexuality through objective assessment of the vaginal blood flow response during arousal. In view of the similar oncological outcomes, conducting NSRH may be preferred over RH. It is also important to stress that support for early-stage CCS should not only depend on the type of treatment, but rather on the patients' and partners' experience with their sexual recovery, and that addressing sexuality during rehabilitation after cancer treatment may reduce the risk of sexual dysfunction. The findings may enable further development of tailored patient information and support, and health care providers should support patients in the rehabilitation phase after treatment to prevent or reduce sexual distress among CCS.

Sexual rehabilitation after pelvic radiotherapy and vaginal dilator use: Consensus using the Delphi method

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CHAPTER 5

Abstract

Objectives

This study aimed to reach consensus among professional experts on patient information provision and support, regarding sexual rehabilitation and vaginal dilator use after radiotherapy for gynaecological cancers.

Methods

An online three-round Delphi study was conducted among 10 radiation oncologists, 10 gynaecologic oncologists and 10 oncology nurses from 12 gynaecological cancer centres providing radiotherapy for gynaecological tumours. We assessed the desired content and provider of instructions and patient support regarding sexuality and vaginal dilator use. Responses were measured on a 7-point scale varying from 'totally disagree' to 'totally agree'. Consensus was reached when 70% of participants' answers fell within two scale categories with an interquartile range ≤1.

Results

The panel agreed that information about sexual rehabilitation using vaginal dilators should be provided by radiation oncologists prior to treatment. Information should always be provided to sexually active cervical and vaginal cancer patients, younger than 70. Tailored information was recommended for vulvar and endometrial cancer patients, patients older than 70, and sexually inactive patients. Preferably, specifically trained oncology nurses should give psychological and practical support. Participants recommended vaginal dilation to prevent vaginal adhesions, tightening and shortening. The panel advised to start dilation around 4 weeks after treatment, to perform dilation 2-3 times a week, for 1-3 minutes, and to continue dilation for 9-12 months. Plastic dilator sets were considered the most suitable type of dilator.

Conclusions

Consensus was reached on patient information provision and support during sexual rehabilitation after radiotherapy for gynaecological cancers. Results were used to develop a sexual rehabilitation intervention.

Introduction

In the Netherlands, each year 4500 women are diagnosed with gynaecological cancer, among which 1900 are endometrial cancers, 750 are cervical cancers and 60 are vaginal cancers.[1] About 35% of these women are treated with pelvic radiotherapy (RT), either as primary or post-surgical treatment.[5] Treatment for gynaecological cancer may cause physical and psychological side effects that interfere with the women's sexuality. Reported sexual problems among gynaecological cancer survivors are a tightened and shortened vagina, diminished lubrication, dyspareunia, post-coital bleeding, and loss of sexual desire, enjoyment and satisfaction.[18,19,21,22,31] Most studies agreed that the negative effect of gynaecological cancer treatment on sexual functioning was more pronounced when treatment included RT, compared to surgery alone.[13,20,30] The negative effect of RT is attributed to decreased lubrication, shortening and tightening of the vagina as a result of formation of fibrosis.[30,49]

Few studies investigated the effect of the regular use of vaginal dilators on the development or prevention of vaginal stenosis after treatment with RT. These studies showed that regular vaginal dilator use is associated with less vaginal shortening and/or tightening.[39,62,63] It is not clear how the (changes in) vaginal dimensions were assessed in these studies, nor what the cause-and-effect relationship was between dilator use and the vaginal measurements. Although more empirical evidence is needed, in clinical practice regular dilator use is found to reduce the risk of shortening and/or tightening due to adhesions and fibrosis.[65] Dilator use is therefore advocated in many guidelines and reviews.[44,67,148]

It is important to provide consistent and uniform, evidence-based counselling regarding when and how dilators should be used.[68–70] In two survey studies from the UK and Australia there was consensus among professionals that women undergoing pelvic RT for gynaecological malignancies should receive information about vaginal dilation.[71,149] Also, professionals recommended to insert a vaginal dilator during 5-10 minutes.[71,149] Other recommendations were inconsistent.[71,149] No consensus existed regarding the most appropriate time interval after RT, the frequency and duration of dilator use, dilator sizes offered, insertion techniques, or the appropriateness of dilator use among sexually inactive patients.[71,149] Moreover, there was no consensus on the content of instructions regarding patients' sexual rehabilitation.

There is a clear need for consensus on all of these aspects in order to further investigate the efficacy of a standardizes procedure of sexual rehabilitation and dilator use after RT. Consensus is needed specifically on which specific gynaecological cancer patients should receive information about sexual rehabilitation and dilator use, what type of health care provider should provide this information, counselling and support, what should be the practical guidelines for use of vaginal dilation.

The Delphi method proved to be an anonymous and economic tool to reach consensus on best practice issues in health care settings.[150-154] At first a questionnaire

addressing the opinion of an expert panel is assessed. Then a second questionnaire is developed that is based on the first questionnaire without the statements on which consensus was reached. It is offered to the panel containing anonymous feedback on the panels' agreement. This encourages the panel to reconsider their first response to the statements.

This study used the Delphi method and aimed to determine clear recommendations on the content and procedures of patient information provision and support, regarding sexual rehabilitation and vaginal dilator use after RT for gynaecological cancers. This was done conducting an online three-round Delphi study among recognized gynaecologic oncology professionals, from different cancer centres and with various areas of clinical expertise.

Materials and Methods

Participants

Eligible participants were radiation oncologists, gynaecologic oncologists and oncology nurses, with recognized clinical expertise in the treatment of gynaecological cancer patients receiving pelvic RT, and expert knowledge on vaginal dilation in this population. It was expected that 30 participants, representing all Dutch gynaecological cancer centres and each of the three specialisms equally, would create a heterogeneous and representative panel.[151-154]

Clinicians who participated in the Dutch gynaecological cancer network received an invitation e-mail, together with a brochure explaining the study content and the Delphi method, and an online informed consent form. Non-responders were approached by phone one week later. Prior to enrolment, it was ascertained that participants had the intention to complete all rounds of the study and had access to the Internet. At the conclusion of the study the participants received a 20-euro gift voucher as a token of appreciation. The study was approved by the Leiden University Medical Centre Medical Ethics Committee.

Questionnaire

The questionnaire consisted of statements and questions addressing participants' opinions on seven different categories (see Table 1, page 64). The questionnaire was developed based on literature on sexuality and vaginal dilation after pelvic RT,[68–71,149,155] and previous in-depth interviews with professionals involved in gynaecological cancer treatment. Items were pilot tested on comprehensibility among five experienced researchers in the field of gynaecologic oncology and/or conducting Delphi studies. Answers were measured using 7-point Likert scales varying from 1 (totally disagree) to 7 (totally agree) (n = 53), single- (n = 8) and multiple-choice questions (n = 6). The questionnaire also consisted of items measuring demographic and work-related characteristics (e.g. age and the years of experience in the field).

Table 1
Description of the seven item categories used in the questionnaire.

Item category	Description of the item category
Responsibility	Responsibilities that radiation oncologists, gynecological oncologists and oncology nurses have regarding their patients' sexual rehabilitation (e.g. providing practical advice on how to cope with sexual problems).
Target population	Specific patient groups that should receive information regarding sexual rehabilitation using vaginal dilators.
Vaginal dilator	Type of dilator that is best advised.
Rationale	The rationale that health care providers should use to advise the use of dilators.
Content instructions	Information and instructions that should be provided regarding the use of vaginal dilators and sexual intercourse during sexual rehabilitation.
Information provision	Type of health care provider that should provide information regarding sexual rehabilitation and vaginal dilator use, the time interval at which information should be provided, and the informational resource that should be used.
Patient support	Type of health care provider that should provide sexual health support during rehabilitation and dilator use, and to what extent sexual health support should be given by a radiation oncologist, gynecological oncologist or oncology nurse.

The Delphi process

The present Delphi method was based on a frequently published standard design.[150–154] The questionnaire elicited responses in three rounds. After each round, the degree of consensus was calculated. In case no consensus was reached on an item, the group response was fed back to the participants in the next round. Participants were asked to comment on their answers in case it differed from the group response. Items on which no consensus was reached and that, according to the comments by participants, appeared to be unclear were adapted.

The degree of consensus on the six multiple-choice questions that were used in Round 1 could not be calculated. Therefore, the multiple-choice questions were not counted as part of the total number of items in Round 1 and reformulated as 25 Likert scale statements in the next round.

An online Delphi study was conducted to allow anonymous inclusion of professionals across diverse centres and expertise and avoid that a specific expert might dominate the consensus process. Participants were asked to fill in each questionnaire within 2 weeks. Non-responders were send a reminder by e-mail and, if necessary, received a subsequent phone call after 1 week.

Consensus

It was decided beforehand that consensus was reached when at least 70% of participants' answers fell within the two lowest or highest answer categories on a Likert

scale, or within one category on a single- or multiple-choice question. In addition, to reach consensus, an interquartile range (IQR) of ≤1 was required. An IQR is a measure of statistical dispersion representing the distance between the 25th and the 75th percentile. A smaller IQR signifies a large consensus and a IQR ≤1 represents good consensus on a 7-point Likert scale.[153,154] When the degree to which consensus was reached differed between the three specialisms, this will be reported.

Statistical analyses

Descriptive statistics (percentages and IQR's) were calculated to measure consensus. The group response on items on which no consensus was reached, were fed back to the participants in Round 2 by stating the median, and in Round 3 by stating the median together with the modus. All statistical analyses were done using the Statistical Package for the Social Sciences (SPSS) version 20.0.

Results

Participants

Thirty-two clinicians were approached, of which 30 agreed to participate with a mean age of 48 years old (see Figure 1, page 66, for more information on the Delphi panel characteristics). Experts from three different disciplines and all 12 gynaecological cancer centres in the Netherlands were included. Twenty-seven participants had more than 5 years of experience within the field of gynaecologic oncology (90%) and 24 participants regularly or often gave patients sexological support (80%). All participants (100%) completed the three rounds.

Consensus results

The specific results of the consensus rounds are shown in Supplemental Information 1 and 2, which illustrate all items that reached consensus (in Round 1, 2 and 3) and all items that did not reach consensus respectively.

Consensus Round 1

Consensus was reached for 22/50 items in Round 1 (44%, see Supplemental Information 1, page 71). After Round 1 eight items were formulated differently based on comments by participants. Furthermore, one item was removed from the questionnaire because this question was not specific enough.

The degree with which consensus was reached, was equal between the three professional groups except for one item. The gynaecologic oncologists reached the consensus that it is part of their responsibility to evaluate their patients' sexual functioning (*n* = 10, 100% agreed and IQR = 1.00). The radiation oncologists almost reached the same consensus (*n* = 8, 80% agreed and IQR = 1.25).

However, the oncology nurses disagreed (IQR = 4.50) about whether this is their responsibility.

The panel did uniformly agree that it is important to give patients advice on how to cope with fear for sexual contact after treatment and, if necessary, to refer

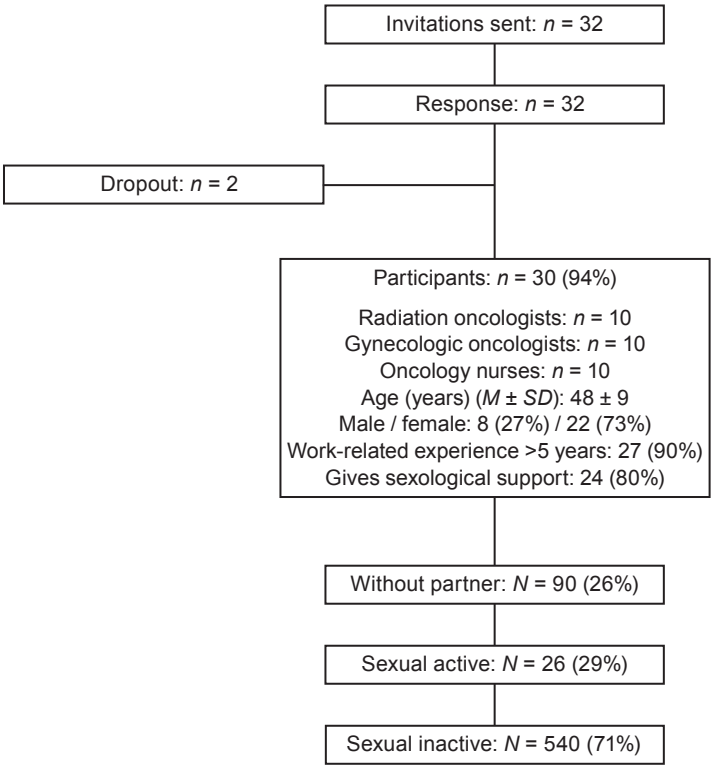

Figure 1. Delphi panel characteristics.

patients to a sexologist after treatment with RT for gynaecological cancers. Furthermore, participants agreed that all sexually active cervical and vaginal cancer patients with a partner, younger than 70, should always be informed about sexual rehabilitation using vaginal dilators. Regarding the use of vaginal dilators, participants thought that dilators should be prescribed with the rationale that regular dilator use prevents the formation of vaginal adhesions and stenosis, and keeps the vagina accessible for penetration in the future. Vaginal dilators should be used together with lubricants. Furthermore, it was thought that the frequency of vaginal dilator use could be reduced in case the patient has resumed sexual intercourse. Health care providers, instead of the patient herself, should initiate the provision of information and patient support on this topic during follow-up appointments after treatment. Monitoring of dilator use and discussion of barriers or problems with its use should take place during each follow-up appointment.

Consensus Round 2

The panel reached consensus on 31/52 items in Round 2 (60%, see Supplemental Information 1, page 71) with an equal degree of consensus between the three specialisms. After Round 2, 14 items were formulated differently based on comments by participants. Also, one item was removed from the questionnaire because this question was less specific than another item addressing the same subject.

The participants agreed that it is part of their responsibility to provide practical advice on how to cope with sexual problems. Patients treated with brachytherapy in combination with external beam RT (or on individual indications) and also patients without a current partner, especially those with cervical and vaginal cancer, should be informed about sexual rehabilitation using vaginal dilators. Patients may start having sexual intercourse 2 to 4 weeks after treatment completion. Most participants also recommended use of dilators with the rationale that dilator use makes future vaginal examinations during follow-up appointments less inconvenient. Two participants added however that this is not an argument to prescribe vaginal dilators, in case a patient would have no other reason to use dilators. Furthermore, participants agreed that it is not desirable to recommend use of vaginal dilators only after vaginal adhesions have been established. According to the panel, the most suitable dilators were commercially available plastic dilator sets. Vaginal dilators should be used two to three times a week during 9 to 12 months after treatment. It could help to move and rotate the dilator around when inserted. The panel agreed that gradually using a bigger cylinder circumference in time is important.

Consensus Round 3

Consensus was reached for 8/21 items in Round 3 (38%, see Supplemental Information 1, page 71) and the degree of consensus was equal between the three specialisms. The panel agreed that it is best if radiation oncologists give the first introduction and information about vaginal dilation. More extensive information should be provided during the first post treatment follow-up appointment. According to the panel, the use of vaginal dilators can also help patients to reduce fear of bodily changes and fear of sexual activity. If preferred, patients can use a vibrator as a vaginal dilator. Furthermore, health care providers should counsel patients on which type(s) of dilator they can use, but the patient ultimately decides. To prevent adhesions, inserting the vaginal dilator for 1 to 3 minutes was thought to be sufficient. Table 2 (page 68) summarizes the results and consensus-based recommendations of the study.

No consensus

No agreement was reached on whether or not to provide standard information about sexual rehabilitation using vaginal dilators to vulvar and endometrial cancer patients, patients older than 70 years, and patients who were not sexually active before treatment (see Supplemental Information 2, page 75). Some participants recommended tailoring the information for these patient groups; depending on the specific type(s) of treatment, age, wish to retain sexual activity, personal and medical situation. Some participants commented to inform every patient about sexuality and vaginal dilator use after treatment with regard to possible needs in the future. Furthermore, participants did not agree on whether dilation should be started between 2 and 4 weeks after RT (n = 20, 67%) or later. It was commented that it is important for the vaginal mucosa to have healed before dilation is started, which often takes 4 weeks after completion of RT.

Table 2
Summary of the consensus-based recommendations described per category.

Category	Consensus
Responsibility	• Health care providers should give patients simple sexological advice[2], such as how to cope with fear for sexual contact after treatment[1] • It is desirable to refer patients to a sexologist in case simple sexological advice does not suffice[1]
Target population	*Patients should be informed about vaginal dilation in case they were:* • Sexually active before treatment[1] (independent of whether they have a partner[1],[2]) • Treated with pelvic radiotherapy (RT) for cervical[1] or vaginal cancer[1] • Treated with vaginal brachytherapy in combination with external-beam RT (or on individual indications)[2]
Vaginal dilator	• Health care providers should advise on which type of dilator should be used, but the patient ultimately decides[3] • The most often recommended type of dilator are commercially available plastic dilator sets[2] • Patients may use a vibrator if preferred[3] • The circumference of a dilator is important during usage[1]
Rationale	*The rationale that health care providers use to prescribe vaginal dilation should contain that dilation:* • Prevents the formation of vaginal adhesions[1] • Keeps the vagina accessible for any form of penetration in the future[1] • Also makes future vaginal examination (during follow-up appointments) more convenient[2] • Can be useful to help reduce fear for bodily changes and sexual activity[3] • Vaginal dilation should start preventively[1] and not only in case of established adhesion[2]
Content instructions	• Plastic cylinders, vibrators, dildo's and fingers should be inserted at least 1 to 3 minutes, 2 to 3 times a week[2], and during 9 to 12 months after treatment[2] • Vaseline tampons (tampons covered in Vaseline), should be inserted over-night[2], 2 to 3 times a week[2], and during at least 9 to 12 months after treatment[3]
Content instructions continued	• Lubricants should be advised together with vaginal dilators[1] • Gradually using a bigger cylinder circumference in time is important[2] • It is best to insert vaginal dilators as deep as possible[1], in a position determined by the patient herself[1], and to move the dilator around when inserted[2] • Patients should consult their health care provider in case of new complaints about pain[1] or lasting loss of blood[1] • Whether or not the partner is actively involved should depend on the patients' needs[3] • The frequency of use can be lowered in case the patient also has successful sexual intercourse[1] • Patients may start having sexual intercourse 2 to 4 weeks after treatment[2]
Information provision	• The health care centre decides which health care provider is responsible for informing patients about vaginal dilation[2] • The radiation oncologist[3] should provide the first introduction[3] before RT[2] • The oncology nurse should provide the more extensive information[2] during the first follow-up appointment[3] • The health care provider should initiate information provision, at least face-to-face[1], even if the patient does not begin to talk about it[1] • Patients' partners should be involved[2] • The availability of an informational brochure[1] and website[1] is desirable

Patient support	• The health care centre decides which health care provider is responsible for supporting patients during sexual rehabilitation[2] • Monitoring vaginal dilator use should always take place during follow-up appointments[1] • The oncology nurse should provide psychological and practical patient support during sexual rehabilitation[2] • The health care provider should initiate providing patient support, even if the patient does not take the initiative[1] • Extra consultations to support the patient should be possible[2] • Extra referral possibilities[1] for patients with sexual problems and more training possibilities in assessing sexual complaints[2] are desirable

[1]Consensus reached in Round 1; [2]Consensus reached in Round 2; [3]Consensus reached in Round 3.

Discussion

An online three-round Delphi study was conducted to assess the content and procedures of patient information provision and support regarding sexual rehabilitation and vaginal dilator use after RT for gynaecological cancer. The study was conducted among 30 gynaecologic oncology experts from 12 gynaecological cancer centres. The panel equally represented radiation oncologists, gynaecologic oncologists and specialized oncology nurses, involved and experienced in counselling, and the follow-up of gynaecological cancer patients after RT. All participants completed the three rounds. The degree to which consensus was reached, was equal between the three professional groups. Previously, no specific recommendations could be made regarding the content and procedures of information provision and support during sexual rehabilitation and vaginal dilator use.[67,71,149] This study offers a clear consensus on these topics.

Consensus was reached that information about sexual rehabilitation and vaginal dilator use should be given to all sexually active cervical and vaginal cancer patients, younger than 70. Moreover, comments by the participants made clear that vulvar and endometrial cancer patients, patients older than 70, and patients that were not sexually active before treatment, should receive care tailored to their needs. The participants also agreed that radiation oncologists should initiate and provide information about sexual side effects of RT, rehabilitation and preventive measures including vaginal dilator use prior to treatment. Additionally, in line with previous suggestions, more extensive dedicated psychological and practical support should preferably be initiated and given by specifically trained oncology nurses.[156]

Although in this study no clear consensus was reached on the best time to start dilator use, most participants recommended to start between 2-4 weeks after completion of RT (*n* = 20, 67%), or as soon as the vaginal mucosa is healed (which is usually around 4 weeks). This was also the most commonly cited time interval in the studies of White & Faithfull (2006) and Lancaster (2004).[71,149] Furthermore, there was consensus that the frequency with which dilators should be used, preferably 2-3

times a week, could be reduced in case the patient has resumed sexual intercourse.

The panel agreed that it is important to gradually use a bigger cylinder circumference in time. Participants in this study also agreed that each dilator should be inserted during 1-3 minutes, which is in contrast to previous recommendations of 5-10 minutes[67,71,149] Furthermore, the panel agreed it is best to perform dilation 9-12 months, whereas in previous studies about half of the respondents recommended indefinite use.[71,149] However, in contrast to the aforementioned survey studies,[22,23] his present study conducted the Delphi method among a heterogeneous panel. Therefore, the results of this study were thought to reflect the opinion of all professionals involved in counselling and the follow-up of gynaecological cancer patients after RT.

Adapting items for the next round in the Delphi study obviously poses a risk of a self-fulfilling prophecy.[151] However, the items concerned were adapted using experts' comments in a systematic way and all the adapted items were pilot tested on comprehensibility again among five experienced researchers in the field. The professionals that participated in this study were expected to be potential users of the findings and, consequently, were thought to form the most useful expert panel. In a separate in-depth interview study the perspective of gynaecological cancer patients on sexual rehabilitation and dilator use after pelvic RT will be investigated. The patient's perspective on this topic is required to be able to improve patient care, since it is expected that these patients have additional needs. For example, participants in this study considered the rigid plastic dilator sets the most suitable type of dilator to prescribe, whereas patients might have preferred a softer flexible dilator.[70] The efficacy of regular dilator use can only be assessed in a randomized controlled trial if there is a standardized procedure of sexual rehabilitation and vaginal dilator use. Using the Delphi method, a common consensus was created out of the available expertise. It is therefore important to further investigate whether the results of this study are generally applicable in clinical practice and support patients during their sexual rehabilitation after pelvic RT, before final policy decisions can be made.

In conclusion, the results of this study offer clear consensus-based recommendations for the education and support of gynaecological cancer patients treated with pelvic RT, during sexual rehabilitation and vaginal dilator use. Based on these results, an intervention has been developed and is currently pilot tested in which patients receive support during sexual rehabilitation and vaginal dilator use after pelvic RT. This study was a first step towards the improvement of gynaecological cancer patient support during their sexual rehabilitation after pelvic RT.

Supplemental Information 1
Items that reached consensus in Round 1, 2 and 3.

Category	Item and comments by participants	*N*[a]	%[b]	IQR[c]
Round 1				
Responsibility	It is the health care providers' responsibility to give patients advice on how to cope with fear for sexual contact after treatment.	22	73	1.00
	It is desirable to refer patients to a sexologist in case simple sexological advice does not suffice.	29	97	1.00
	According to gynecological oncologists, it is the health care providers' responsibility to evaluate their patients' sexual functioning. *	10	100	1.00
Target population	Patients treated with RT for cervical cancer have to be informed about vaginal dilation.	29	97	0.00
	Patients treated with RT for vaginal cancer have to be informed about vaginal dilation.	24	80	0.00
	Patients treated with RT for ovarian cancer do not have to be informed about vaginal dilation. †	28	93	0.00
	Patients that were sexually active before treatment have to be informed about vaginal dilation.	26	86	1.00
	Patients with a partner have to be informed about vaginal dilation.	25	83	0.00
Vaginal dilator	The circumference of a dilator is considered important during usage.	21	70	1.00
Rationale	The rationale that health care providers use to prescribe vaginal dilation should at least contain that dilation prevents the formation of vaginal adhesions.	24	80	0.00
	The rationale that health care providers use to prescribe vaginal dilation should at least contain that dilation keeps the vagina accessible for any form of penetration in the future.	25	83	0.00
	Vaginal dilation should start preventively, before the formation of vaginal adhesions.	27	90	1.00
Content instructions	The frequency with which vaginal dilators are used can be lowered in case the patient also has successful sexual intercourse.	28	93	0.00
	Lubricants should be advised together with the use of vaginal dilators.	30	100	0.25
	The position in which a vaginal dilator is inserted, is best determined by the patient herself.	22	74	1.00
	It is best to insert vaginal dilators as deep as possible.	21	70	1.00
	Patients should consult their health care provider in case of new complaints about pain.	21	70	1.00

Category	Item and comments by participants	*N*[a]	%[b]	IQR[c]
	Patients should consult their health care provider in case of lasting loss of blood.	25	83	0.25
Information provision	Health care providers should initiate information provision about vaginal dilation, even if the patient does not begin to talk about it.	26	87	1.00
	Patient education about vaginal dilation should at least take place face-to-face.	27	90	1.00
	Initially, the sexologist does not provide patient education about vaginal dilation.	26	87	0.00
	The availability of an informational brochure is desirable.	28	94	1.00
	The availability of an informational website is desirable.	27	90	0.25
Patient support	Monitoring vaginal dilator use should always take place during follow-up appointments.	24	80	1.00
	The health care provider should initiate providing patient support during sexual rehabilitation, even if the patient does not take the initiative.	25	83	0.00
	Initially, the sexologist does not provide patient support with vaginal dilation.	23	77	0.25
	Extra referral possibilities, to refer patients with sexual complaints to, are desirable.	24	80	0.00
Round 2				
Responsibility	It is the health care providers' responsibility to provide simple sexological advice.	25	83	1.00
Target population	Patients treated with vaginal brachytherapy should be informed about vaginal dilation. *Eight participants added that only treatment with brachytherapy in combination with external-beam RT or individual indications would make them inform patients*.	28	94	1.00
	Patients without a partner should be informed about vaginal dilation. *Five participants commented that this is important because dilation would make future physical examinations and sexual intercourse possible.*	20	76	1.00
Vaginal dilator	The best advised type of dilator are commercially available plastic dilator sets.	23	77	0.25
Rationale	The rationale should also contain that dilation makes future vaginal examination (during follow-up appointments) more convenient. *Two participants added however that this is not an argument to prescribe vaginal dilators, in case a patient would have no other reason to use them*.	21	70	1.00
	Participants agreed that it is not desirable to advise dilation only in case of established adhesion.†	26	87	0.00

Category	Item and comments by participants	*N*[a]	%[b]	IQR[c]
Content instructions	Patients may start having sexual intercourse 2 to 4 weeks after treatment completion. *According to two participants, the right moment to start depends on to what extent the vaginal epithelia is healed and the ability to have sexual intercourse cautiously.*	21	70	0.50
	Plastic cylinders, vibrators, dildo's and fingers can best be used two to three times a week.	25	83	0.00
	Plastic cylinders, vibrators, dildo's and fingers can best be used during 9 to 12 months after treatment. *Although, according to three participants, adhesions can also emerge after this period.*	21	70	0.00
	It is thought that gradually using a bigger cylinder circumference in time is important.	24	80	0.00
	Some advised the use of Vaseline tampons (tampons covered in Vaseline), which should be used two to three times a week.	24	80	0.00
	Vaseline tampons should be inserted overnight.	22	73	1.00
	It is advantageous (against the formation of adhesions) to move vaginal dilators around when inserted.	25	83	0.00
Information provision	Every health care centre should decide for themselves which health care provider is responsible for informing patients about vaginal dilation.	25	83	0.00
	Patients' partners should be involved during information provision. Although, six participants commented that patients should decide whether their partner is present or not.	21	70	1.00
	It is best if the oncology nurse provides the more extensive information.	21	70	1.00
	The first introduction about vaginal dilation should be given before RT starts.	23	77	0.25
Patient support	It is best if the oncology nurse gives the psychological and practical patient support during sexual rehabilitation.	22	73	1.00
	Every health care centre should decide for themselves which health care provider is responsible for supporting patients during sexual rehabilitation.	27	90	0.00
	Extra consultations to support the patient with vaginal dilator use should be possible.	29	97	0.00
	More training possibilities in assessing sexual complaints is desirable.	22	73	1.00
Round 3				
Vaginal dilator	Health care providers should advise on which type of dilator should be used, but the patient ultimately decides.	24	80	0.00
	Patients may use a vibrator if preferred. *One participant added that it is possible as long as the dilator has a wide tip.*	22	74	1.00
Rationale	It is useful to add to the rationale that using dilators can help patients to reduce fear for bodily changes and sexual activity.	29	96	0.00

Category	Item and comments by participants	*N*[a]	%[b]	IQR[c]
Content instructions	Inserting the cylinder, vibrator, dildo or fingers for 1 to 3 minutes is sufficient against the formation vaginal adhesions.	23	77	0.00
	It is sufficient to use Vaseline tampons 9 to 12 months after treatment.	24	80	0.00
	Whether or not the partner is actively involved during the use of dilators should depend on patients' needs.	27	90	0.00
Information provision	The panel agreed that radiation oncologists could best introduce vaginal dilation.	27	90	0.00
	More extensive information should be given during the first follow-up appointment after treatment.	24	80	0.00

[a] Number of participants that agreed on the item (*N*);
[b] Percentage of participants that agreed on the item (%);
[c] Interquartile range of the total group response (IQR);
* This statement did not appear applicable to all participants' and was removed from the questionnaire after Round 1. Radiation oncologists almost agreed (*n* = 8 agreed and IQR = 1.25) and oncology nurses disagreed (IQR = 4.50) about whether it is part of their responsibility to evaluate their patients' sexual functioning;
† This item was inversely formulated in the original questionnaire.

Supplemental Information 2
Items that did not reach consensus and comments made by participants.

Category	Item and comments by participants	*N*[a]	%[b]	IQR[c]	Mdn[d]
Target population	Patients treated with solely external-beam RT should be informed about vaginal dilation.	18	60	1.00	6.0
	Patients treated with RT for endometrial cancer should be informed about vaginal dilation.	18	60	1.00	6.0
	Patients treated with RT for vulvar cancer should be informed about vaginal dilation.	14	46	1.00	5.0
	Some participants stated that the information these patients receive should depend on their personal situation (n = 4), needs (n = 3), sexual activity (n = 1) and possible operational outcomes (n = 2).				
	Patients who were not sexually active before treatment should not be informed about vaginal dilation.*	6	20	2.00	5.0
	Patients older than 70 years should be informed about vaginal dilation.	12	40	2.00	5.0
	Some participants inform every patient about sexuality and the use of vaginal dilators after treatment with regard to possible needs in the future (n = 4), but others adjust their information provision to the patients' age (n = 4).				
Vaginal dilator	The use of fingers as a vaginal dilator is less effective because fingers can be inserted less deep.	16	54	2.00	6.0
Content instructions	Vaginal dilation should be started between 2 and 4 weeks after RT. *Three participants commented that it is important for the vaginal epithelia to heal and that it is often not before 4 weeks after RT.*	20	67	0.00	2 - 4 weeks†
	The use of various plastic cylinder sizes should be build up to a size comparable to the size of the penis of their partner. *Four participants thought it is not always necessary, because sexual intercourse may be less problematic than inserting a large plastic cylinder and intercourse is sufficient to prevent adhesions.*	14	46	2.00	5.0
	It is useful to embed the use of vaginal dilators in the sexual relationship. *Two participants commented that medical reasons for using dilators may be held separate from sexual contact and patients may decide for themselves in what context they use vaginal dilators.*	20	69	1.00	6.0

[a] Number of participants that agreed on the item (*N*);
[b] Percentage of participants that agreed on the item (%);
[c] Interquartile range of the total group response (IQR);
[d] Median of the group response on a 7-point Likert scale varying from 1 (totally disagree) to 7 (totally agree) (Mdn);
* This item was inversely formulated in the original questionnaire;
† This item was a single-choice question.
The median of the group response on the answer options was reported.

Qualitative accounts of patients' determinants of vaginal dilator use after pelvic radiotherapy

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Abstract

Objectives

Treatment with pelvic external-beam radiotherapy with brachytherapy (EBRT/BT) for gynaecological cancers may cause sexual dysfunction due to vaginal shortening and tightening. Regular vaginal dilator use is thought to reduce vaginal shortening and/or tightening, but compliance is poor. This study identified determinants of patients' adherence with dilator use after EBRT/BT.

Methods

Semi-structured interviews were conducted with 30 women, aged 32-67 years, treated with EBRT/BT for gynaecological cancers at two University Medical Centres in the past 36 months. Transcriptions were coded and analysed with N-Vivo software. Determinants of dilator use were clustered based on the Health Action Process Approach, which describes 1) motivation processes that lead to a behavioural intention and 2) volition processes that lead to the initiation or maintenance of actual behaviour.

Results

Almost all women attempted to perform long-term regular vaginal dilator use. Intended dilator use was determined by the expectation that it would prevent the development of vaginal adhesions and stenosis. Planning dilator use and making it part of a routine, using it under the shower, using lubricants, a smaller dilator size or vibrators, helped women. Others reported a lack of time or privacy, forgetting, or feeling tired. Women self-regulated dilator use by rotating the dilator and timing dilator use. Influencing factors were negative emotions regarding dilator use or its hard plastic design, (being anxious for) pain or blood loss, and an association with EBRT/BT. Some women mentioned a lack of instrumental support, for example lubricants. Others received reassurance through informational support or were supported socially.

Conclusions

Consensus was reached on patient information provision and support during sexual rehabilitation after radiotherapy for gynaecological cancers. Results were used to develop a sexual rehabilitation intervention.

Introduction

Treatment for gynaecological cancers may cause sexual dysfunction, especially when treatment includes pelvic external-beam radiotherapy with brachytherapy (EBRT/BT).[13,19–21,33,46,157] The negative effect of treatment with EBRT/BT is attributed to vaginal shortening and tightening induced by fibrosis and stenosis.[30,49] Regular vaginal dilator use is thought to reduce vaginal shortening and/or tightening.[39,62,63] Although more empirical evidence is needed, dilator use has become established practice worldwide.[44,65,67,148] Gynaecological cancer experts in the Netherlands have reached consensus in a Delphi panel consensus process on how vaginal dilation should be performed.[101]

Despite the proposed benefits of regular dilator use, patients have difficulties following the instructions and compliance is poor.[70,73–75,158] In previous studies, 1% to 35% of the participating gynaecological cancer patients used a dilator with the recommended frequency within the first 12 months following EBRT/BT.[73–76,158] In two studies, 10 to 15 gynaecological cancers patients were interviewed after EBRT/BT about their experiences with dilator use and reasons for (non-)compliance.[69,77] Reported barriers were painful insertion, embarrassment, fear, reliving the invasive treatment, lack of information or time, forgetting, or dilation not being a priority during recovery.[69,77] Facilitating factors mentioned by patients were concern about the development of vaginal adhesions, belief that dilators help, reminders of adhesions development, acceptance of dilator use as part of a routine or an extension of treatment, or focusing on positive aspects of dilator use.[69]

It remains unclear how these barriers and facilitators explain the women's compliance with dilator use. Therefore, this qualitative study aimed to identify the determinants intention, initiation and maintenance of long-term regular dilator use and to describe dilator use as a health behavioural process. Moreover, the identified determinants were supported by the theoretical constructs of the Health Action Process Approach (HAPA), which has been used to explain and predict numerous health behaviours.[159]

Methods

Participants and recruitment

Eligible women (aged 20-70 years) were treated with external beam radiotherapy in combination with brachytherapy (EBRT/BT) for gynaecological cancers at two University Medical Centres 2 to 36 months prior to the interview. Exclusion criteria were signs of recurrent or metastatic cancer, medical or psychological problems, living abroad or insufficient knowledge of the Dutch language. Three radiation oncologists informed women about the study during their follow-up consultations between November 2012 and July 2013. It was ascertained that the participants consented to be interviewed. Participants received a 20-euro gift voucher. The Leiden University

Medical Centre Medical Ethics Committee approved the study protocol.

Data collection

Two female researchers (RB and WV) conducted semi-structured face-to-face interviews, in private, either at home or at the medical centre. Two interviews were conducted by telephone due to practical reasons. The average duration of the interviews was 42 minutes (range: 27 to 62 minutes). As psychologists (MSc and PhD), the researchers were trained and experienced in interviewing patients, and not involved in the treatment of the women. All interviews were digitally recorded and transcribed verbatim.

Data analyses

The transcriptions were analysed with QSR International's NVivo 10 software using the Framework Approach.[116,117] The Framework Approach is used in health research to systematically analyse qualitative data by applying a combination of deductive and inductive coding. Therefore, emerging themes were identified using an a priori coding scheme based on the interview topics. The coding of the two researchers was compared and discussed after every third interview. Agreement on the adequacy of new emerging codes was achieved through negotiated consensus. At first, RB and WV coded a random sample of 10 interviews. Secondly, RB coded the remaining 20 interviews using the definitive coding scheme. Lastly, RB and WV coded and crosschecked five of these interviews to ensure consensus on the definitive coding scheme and - if needed - complement the coding (RB, WV).[118] Descriptive statistics (e.g. age) were calculated using IBM SPSS version 21.

Main outcome measures

Socio-demographic data were obtained from both women's medical records and the interview. Participants were interviewed about 1) received information and support, regarding sexual rehabilitation and vaginal dilator use, 2) experiences with dilator use, and 3) reasons for (non-)compliance with dilator use. Table 1 (page 80) describes the interview topics in detail.

The determinants of dilator use reported by the participants, were analysed using the theoretical constructs of the Health Action Process Approach (HAPA).[159] The HAPA describes the intention, initiation, and maintenance of health behaviours as a process. According to the HAPA, the intention to perform long-term regular dilator use is influenced by risk perception (the perceived likelihood of vaginal shortening and tightening) and outcome expectancies (the pros and cons of regular dilator use). Transforming the intention into initiation and maintenance of dilator use requires planning (where and when to perform dilator use, and how to cope with possible difficulties), action control (evaluating the ongoing dilator use), and resources (instrumental, informational or social support). Also, for example negative emotions may form a barrier to perform dilator use. The perceived self-efficacy (the belief to be able to perform, continue and resume dilator use after relapse) also affects dila-

tor use. See also Figure 1 (page 81), which represents example determinants and their interrelations.

Table 1
Interview themes and topics[a].

Themes	Topics
Demographic characteristics	Relationship, job and housing status, important life events, dates of cancer diagnosis and treatment
Sexual rehabilitation since treatment	Sexual activity
Received information and support	- Received information and support regarding sexual health and vaginal dilator use after pelvic external-beam radiotherapy with brachytherapy - Satisfaction with and suggestions for information provision and support
Adopted vaginal dilator use	- Evaluation of the vaginal dilator use in detail - Alternative dilator use other than the plastic dilator set - Partner involvement (if applicable) - Use of other possible components (e.g. lubricants)
Reasons for (non-) compliance	- Personal motivation and experiences with dilator use - Practical, psychological or physical reasons for (non) compliance - Role of received instructions - Experienced effect of (non) compliance - Experienced effect of alternative dilator use - Effect of experiences with treatment on dilator use - Experiences with the design of the plastic dilator set - Role of the partner (if applicable) - Applicability of other possible components (e.g. lubricants)

[a]The order and relevance of the topics discussed could vary due to the semi-structured nature of the interview.

Results

Participant characteristics

At the Leiden University Medical Centre (LUMC) 13 out of 17 (77%), and at the Erasmus Medical Centre (EMC) 17 out of 35 (49%) eligible women participated (in total 58%). Five women declined participation because the subject was too upsetting or intimate, four because of personal reasons and two others could not be reached by phone. The other eleven women declined participation for unknown reasons (since the women were not obliged to specify their reason for refusing participation).

No new themes emerged after interviewing 25 women and thus data saturation was reached.[118,160] Participants were treated with primary (*n* = 25) or postoperative EBRT/BT (*n* = 5) (together with chemotherapy in *n* = 25), for cervical cancer (*n* = 29) or vaginal cancer (*n* = 1). The majority of the women had squamous cell carcinoma

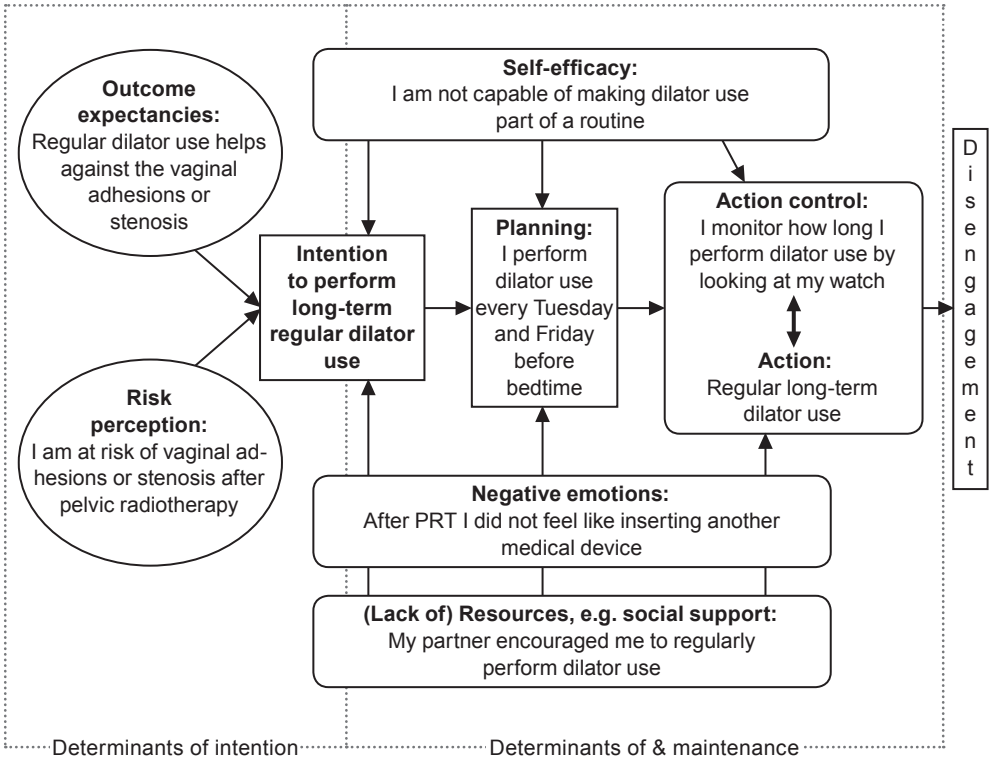

Figure 1. Example determinants of vaginal dilator use and their interrelations according to the HAPA.

(*n* = 26) and a minority adenocarcinoma (*n* = 4). Furthermore, participants were treated 16 months ago on average (± *SD* = 9, range: 2-36 months). The mean age was 49 years (± *SD* = 11, range: 32-67 years). All participants under the age of 45 years were offered hormone replacement therapy (HRT) until they were 50, due to their treatment induced postmenopausal status. Of all participants 23 participants were partnered and 20 women reported to be sexually active.

All participants reported sexual problems and half of the women reported sexual distress since treatment. Almost all women reported pain during sexual contact. The majority reported symptoms of a shortened and/or tightened vagina, vaginal adhesions, loss of sexual desire, lubrication problems, a burning sensation and sensitive vaginal skin, loss of blood after penetration, reduced sexual enjoyment and/or fear for sexuality (e.g. because of possible pain or infections). Also, one third reported loss of sexual satisfaction.

Reported dilator use

Two women treated more than 2 years ago, never intended to perform dilator use. All other participants reported to have (had) the intention to use a dilator and also used a dilator at least once. Furthermore, almost half of the participants performed

dilator use at least two times a week. Half of those women, a quarter of all participants, were treated at 9 to 12 months previously and completed the instructed period of use.

However, the other half of the participants was not able to translate their intention and attempts into dilator use as recommended. Some of these women reported dilating regularly only during the first few months after treatment. Others performed dilator use infrequently or attempted not more than a few times. The majority was treated between 1 and 2 years previously.

Determinants of the intention to perform dilator use

Table 2 (page 86) provides example quotes of the findings structured according to the HAPA.

Risk perception

For most women the intention to start or continue dilator use was determined by a motivation to prevent the development of vaginal adhesions and subsequent possible occlusion of the vagina (quote 1, Table 2). Furthermore, half of the women became motivated and convinced that they were at risk of adhesions, because they were bothered or scared to notice that adhesions had formed. Some already noticed adhesions before they ever used a dilator and others noticed adhesions after infrequent or lack of dilator use. Some of the women stated that dilator use had no priority, because sexuality was irrelevant at that moment.

Participants' risk perception was influenced by the way they perceived the instructions from their health care providers. The two women who never intended to perform dilator use reported insufficient information provision. One of them received some information, but no dilator set or instructions. She thought her doctor estimated it was not necessary. Another woman refused a dilator set at the time, because she thought it was advised to stimulate sexual contact, which she did not consider necessary. Furthermore, some women mentioned to have stopped dilator use after a while, even though this was not recommended or approved for by their health care provider. They hoped that they performed dilator use long enough to prevent adhesions.

Outcome expectancies

Participants generally expected that dilator use would prevent the development of vaginal adhesions and would keep the vagina accessible after EBRT/BT (quote 2, Table 2). Also, half of the women expected to facilitate sexual contact or intercourse, now or in the future. A couple of women intended to facilitate physical examination during post treatment follow-up appointments. For one woman, facilitating follow-up examinations was the only well-known purpose to her. Some women acknowledged continuing dilator use just because they received the instruction that it was important or because they saw it as part of their treatment.

Discovering adhesions after a short period of not using dilators, not only heightened women's risk perception, but also convinced them of its beneficial effect

against adhesions. Some women also indicated being supported by experiencing benefits like reduction in vaginal tightening and pain, and an increase in vaginal sensations. A few women also experienced these beneficial effects while having sexual intercourse. Retrospectively however, participants that adhered to long-term regular dilator use did not mention to be more sexually active or satisfied, or have a sexual relationship more often.

Some women attempting regular dilator use stated that it did not prevent adhesions or even caused pain. Half of the women mentioned experiencing pain during dilator use and some reported blood loss or vaginal discharge. Experiencing pain or blood loss during dilator use motivated a few women to continue dilator use, because that would reduce anxiety and pain.

About half of the women indicated that their doctor evaluated their vaginal dilator use. A couple of women became convinced that dilator use was useful, because the doctor told them that the condition of their vagina looked good and accessible after examination. Others had become less convinced, because their doctors did not talk about it or because physical examination was still painful.

Determinants of the initiation and maintenance of dilator use

Planning

A group of women explained that planning dilator use and making it part of a routine, helped them to transform their intention into action (quote 3, Table 2). A few women mentioned choosing a fixed time or day. Someone recommended starting dilator use shortly after treatment to make it less of an obstacle. However, some women found it difficult to make time for dilator use and cleaning afterwards. A couple of women reported forgetting, being tired or finding the privacy for dilator use as a problem.

To anticipate on difficulties during dilator use, some women lay down on their bed, made sure not to be disturbed or playing relaxing music to relax. About half of the women used neutral (water- or silicone-based) lubricants during dilator use and some experienced less discomfort because of it. Other women used a dilator under the shower to save lubricant and time. And some women found it helpful to build up in dilator size in order to reduce anxiety. A few women placed the dilator against the vaginal opening or waited before pushing it inside to get used to the device.

A couple of women preferred using a vibrator, because they expected it to be more enjoyable, less alien and possible to integrate during sexual contact. However, a few older women could not even imagine it to be more enjoyable. A couple of women stopped using a vibrator, because they read that the material could cause cancer or it confronted them with a lack of sexual desire. A couple of partnered women reported being helped by making dilator use part of sexual contact. About half of the women frequently had sexual intercourse as an alternative

means of dilation and could therefore lessen (or even stop) dilator use. However, another few felt pressured by their partner to have intercourse instead.

Action control

A few women indicated to rotate the dilator while inserted in order to better prevent the formation of adhesions. A few others indicated being helped by reading something or trying to stop thinking about daily concerns, to be able to continue. Almost half of the participants inserted a dilator during 1 to 5 minutes and some women during 10 minutes. A few women mentioned timing the insertion of dilator use by looking at their watch or listening to a music piece of a certain length (quote 4, Table 2).

Factors influencing vaginal dilator use

Negative emotions

More than half of the women expressed negative emotions about dilator use. Experiencing pain, blood loss or discharge during dilator use made half of the women anxious to use a dilator (quote 5, Table 2) and a few were bothered by tension of the pelvic floor muscles. Some had stopped dilator use because of it. A couple of women indicated a negative association with blood loss during dilator use, or sexual contact, and cancer (fear of recurrence). Women acknowledged that dilator use confronted them with the fact that they were still dealing with the cancer. Also, some women negatively associated dilator insertion with the invasive brachytherapy treatment, or were not ready for dilator use yet (quote 6, Table 2). Almost half of the women acknowledged that regular dilator use felt like homework or a bothersome chore (quote 7, Table 2). Also, some women felt resistant or even repulsed towards dilator use. A few women felt so repulsed that they stopped dilator use. Lastly, a few women stated not being the type to perform dilator use as if it embarrassed them.

Resources

A couple of women were frustrated about their health insurance company not paying for the dilator set (since one of the two hospitals itself did not supply them) (quote 8, Table 2) or having to buy neutral (water- or silicone-based) lubricants themselves. One older woman stated being embarrassed having to explain at her local drugstore why she would need lubricants. Informational support from health care providers reassured some women that it was normal experiencing certain setbacks during dilator use, such as blood loss (quote 9, Table 2). However, some women stated to lack professional advice or support and therefore did not use a dilator more often. Another woman regretted not getting more follow-up appointments with her helpful oncology nurse. Several women suggested that it would be helpful to have at least one consult with a psychologist or other health care provider to support them with dilator use at the end or just after treatment.

A few women mentioned being supported socially and received encouragement to continue from their partner, friends or health care provider (quote 10, Table 2).

Most partnered women did not involve their partner in dilator use. However, a few women felt supported and experienced less anxiety by doing so. Also, a few mentioned their partner remembering more of the received instructions regarding vaginal dilator use than they did.

Perceived self-efficacy of vaginal dilator use

A few women acknowledged that it was not the action itself that was hard to achieve, but that other barriers (such as negative emotions) made it hard to perform regular dilator use. Another few mentioned doubting that dilator insertion was physically possible. A few women expressed not being able building dilator use into their routine (quote 11, Table 2). Where as a few participants mentioned that dilator use made them feel in control of the prevention of adhesions.

Importantly, someone indicated that experiencing pain during dilator use made her not want to have sexual intercourse anymore. Nevertheless, a few women indicated that dilator use helped them to initiate sexual intercourse, because it made them aware that it was physically possible without a lot of pain and therefore reduced anxiety.

Dilator design

More than half of the women had negative feelings about the ("hard and clinical") design of the plastic dilator set. Besides some women desiring a more pleasurable dilator made out of softer material, a few women mentioned a dilator should have a bigger diameter, a (non-transparent) colour, be pointier or able to rotate itself. Others wanted a more pleasurable design that would be suitable to integrate in sexual contact. Half of the women rather saw dilators as a technical tool or medical device. Therefore, some added that its neutral design is appropriate. Also, a group of women suggested it was not necessary to provide a dilator set containing four sizes. Some women never used the smallest size, because according to them it did not serve a purpose. Whereas others never used the biggest size, because it was too painful and the doctor told them that using this size was not necessary to prevent adhesions.

Table 2
Interview topics and example quotes of vaginal dilator use determinants.

Topic		Example quote
The intention		
Risk perception	1	Partnered, 32 – If you don't insert anything in your vagina when it is one big wound [after treatment], it will just completely occlude.
Outcome expectancies	2	Partnered, 50 – I feel that I have to do it [referring to dilator use], so it's not enjoyable, but it is important I think. Otherwise my vagina gets too small I think.
The initiation and maintenance		
Planning	3	Partnered, 53 – Well, I just take a shower and perform dilator use every Tuesday and Friday. Just regular days and then I take the dilator and just insert it.
Action control	4	Single, 62 - Well, I perform… Yes, it's weird, but I perform dilator use while listening to music from Wagner. Because it is a music piece that lasts exactly 10 minutes.
Negative emotions		
Anxious for pain or blood loss	5	Partnered, 41 – And because of the radiotherapy I had some burning feeling, some kind of burns, also vaginal. So yes, it [referring to dilator use] was all very sensitive and very painful. It was mostly the fear of pain.
Association with cancer diagnosis or PRT	6	Partnered, 48 – The idea repulsed me a little. Well maybe because, just after that operation and brachytherapy and such, the medical world frequently inserted all kinds of objects [referring to vaginally], and that made you feel like: not now.
Bothersome chore	7	Partnered, 44 – I think it's odd to have something in and out of your vagina every day. I don't know. I can't explain really. It's like an extra chore. A bothersome job.
Resources		
Instrumental support	8	Partnered, 41 – Those things [referring to dilators] aren't enjoyable sex toys. [..] Then I think: then you also have to pay for them as well. [..] I also let them know that I found that very disturbing.
Informational support	9	Partnered, 36, actor – But it was also kind of scary [referring to blood loss during dilator use], then I heard from my doctor that.. "Look, I understand that you have a negative association with blood loos, but it is understandable that you have it". That did reassure me.
Social support	10	Partnered, 32 – It was just something I did [referring to dilator use] [..] And my partner helped me a lot and the doctor says: "Use it as often as you can and if it hurts a little..". He was really coaching me like: try to keep it up.
Perceived self-efficacy		
	11	Partnered, 49 – Because it is some kind of obligation, it's not.. That you have to continue as a routine. I just couldn't do it.. I couldn't get it done in the beginning; I just didn't know how to handle it.

Discussion

This study distinguished determinants of the intention, initiation and maintenance of dilator use. Almost all women intended and attempted to perform long-term regular vaginal dilator use. The intention to perform dilator use was determined by the motivation to prevent the development of vaginal adhesions and stenosis, with the expectation that it would keep the vagina accessible. The intention was influenced by the quality and quantity of instructions, the degree to which dilator use was evaluated during follow-up appointments and experienced benefits. Women reported planning dilator use and made it part of a routine, used lubricants, vibrators or performed dilator use under the shower. Others had difficulties planning dilator use and reported a lack of time or privacy, forgetting, and feeling tired when performing dilator use. Women regulated dilator use by rotating the dilator and timing dilator use. Influencing factors were negative emotions about dilator use, pain or blood loss during dilator use and the association with brachytherapy. Some women mentioned a lack of instrumental resources. Others were helped by informational or social support.

The reported determinants of dilator use confirm the limiting and facilitating factors that were previously described.[69,77] The representativeness of the study population might be limited, because women with insufficient knowledge of the Dutch language were excluded from participation. Also, women that feared to talk about the subject or had great resistance towards dilator use might have declined participation more often. Therefore, it is possible that this study's population was more motivated to use dilators compared to an average patient. However, almost all participants were diagnosed with cervical cancer and two thirds had a sexual relationship. Therefore, the selected participants did represent the target group that receives EBRT/BT and the recommendation to perform long-term regular dilator use.

A few partnered women indicated that dilator use had beneficial effects regarding sexual intercourse. It makes sense that having a satisfactory sexual intercourse might be an important incentive for long-term regular dilator use. In this study, compliant participants did not mention to be more sexually active or satisfied, nor did they seem to differ in relationship status. It is however interesting to investigate whether sexual behaviour could influence dilator use in a prospective (quantitative) study.

Women mentioned the dilator design to be relevant for their dilator use behaviour. In the Netherlands, white or transparent plastic dilator sets are advised. However, in other countries different dilator sets might be used. It is not known whether women would have adhered to long-term regular dilator use when their health care providers discussed or demonstrated different dilator sets. It is important to provide women with alternative types of dilators, such as vibrators, when possible and to let the patient decide on which type of dilator to use (see Table 3, page 89, for more recommendations).[101]

In order to effectively support women with dilator use, interventions should match whether women need help with the intention formation, initiation or maintenance of dilator use. According to Schwarzer et al. (2011), women with no intention can be expected to benefit from the confrontation or learning experience that regular dilator use has positive outcomes.[159] This was confirmed by the reported influence of the quantity and quality of received instructions, dilator use evaluation and experienced benefits on participants' intention to start or continue dilator use. Previous studies also described that information provision can help women adhere (see Table 3, page 89).[73,74,76,101,161,162]

Some participants reported that they were not readily able to use dilators due to anxieties or other barriers. However, participants' perceived self-efficacy to maintain dilator use, or to resume after discontinuing dilator use, was hardly spontaneously discussed. The HAPA constructs were not part of the interview guideline and it remains unclear whether participants saw themselves as capable of long-term regular dilator use. Since almost all participants at least attempted dilator use but only part of them continued, the main challenge appears to be to increase long-term regular adherence among women. According to participants in the current study, women could benefit from planning and preparing for situations in which they tend to stop using dilators is imminent. Therefore, also in concordance with the HAPA, interventions should help this group of women change their routine, negative emotions about dilator use or enlarge their perceived self-efficacy.[159] Such a supportive intervention could comprise a short Cognitive Behavioural Therapy (CBT) intervention and apply Motivational Interviewing, to help women deal with behavioural skills and motivational issues.[73,74,163] Specialized nurses could provide this after EBRT/BT.[161] Furthermore, participants mentioned that social support was helpful. This confirms previous results that including partners or a peer group in such an intervention is beneficial as well (see Table 3, page 89).[74,164]

In the current study, useful motivation and volition processes that determined initiation and maintenance of dilator use were identified. These and the principles discussed above were used in the development of a sexual rehabilitation intervention for gynaecological cancer patients, which is currently pilot tested.

Table 3
Recommendations for health care providers regarding the intention formation, initiation or maintenance of patients' vaginal dilator use.

The intention to start dilator use
Provide explanation and/or learning experience regarding risk of vaginal adhesions and positive outcomes dilator use: • Provide clear rationale that dilator use: • Prevents the formation of vaginal adhesions • Keeps the vagina accessible for penetration (in the future; for women without partner) • Also makes future vaginal examination during follow-up appointments more convenient • Can be useful to help reduce fear for bodily changes and sexual activity. • Provide clear instructions (regarding the frequency; duration (minutes); period of dilator use (months); how to insert) and psycho-education regarding dilator use through oral information, a specific information brochure and/or websites. • Discuss and consider demonstrating various types of dilators (e.g. commercially available plastic dilator sets, softer dilators, vibrators) and let the patient ultimately decide. • Provide a dilator set or specific recommendations after discussing options. • Encourage that inserting a dilator vaginally is physically possible after treatment.
The initiation & maintenance of dilator use
Help to plan and control dilator use: • Encourage gradually increasing the dilator size that is used, once a smaller size is used without difficulty. • Encourage building dilator use into a routine (on convenient time and fixed days during the week). • Help to time dilator use, e.g. by setting a clock. • Advise to guarantee privacy during dilator use. • Advise to find comfortable position in bed or under the shower. • Advise to place dilator against vaginal opening first in order to reduce anxiety.
Provide support: • Monitor and evaluate dilator use during every follow-up appointment. • Emphasize experienced benefits while evaluating dilator use. • Involve women's partners during consultations depending on the patient's needs. • Actively involving the partner during dilator use itself should depend on the patient's needs. • Extra consultations with a specialized oncology nurse, psychologist or sexologist should be made possible.
Help to prepare for situations in which women tend to stop dilator use: • Recommend using lubricants to prevent painful experiences; discuss various types of lubricants and their specific properties. • Give simple advice, such as how to relax the pelvic floor muscles. • Provide reassurance that dilator use might feel uncomfortable or painful, or may cause minor blood loss or vaginal discharge.
Help to deal with negative emotions, behavioral skills and motivational issues: • Challenge women's resistance, repulsion, embarrassment and other negative emotions regarding dilator use by using Cognitive Behavioral Therapeutic (CBT) techniques. • Explore and resolve patients' ambivalence and lack of self-efficacy regarding dilator use (i.e. Motivational Interviewing (MI) counseling approach may be helpful). • Fear of dilator use may be reduced during a health care provider-guided dilator use practicing session at the hospital. • Refer women to a sexologist in case simple sexological advice does not suffice.

Part III

Developing a sexual rehabilitation intervention for patients treated with radiotherapy

A nurse-led sexual rehabilitation programme after radiotherapy for gynaecological cancer

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CHAPTER 7

Abstract

Objectives

Although vaginal dilator use after combined pelvic radiation therapy and brachytherapy (RT/BT) is recommended to prevent vaginal shortening and stenosis, women fail to use them and experience sexual problems. A nurse-led sexual rehabilitation intervention targeting sexual recovery and vaginal dilatation was developed. Its feasibility was investigated during a prospective, longitudinal, observational pilot study

Methods

Four oncology nurses were specifically trained to conduct the intervention. Gynaecologic cancer patients treated with RT/BT were assessed using: i) questionnaires on frequency of dilator use (monthly), sexual functioning and sexual distress (at baseline, and 1, 6 and 12 months), and psychological, and relational distress (at 1, 6 and 12 months); ii) semi-structured interviews (between 6 and 12 months); and iii) consultation recordings (a random selection of 21% of all consults).

Results

Twenty participants were 26-71 years old (mean = 40). Eight participants discontinued participation after 3 to 9 months. At 6 months after RT, 14 out of 16 (88%), and at 12 months 9 out of 12 (75%) participants dilated regularly, either by having sexual intercourse or by using dilators. Sexual functioning improved between 1 and 6 months after RT, with further improvement at 12 months. Most participants reported that the intervention was helpful and the nurses reported having sufficient expertise and counselling skills.

Conclusions

According to the pilot results, the intervention was feasible and promising for sexual rehabilitation and regular dilator use after RT. Its (cost-)effectiveness will be investigated in a randomized controlled trial.

Introduction

About 35% of gynaecologic cancer survivors (GCS) are treated with primary or post-surgical pelvic radiotherapy (RT).[1] Patients with more advanced cervical and vaginal cancers (CC) are treated with primary chemoradiotherapy, consisting of pelvic external beam radiation and intrauterine brachytherapy (EBRT/BT), with concurrent cisplatin-based chemotherapy, most often 5-6 weekly infusions of cisplatin 40 mg/m^2.[5,6] Brachytherapy is started in the final week(s) of EBRT to ensure an overall treatment duration of less than 50 days. Image-guided adaptive BT based on volumetric imaging (CT/MRI) has improved efficacy and decreased late morbidity after treatment.[9] Nevertheless, treatment with RT has been associated with sexual dysfunction among both GCS and their partners.[13,17,25,28,105] The negative effect of EBRT/BT on sexual functioning is caused by shortening and tightening of the vagina, reduced flexibility and decreased lubrication, induced by fibrosis and stenosis and mucosal atrophy.[30,49,165]

Regular vaginal dilator use after EBRT/BT has been associated with reduced vaginal shortening and/or tightening, although more empirical evidence is needed regarding the effect in reducing sexual problems.[39,62–65] Regular dilator use has become an essential component of the sexual rehabilitation of GCS worldwide.[65,67,101] In spite of this, most patients (75%) reported being unable to follow dilator use instructions, for example due to being anxious about pain or blood loss, negative emotions regarding dilator use or EBRT/BT, or a lack of support or routine.[64,75,76,90] Support during rehabilitation is therefore needed to help GCS experience fewer problems during dilator use and when resuming sexual activity.

An Australian study found that a specific information booklet somewhat increased dilator use 3 and 6 months after treatment compared to 'care as usual' (CAU).[166–168] Two small Canadian trials compared the effect of two additional psychologist-led group sessions at 1 and 2 months after treatment to CAU.[73,74] The intervention group used the dilators more frequently (65%) than the CAU group (38%) at 6 weeks, but no significant difference was found after 6 months (31% versus 19%).[73,74] The abovementioned interventions, however, found no difference with regard to sexual functioning. The efficacy of sexual rehabilitation interventions may increase by addressing other psychosocial and somatic aspects of sexual functioning possibly affected by cancer treatment; addressing both partners' knowledge, fears, and promoting couples' mutual coping to improve sexual health, and including specific sexual therapy techniques.[164,165] Furthermore, it is worthwhile providing follow-up sessions during one year after RT to ensure continued support during the recommended 12-month period of dilator use, and to investigate whether oncology nurses, who are closely involved with patients during follow-up, would be able to conduct such an intervention after a special training in sexology.

There are no published effective interventions to support GCS with sexual recovery and long-term regular dilator use. Therefore, this prospective, longitudinal, observational pilot study tested a sexual rehabilitation intervention combined with a specific

patient information booklet for its clinical feasibility. The intervention was directed at increasing knowledge and offering coping strategies to both patients and their partners with respect to sexual issues after treatment and benefits of dilator use, and increasing long-term compliance with dilator use.

Materials & methods

Participant selection

In line with experts' recommendations with regard to which patients should be offered support after treatment, eligible patients were 18 to 70 years old, and had to be treated with primary or postsurgical EBRT/BT for gynaecologic cancer.[101] In practice, primary EBRT/BT is mainly given to patients with cervical cancer (primary treatment for FIGO stages IB2-IIIB) or vaginal cancer (stages I-III), and postsurgical EBRT/BT mainly for cervical cancer (FIGO stage IB1) or endometrial cancer (stage II or III). Women older than 70, were only invited to participate if they were sexually active and wished to resume sexual activity after treatment. Patients with insufficient knowledge of the Dutch language or major psychological problems were excluded, and offered counselling by a senior clinical psychologist specialized in sexual rehabilitation. The Leiden University Medical Centre Medical Ethics Committee approved the protocol (NL44759.058.13). All participating women provided written informed consent.

The intervention

A patient information booklet entitled 'Sexuality after pelvic radiation for gynaecologic cancer: Information for women and their partners' was developed. The booklet was developed in collaboration with a multidisciplinary team of sexologists, radiation oncologists, gynaecologic oncologists, and oncology nurses. The booklet was subsequently pilot tested by GCS, healthy lower-educated women, and patient advocates from the Dutch gynaecologic cancer patient support group 'Stichting Olijf'. The initial draft of the booklet was partly based on an Australian brochure with permission.[166]

A team of clinical psychologist-sexologists developed the intervention based on previous study and intervention results.[90,101,169,170] Two senior psychologist-sexologists developed and provided the nurses' training program, and monthly 2-hour group supervision. The intervention comprised four face-to-face counselling sessions at 1, 2, 3 and 6 months after completion of EBRT/BT. An evaluation and closing session was scheduled at 12 months after EBRT/BT. The sessions were planned in line with their radiation oncologist follow-up visits, except for the session at 2 months. Although not obligatory, the partners of participants in a relationship were invited to join the sessions. The sessions were adapted to the relationship status of participants and the possible partners' presence. During the first session participants were informed about the intervention, their diagnosis, therapy and possible treatment consequences, and the importance of long-term regular dilator use.

Furthermore, participants were recommended to start vaginal dilator use and provided with instructions.[101] A vaginal dilator set, lubricants and information booklet were provided for free by the participating hospitals.

During the second session possible barriers to new behaviours such as dilator use, lubricant use, fear of penetration during dilator use or while resuming sexual activity, were discussed. Nurses provided tailored advice depending on the participants' situation and reported issues. During the third and fourth session participants' experiences with sexual rehabilitation and dilator use were discussed, and again tailored advice was given. Couples' mutual coping and support processes were promoted, and specific interventions to address sexual, body image and relationship concerns were included. A follow-up session at 12 months was scheduled to evaluate the course of the sexual rehabilitation in the past year and provide future advice. Furthermore, an extra session could be scheduled between 6 and 12 months after treatment.

The nurses' training

Four oncology specialist nurses conducted the intervention after receiving 50 hours of skills training. Two senior clinical psychologist-sexologists, with expertise in the conceptualization, methods, and skills, developed and provided the nurses' training program. The training was provided during 6 days, spread over a period of 3 months, and covered the basic principles of sexology, motivational interviewing,[171-173] cognitive behavioural interventions[170,174,175] and the treatment protocol itself. The training was delivered using a combination of lecture-style presentation (30%), role-play and group discussions (35%) and small group practice sessions (35%). Also, guest speakers (a radiation oncologist and gynaecologic oncologist) provided education on surgical and radiation treatment, with emphasis on the treatment-related toxicities and management thereof. The nurses received copies of the treatment manual, patient information booklet, and a handbook with the presentations' handouts. During the study period (around 2 years) the nurses received monthly 2-hour group supervision from one of the two clinical psychologist-sexologists.

Measures

Information was collected from medical records with regard to age, type of cancer, *International Federation of Obstetrics and Gynaecology* (FIGO) stage and hormone replacement therapy (HRT).

Secondary outcome measures

Frequency of vaginal dilatation was assessed monthly using four questions about dilator use frequency, duration, sexual intercourse frequency and alternative dilator use. Sexually related personal distress was measured with the *Female Sexual Distress Scale* (FSDS). The FSDS was completed also retrospectively at inclusion, and at 1-, 6-, and 12- months after RT. A higher total score (ranging from 0 to 48) indicates more sexually related personal distress.[141] The subscales *Anxiety* and *Depression* of the *Hospital Anxiety and Depression Scale* (HADS) were used to measure anxiety and depression.[93] The subscale *Marital (Mal)adjustment* of the *Maudsley Marital Questionnaire* (MMQ) was used to measure relationship

dissatisfaction.[177] Higher scores indicate more symptom burden on the three questionnaires. The HADS and MMQ were completed at 1-, 6-, and 12- months after RT.

Patients' and nurses' exit interviews

Structured exit interviews were conducted among participants after their last nurse-led consultation at 6 months, and before the evaluation session with their nurse at 12 months. They were asked about their experiences with vaginal dilator use, sexual activity, the supportiveness and acceptability of all components of the sexual rehabilitation intervention (including the information booklet), and reasons for discontinuing their participation. The interviews additionally served as a concluding consultation with the researchers about the burden and logistics of the assessments, and appointments. Two researchers (RB & MK) who were not involved in the intervention conducted the interviews. Subsequently, they were verbally transcribed, and the researchers summarized participants' most important evaluations through negotiated consensus.

Exit interviews were also conducted with the nurses regarding the feasibility of the intervention. Furthermore, all nurses' consultations were digitally recorded. Two independent research assistants assessed the nurses' adherence with the treatment protocol and general competency in a sample of 18 out of 85 consults (21%).

Statistical methods

Descriptive statistics were used to evaluate participant characteristics and to assess the nurses' consultations. Non-parametric tests were conducted to analyse the outcome measurements among this small, not normally distributed, pilot sample. Therefore, two-sided, Friedman's ANOVA's and post-hoc Wilcoxon signed ranks tests for paired samples were used to investigate differences between baseline, and the subsequent questionnaires during the study period. Effect sizes for post-hoc comparisons were reported as r and classified as small (r = 0.1-.03), intermediate (r = 0.3-0.5), or strong ($r \geq 0.5$).[142] Due to the hypothesis-generating nature of the pilot study, no corrections for multiple testing were applied. A significance level of 5% was used in all analyses. Analyses were conducted using IBM SPSS version 20 (Armonk, NY, USA).

Results

Participant characteristics

Of the 74 patients that received EBRT/BT at one of the hospitals during the study period, 34 patients (46%) were eligible for the study, of whom 31 (91%) were invited and 20 (62%) agreed to participate (see Figure 1, page 98). Participants were between 26 and 71 years of age (mean (M) = 40 ± 11 years) and either treated for cervical (n = 18, 90%), vaginal cancer (n = 1, 5%), or endometrial cancer (n = 1, 5%). Fourteen participants were in a partner relationship at the time of inclusion for an average of

15 years (± 13). In total, 16 participants used vaginal estriol 3 times weekly during 6 weeks (2 to 8 weeks after RT) and 14 participants used hormonal replacement therapy (HRT) (see Table 1, page 99).

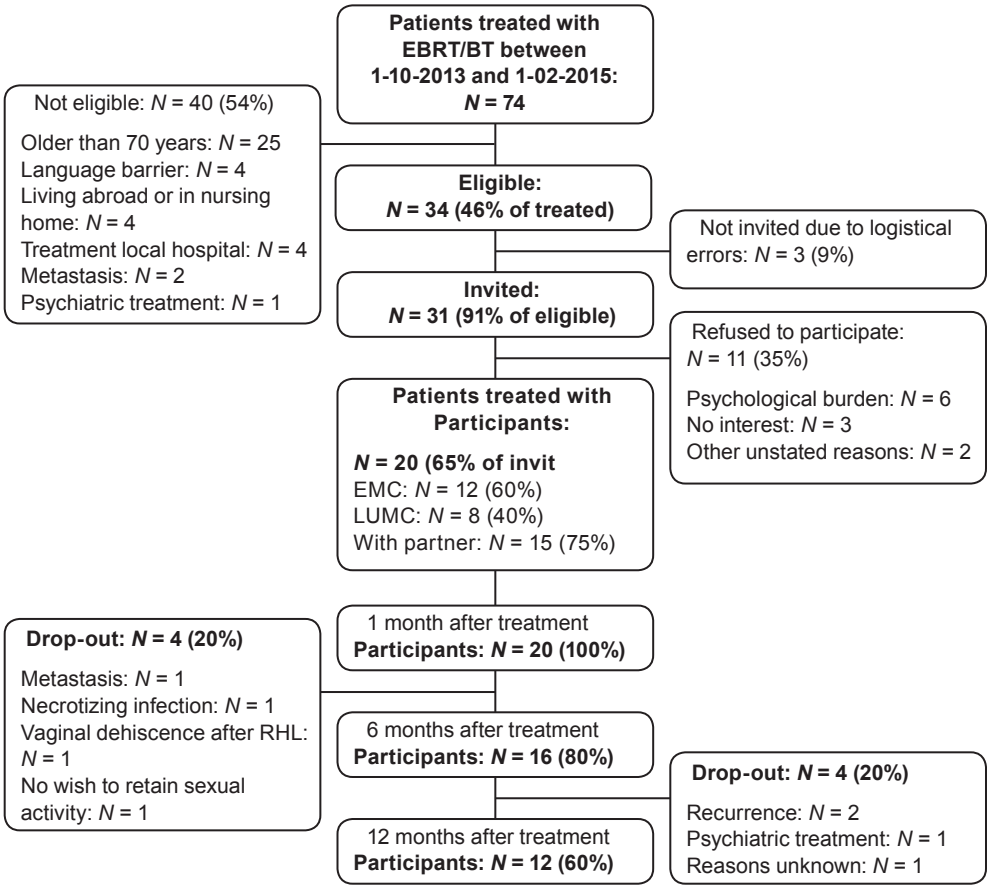


Figure 1. Flow chart of the participant selection.
EMC: ErasmusMC-Cancer Institute; LUMC: Leiden University Medical Centre.

Table 1 Description of the seven item categories used in the questionnaire.

Participant	Cancer type and FIGO stage[1]	Primary treatment[2]	Secondary treatment[2]	HRT[3]	Age (years)	Relationship duration (years)
P1	CC IIB	EBRT/BT	-	Yes	42	21
P2	CC	IIB EBRT/BT	-	Yes	32	1
P3	EC IB	RHL	EBRT/BT	No: declined	40	-
P4	CC IIB	EBRT/BT	AH	Yes	32	0
P5	CC IB1	EBRT/BT	-	Yes	43	-
P6	CC IB2	EBRT/BT	-	Yes	31	-
P7	CC IIB	RHL	EBRT/BT	Yes	35	14
P8	CC IIB	EBRT/BT	-	Yes	32	-
P9	CC IIB	EBRT/BT	-	No: postmenopausal	57	37
P10	CC IIA	EBRT/BT	-	Yes	26	7
P11	CC IIB	EBRT/BT	AH	No: postmenopausal	51	20
P12	CC IB1	EBRT/BT	-	No: postmenopausal	71	45
P13	CC IB2	EBRT/BT	-	Yes	43	-
P14	VC IIB	EBRT/BT	-	Yes	41	-
P15	CC IB2	EBRT/BT	-	Yes	39	7
P16	CC IIB	EBRT/BT	-	Yes	31	4
P17	CC IB1	EBRT/BT	LND/OD	No: adequate function of displaced ovary	26	3
P18	CC IB1	EBRT/BT	LND/OD	Yes	28	11
P19	CC IIB	EBRT/BT	-	No: declined	46	14
P20	CC IIB	EBRT/BT	AH	No: postmenopausal	50	23

[1]FIGO = *International Federation of Gynecology and Obstetrics*; CC = cervical cancer; EC = endometrial cancer; VC = vaginal cancer. [2]RHL = radical hysterectomy with pelvic lymphadenectomy; LND = lymph node dissection; OD = ovarian displacement; AH = abdominal hysterectomy. [3]HRT= hormone replacement therapy.

Four participants stopped participation before the 6-month assessment and another four in the subsequent 6 months (see Figure 1, page 98, and Table 2). Participants had on average 4.5 sessions with their oncology nurse, lasting between 8 and 73 minutes per session (M = 29 ± 6 minutes).

Table 2
Intervention related participant characteristics.

Intervention-related			Drop-out related	
Participant	**No. of sessions (by telephone)**	**Total duration (minutes)**	**No. of months after RT**	**Reason**
P1	5	112	-	-
P2	3	150	5	Necrotizing infection
P3	2	42	4	No interest sexual activity
P4	6	304	-	-
P5	5 (1)	107	-	-
P6	5	103	-	-
P7	6	218	-	-
P8	5	167	-	-
P9	5	61	-	-
P10	6 (2)	135	-	-
P11	4	69	5	Vaginal dehiscence after surgery for residual disease
P12	4	109	-	-
P13	6	118	-	-
P14	6	160	-	-
P15	4	71	9	Recurrence
P16	3	42	6	Unknown
P17	4	224	8	Psychiatric treatment
P18	5	239	-	-
P19	4	195	8	Recurrence
P20	2	101	3	Metastasis (palliative care)

Primary outcome measures

Participants' sexual functioning significantly changed over time ($\chi^2(3) = 18.00$, $p < .001$). Compared to their situation before diagnosis, participants reported lower levels of sexual functioning at 1 month ($p < .001$, $r = -.60$), as well as at 6 months after RT ($p < .001$, $r = -.59$). However, after treatment with RT, participants' sexual functioning significantly increased over time. Compared to 1 month after RT, participants' reported higher levels of sexual functioning at 6 months ($p = .011$, $r = -.42$) and at

12 months after RT (p = .012, r = -.44), and continued to improve between 6 and 12 months after RT (p = .015, r = -.46). Their sexual functioning at 12 months was comparable to prior to diagnosis (p = .346, r = -.17). See Figure 2 and Supplemental Information 1 (page 106).

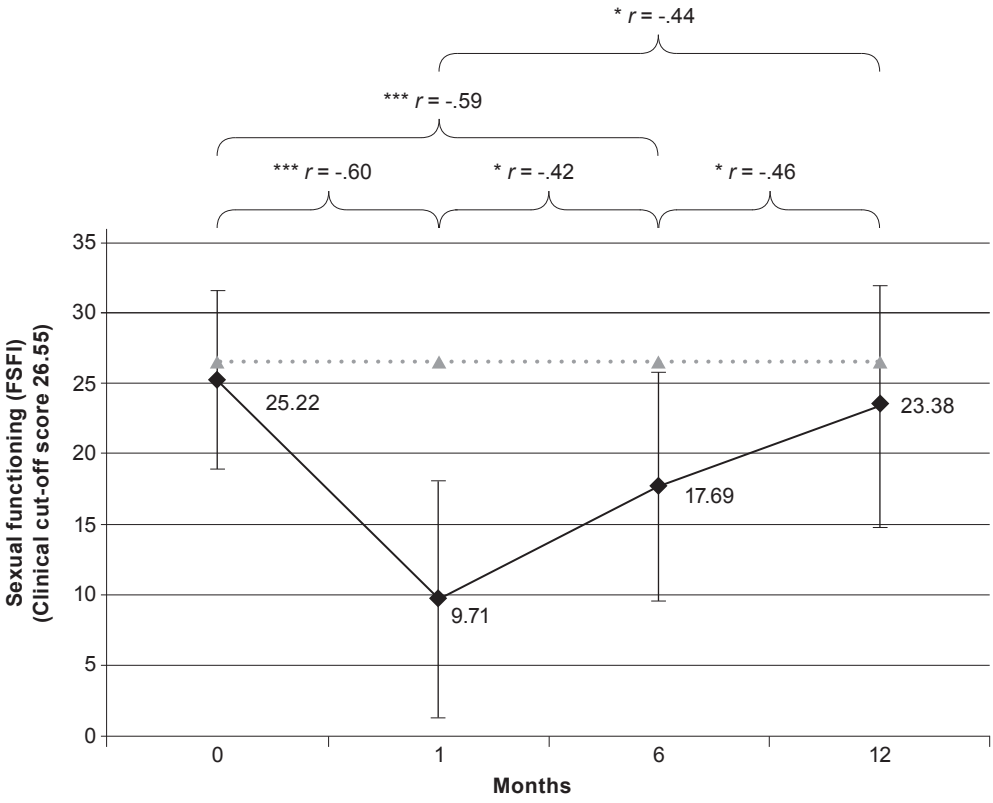


Figure 2. Sexual functioning assessed retrospectively about pre-diagnosis and during the intervention at 1, 6, and 12 months after treatment.
*** Significant difference with p < .001. * Significant difference with p < .05.
Effect size r: small = 0.1-.03, intermediate = 0.3-0.5, and strong ≥ 0.5 (Cohen, 1988).

Secondary outcome measures

At 6 months, 14 out of 16 participants (88%) reported using dilators at least twice a week. At 12 months, 9 out of 12 remaining participants (75%) dilated at least twice a week and 11 at least once a week (92%) (see Figure 3, page 102). Participants performed dilation either by resuming sexual intercourse or using vaginal dilators, while 13 (65%) reported having used other types of dilators at least once, namely vibrators (n = 6, 30%), Vaseline tampons (n = 4, 20%) or fingers (n = 7, 35%). At 6 months, partnered participants (n = 11) gradually replaced (n = 2, 18%) or supplemented (n = 6, 55%) vaginal dilator use by having sexual intercourse. See also Supplemental Information 2 (page 108). Participants' sexual distress was not significantly different over time

($\chi^2(3) = 3.67$, $p = .299$). Post-hoc analyses showed, however, that compared to their pre-diagnosis situation, participants reported higher levels of sexual distress at 1 month ($r = -.41$, $p = .009$) and 6 months after treatment with RT ($r = -.42$, $p = .012$), and a trend for higher levels at 12 months after RT ($r = -.33$, $p = .066$). Also, after treatment with RT, participants' levels of sexual distress did not significantly decrease over time during the intervention. Furthermore, after treatment with RT, participants' levels of depression ($\chi^2(2) = 3.50$, $p = .174$), anxiety ($\chi^2(2) = 0.70$, $p = .704$), and relationship dissatisfaction ($\chi^2(2) = 3.94$, $p = .140$) did not significantly decrease over time during the intervention. However, post-hoc analyses showed that compared to 1 month post-treatment, there were trends for the levels of depression ($r = -.34$, $p = .061$) and relationship dissatisfaction ($r = -.33$, $p = .091$) to be lower at 12 months after RT. See Table 3 (page 103) and Supplemental Information 1 (page 106).

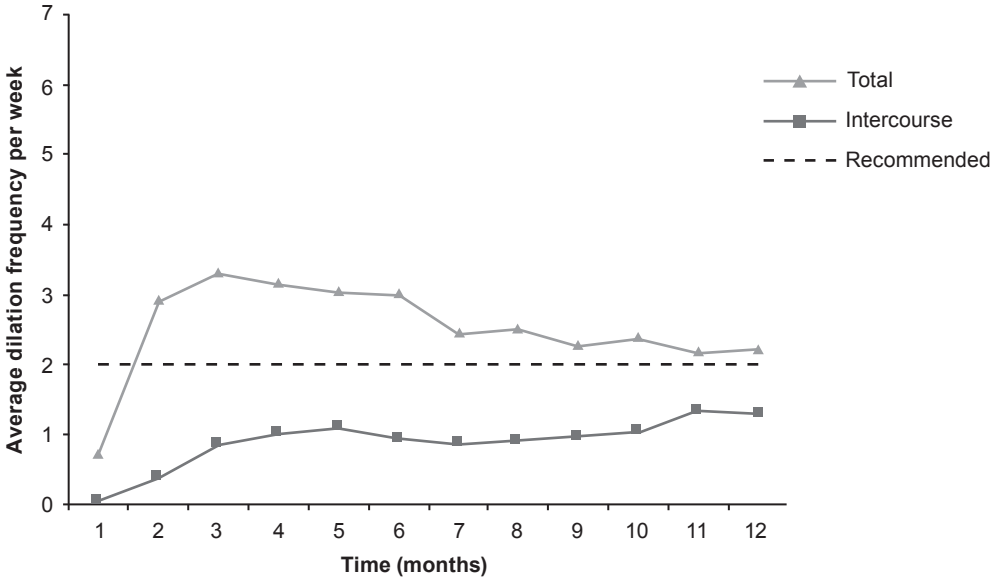


Figure 3. Average dilation frequency per week ($n = 20$).

Table 3
Outcome measurements completed retrospectively about pre-diagnosis and during the intervention at 1, 6, and 12 months after treatment.

	0 months mean (± *SD*)[2]	1 month mean (± *SD*)	6 months mean (± *SD*)	12 months mean (± *SD*)	X^2	*p*-value	Post-hoc analyses
	a	b	c	d			
	n = 20	*n* = 20	*n* = 20	*n* = 20			
Measure[1]							
Sexual functioning	.25.22 (6.31)	9.71 (8.44)	17.69 (8.13)	23.38 (8.58)	18.00*	<.001	b < c< d = a
Sexual distress	10.25 (11.06)	18.25 (13.81)	17.94 (13.84)	18.91 (12.00)	3.67	.299	b < c< d = a
Relationship dissatisfaction	-	20.65 (30.97)	12.00 (8.57)	7.70 (5.87)	3.94~	.140	
Anxiety	-	5.80 (4.20)	5.88 (3.81)	4.91 (3.48)	0.70	.704	
Depression	-	5.30 (3.84)	3.94 (3.45)	2.73 (3.72)	3.50~	.174	

[1]Sexual functioning: *Female Sexual Functioning Index*; Sexual distress: *Female Sexual Distress Scale*; Anxiety and Depression: *Hospital Anxiety and Depression Scale Subscales Anxiety and Depression*; Relationship dissatisfaction: *Maudsley Marital Questionnaire*.
[2]*SD* = Standard deviation.
*Significant difference with $p < .05$.
~Post-hoc analyses showed a trend for b = c > d with $p < .10$.

Patients' and nurses' concluding remarks

The exit interviews were conducted with 16 participants and lasted 38 minutes on average. They reported that the intervention had been helpful for dilator use and resuming sexual activity (*n* = 15, 94%). About two thirds mentioned having been bothered by fear of pain or bleeding at first dilator use or sexual activity. However, they also reported that their nurses' support provided reassurance, and motivated them to start, which they might not otherwise have done. Furthermore, most women (*n* = 12, 75%) read the information booklet once or twice, and studied the sexual position images more often. Furthermore, according to the participants, having one specific nurse available for extra consultation was important in order to talk comfortably about their personal situation and sexual functioning. Some reported that their partners' presence was not needed, but others considered it important to create mutual understanding. The nurses reported feeling sufficiently skilled to conduct the intervention and to support participants. From the consultation recordings, it was apparent that all nurses adhered to the treatment protocol, with flexibility with regard to the specific patient situation. Each nurse demonstrated sufficient competence to conduct the specific interventions.

Discussion

A nurse-led sexual rehabilitation intervention to help gynaecologic cancer survivors (GCS), treated with external beam radiotherapy and brachytherapy (EBRT/BT), to initiate vaginal dilator use and address sexual issues, anxieties and coping problems in the recovery phase was developed and its feasibility was pilot tested. During the intervention, participants' sexual functioning improved and most participants dilated regularly either by gradually resuming sexual intercourse, or by using vaginal dilators or other types of dilation (e.g., vibrator or fingers). Sexual distress, however, continued to be elevated during the 12 months of the intervention. However, as this was a non-randomized feasibility study, a randomized efficacy study should investigate whether the improvements were due to the intervention itself. Most participants reported that the intervention was helpful and the nurses reported having sufficient expertise.

For the first time, the long-term sexual functioning of GCS was studied extensively and was shown to improve, and return to participants' reported pre-diagnosis levels, during a 12-month sexual rehabilitation intervention.[74] Therefore, it is possible that more follow-up sessions during the first 6 to 12 months after RT and the invitation to the patients' partners to join the sessions lead to better, and more sustained sexual recovery among GCS than short individual or peer-group interventions.[164]

In contrast to previous studies, a large proportion of this study's participants continued regular long-term dilator use and gradually replaced it with sexual intercourse as well.[74] Jeffries et al. (2006) showed that at 6 months, 4 months after the intervention, only 31% of the participants dilated at least twice a week.[73] This may be in line with the suggestion that more follow-up sessions may motivate GCS with dilator use and our compliance rate of 88% is promising. Furthermore, the trend for participants' decreased levels of depression and relationship dissatisfaction at 12 months appeared to indicate better functioning compared to previous GCS cohorts who received no specific support after treatment.[17,57] However, participants reported continued sexual distress levels that were comparable with the sexual distress levels reported among a cohort of 72 cervical cancer survivors evaluated 64 months (± 33) after EBRT/BT.[57] Our study's participants were evaluated early in the recovery phase and, therefore, it should be noted that sexual distress among GCS may further recover between 12 and 24 months.[13] How much improvement can be achieved after a sexual rehabilitation intervention compared with care as usual in the long term is unknown.

Although the results obtained in this intervention study are promising, several comments can be made for future reference. Given the uncontrolled nature of this pilot study it can be argued that the improvement in sexual functioning to pre-diagnosis levels was due merely to the passage of time and that the extra contact with professionals may also improve sexual problems of GCS.[13] In addition, despite the clinical evidence that vaginal dilatation is associated with reduced vaginal complaints and better sexual rehabilitation, firm evidence for its effectiveness is still lacking. Furthermore, a possible selection bias may have occurred since 55% (6 out of 11) of the

patients who declined felt that participation would be a psychological burden. Therefore, the current participants may have experienced less distress or better coping mechanisms. Lastly, this study's dropout rate of 40% was higher than the 20% that was expected based on previous interventions studies.[73,74] However, dropout was only due to disease-related issues. Also, the recruitment of 10 to 15 participants is considered adequate for the purpose of a pilot study.[178]

Based on our pilot findings, this study's intervention has proven to be feasible and promising, and may improve support for GCS during sexual recovery, and vaginal dilatation after EBRT/BT. We are now one step closer to improving sexual health-related care for EBRT/BT survivors. To follow-up on participants' improvement during the current nurse-led sexual rehabilitation intervention, long-term efficacy should be investigated in a larger controlled study. Therefore, to evaluate its (cost-)effectiveness, a multicentre, randomized trial with a control group receiving standard care will be initiated.

Supplemental Information 1.
Outcome measurements completed retrospectively about pre-diagnosis and during the intervention without patients that stopped participation.

Table A
Outcome measurements completed retrospectively about pre-diagnosis and during the intervention at 1, and 6 months after treatment (*n* = 16).

	0 months mean (± *SD*)[2]	1 month mean (± *SD*)	6 months mean (± *SD*)	X^2 for 1-6 months	*p*-value	Post-hoc analyses
	a	b	c			
Measure[1]						
Sexual functioning	.25.22 (6.31)	8.10 (7.03)	17.69 (8.13)	2.25	.134	a < b < c
Sexual distress	10.25 (11.06)	17.94 (13.06)	17.94 (13.84)	0.00	1.000	a = b = c
Relationship dissatisfaction	-	24.69 (34.00)	12.00 (8.57)	0.08	.782	
Anxiety	-	5.31 (3.95)	5.88 (3.81)	2.27	.132	
Depression	-	5.06 (3.87)	3.94 (3.45)	0.08	.782	

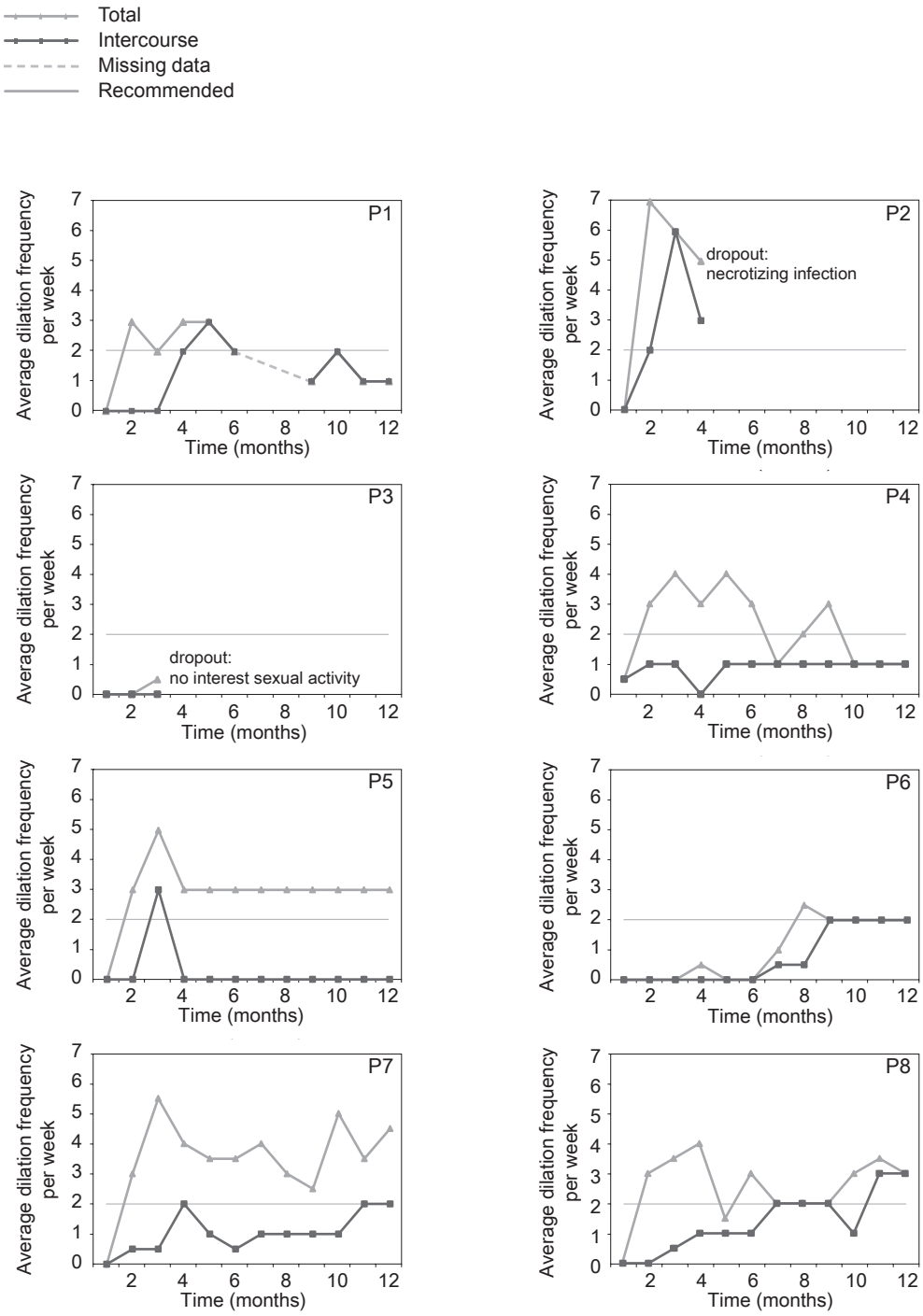
[1]Sexual functioning: *Female Sexual Functioning Index;* Sexual distress: *Female Sexual Distress Scale*; Anxiety and Depression: *Hospital Anxiety and Depression Scale* Subscales *Anxiety* and *Depression*; Relationship dissatisfaction: *Maudsley Marital Questionnaire*.
[2]*SD* = standard deviation.
*Significant difference with $p < .05$.
~Post-hoc analyses showed a trend for b = c < d with $p < .10$.

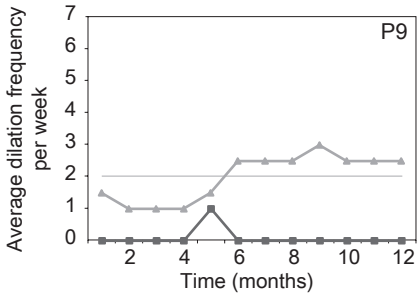
Table B
Outcome measurements completed retrospectively about pre-diagnosis and during the intervention at 1, 6, and 12 months after treatment (*n* = 12).

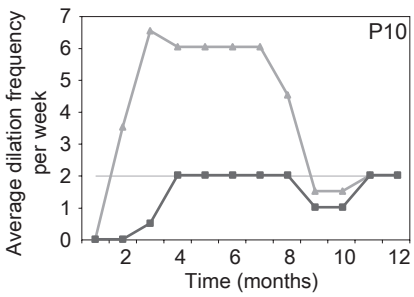
	0 months mean (± *SD*)[2]	1 month mean (± *SD*)	6 months mean (± *SD*)	12 months mean (± *SD*)	X^2 for 1-12 months	*p*-value	Post-hoc analyses
	a	b	c	c			
Measure[1]							
Sexual functioning	24.18 (6.70)	7.78 (7.69)	18.04 (7.85)	23.38 (8.58)	18.00*	<.001	b < c < d = a
Sexual distress	11.08 (12.41)	16.50 (12.51)	17.42 (14.90)	18.91 (12.00)	3.67	.299	b = c = d > a
Relationship dissatisfaction	-	32.00 (39.20)	10.09 (8.38)	7.70 (5.87)	3.94~	.140	
Anxiety	-	5.58 (4.30)	5.83 (3.71)	4.91 (3.48)	0.70	.704	
Depression	-	4.25 (3.68)	3.08 (2.94)	2.73 (3.72)	3.50~	.174	

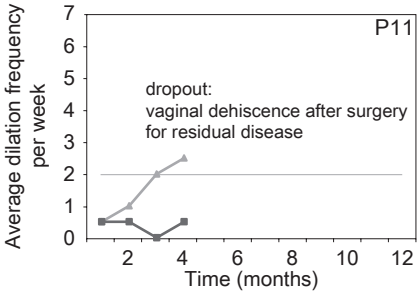
[1]Sexual functioning: *Female Sexual Functioning Index;* Sexual distress: *Female Sexual Distress Scale*; Anxiety and Depression: *Hospital Anxiety and Depression Scale* Subscales *Anxiety* and *Depression*; Relationship dissatisfaction: *Maudsley Marital Questionnaire*.
[2]*SD* = standard deviation.
*Significant difference with $p < .05$.
~Post-hoc analyses showed a trend for b = c < d with $p < .10$.

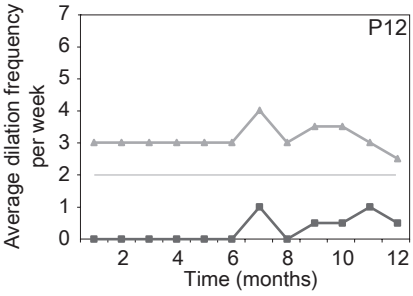
Supplemental Information 2.
Total dilation and sexual intercourse frequencies per participant during 12-months follow-up.

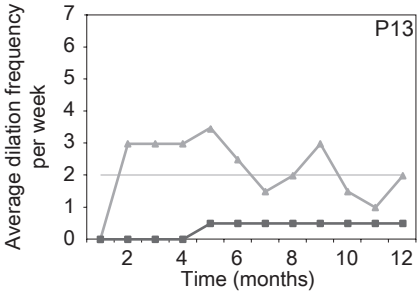


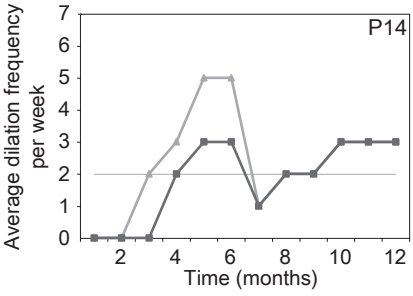

P9
Average dilation frequency per week
Time (months)

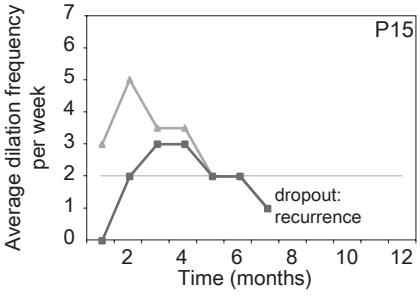

P10
Average dilation frequency per week
Time (months)

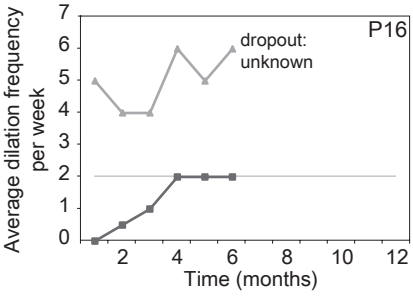

P11
dropout:
vaginal dehiscence after surgery
for residual disease
Average dilation frequency per week
Time (months)

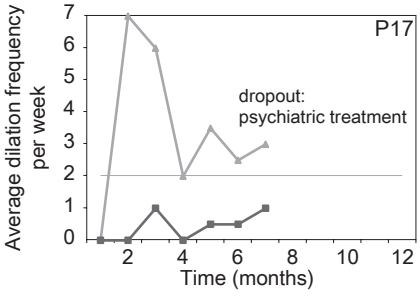

P12
Average dilation frequency per week
Time (months)

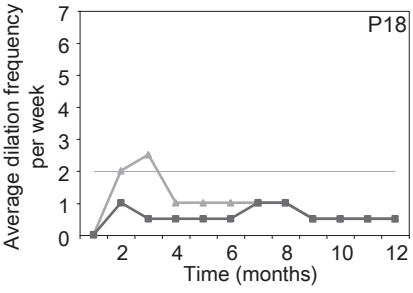

P13
Average dilation frequency per week
Time (months)

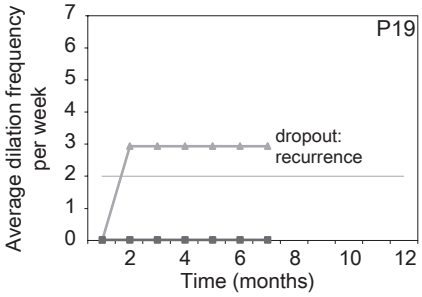

P14
Average dilation frequency per week
Time (months)

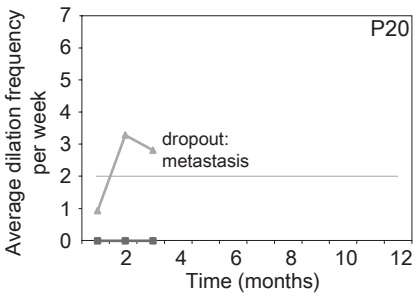

P15
dropout:
recurrence
Average dilation frequency per week
Time (months)

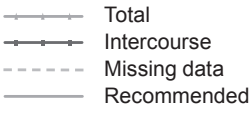

P16
dropout:
unknown
Average dilation frequency per week
Time (months)


P17
dropout:
psychiatric treatment
Average dilation frequency per week
Time (months)


P18
Average dilation frequency per week
Time (months)


P19
Average dilation frequency per week
0
1
2
3
4
5
6
7
2
4
6
8
10
12
Time (months)
dropout: recurrence


P20
Average dilation frequency per week
0
1
2
3
4
5
6
7
2
4
6
8
10
12
Time (months)
dropout: metastasis


Total
Intercourse
Missing data
Recommended

General discussion

CHAPTER 8

Improved cancer screening, early detection and treatment have led to higher survival rates and a growing number of women living with a history of gynaecological cancers over recent decades.[11] Cancer and its treatment may have a strong negative impact on women's sexual functioning. Half of the gynaecological cancer survivors report at least one sexual problem.[18,21,22,31,32] When sexual problems cause survivors to personally experience significant sexual distress this may lead to the diagnosis of a sexual dysfunction.[45] The increasing awareness of sexual difficulties during and after treatment, and attention to sexual problems in survivorship care is therefore a welcome and much-needed trend.

According to the Dutch national guideline for treatment of cervical cancer, each patient and her partner should receive counselling about possible treatment consequences for sexual functioning, and referral for professional support if needed.[4] However, current survivorship care does not meet the informational or professional help needs of these women and their partners.[179-184] While survivors only occasionally initiate a conversation or seek help for their sexual difficulties, in many cases the health care providers fail to raise the topic as well.[55,180,182,185,186] Therefore, appropriate rehabilitation measures for prevention and/or treatment of sexual problems among gynaecological cancer survivors are urgently needed.

This thesis focused on assessing what kind of education and/or support is needed to minimise the impact of gynaecological cancer treatment on sexual functioning, and on developing measures to improve the survivors' sexual recovery and wellbeing. In this chapter our main findings are discussed and put into perspective. Finally, research considerations and implications for clinical cancer care for future reference are provided.

Developing sexual rehabilitation measures in response to current sexual health care needs

It was established that gynaecological cancer survivors desired more extensive, and less medically oriented, information and practical psychosexual counselling and support after treatment (**chapter 3**). We investigated these shortcomings from several different perspectives. First of all, numerable gynaecological cancer survivors experience sexual distress (**chapter 2**). When we examined survivors' and their partners' experience with sexual recovery it was made clear that the impact on sexual distress was not only related to physical changes after treatment (**chapter 2**

and 3). The psychosocial aspects of sexual functioning were also important in determining whether survivors experienced sexual distress. Furthermore, it is likely that physical symptoms can induce or aggravate the psychosocial aspects and that both elements are not only two separate entities but are in fact interrelated. If this is true solving or diminishing physical symptoms might favourably affect the psychosocial aspects of sexual dysfunction. It was suggested that psychosexual support should be aimed at reducing treatment-induced vaginal symptoms and problems, but also at concerns about sexual pain, body image and relationship issues (**chapter 2 and 3**).

In order to improve current psychosexual care with practical and policy recommendations, we investigated how professionals should target physical vaginal symptoms as a consequence of treatment. Performing a nerve-sparing radical hysterectomy for early-stage cervical cancer did preserve survivors' vaginal blood flow during sexual arousal, whereas a radical hysterectomy resulted in a lower vaginal blood flow, compared to healthy controls. However, the reported levels of sexual dysfunction did not differ between women in the nerve-sparing versus non-nerve-sparing radical hysterectomy groups. Therefore, support during rehabilitation should not solely depend on the type of surgery that was conducted and rather be tailored to survivors' experiences with their sexual recovery (**chapter 4**). This seemed to be in line with **chapter 2** and a previous psychophysiological study, indicating that the experience of sexual concerns is not only determined by physical changes, but is affected by other factors as well, such as the survivors' psychological and relationship functioning.[103]

Women who receive combined primary external beam radiation therapy (EBRT) with brachytherapy (BT) for more advanced stages of cervical cancer or vaginal cancer are especially in need of support since they run a higher risk of radiation-induced vaginal symptoms, and are prone to experience higher levels of sexual distress (**chapter 2**). Consequently, these women need timely information and specific support to address sexual health related issues, and promote vaginal dilator use in order to prevent vaginal stenosis and adhesions. It is advised that they use dilators with a frequency of at least twice a week during at least 9 months after radiotherapy (**chapter 5**). The survivors' low compliance with these instructions was suggested to be best targeted by planning, preparing and coping with situations in which they might tend to stop using dilators (**chapter 5 and 6**). Health care providers should counteract negative emotions about dilator use or enlarge their perceived self-efficacy, by dealing with behavioural skills and motivational issues (**chapter 6**).

The professionals in gynaecological cancer treatment who participated in the studies agreed that it is part of their responsibility to provide information and practical advice on how to cope with sexual problems after treatment, and provide specific information and support regarding dilator use issues (**chapter 5**). It is important to stress that gynaecological cancer survivors should be supported with sexual relationship adjustment after treatment and regaining pleasurable sexual contact, which should also include alternative ways besides focusing on coital sex only (**chapter 3 and 6**). Furthermore, it was agreed that patients' radiation oncologists and gynaecological oncologists serve as a useful first resource of information, and specifically

trained nurses should provide the more extensive psychosexual support, after dedicated training. In case of more complex sexual problems and sexual distress, physicians should refer patients to a clinical psychologist-sexologist (**chapter 3 and 5**).

However, it is known that health care providers encounter barriers to provide psychosexual support to survivors such as embarrassment, a lack of time, but also a perceived lack of appropriate skills-training and dedicated patient information.[180] Physicians felt this dedicated support should be integrated in standard gynaecological cancer care. Therefore, supplemental training, time and materials should be made available to professionals working with survivors during sexual rehabilitation (**chapter 3 and 5**).

In the past thirty years only a few randomized controlled studies have investigated psychosexual interventions aimed at supporting gynaecological cancer survivors during sexual rehabilitation.[73,74,82,102,103,187–191] The interventions only showed a moderate effect in supporting survivors and the trials were of limited methodological quality.[79,103,192] Providing psycho-education 'only' turned out to have a relatively small effect in supporting survivors and additional professional support improved this effect significantly.[73,74,189] Therefore, future interventions should focus on more than providing information alone, and target patients' motivational and self-efficacy skills.[74,78] Providing two supportive group sessions shortly after gynaecological cancer treatment did not seem to suffice.[73,74] Indications are that specifically trained nurses can successfully conduct a psychosexual intervention that positively affects sexual functioning among gynaecological cancer survivors shortly after treatment.[82,187]

Adding such extensive psychosexual rehabilitation support, provided by specifically trained nurses, to standard care in the recovery phase seemed appropriate and promising in the context of our findings (**chapter 7**): In response to the findings in this thesis and previous literature we developed a four-session sexual rehabilitation intervention together with a patient information booklet for gynaecological cancer patients treated with EBRT combined with BT. Dedicated nurses conducted the intervention, directed at increasing knowledge and coping strategies regarding sexual issues, and dilator use, after a skills training by our psychologist-sexologists. The nurses' skills training covered, amongst others, techniques that were known to enhance the effectiveness of psychosexual support; the basic principles of sex- and cognitive behavioural therapy interventions relevant for negative emotions and avoidance behaviour,[97,135,193,194] and motivational interviewing to explicitly address self-efficacy and compliance with dilator use.[74,159,163,195] In line with survivors' and professionals' suggestions (**chapter 3, 5, 6 and 7**), the patients' partners, if available, were invited to participate in order to further increase the intervention's effectiveness.[164] Our prospective multicentre pilot-study showed that the intervention was feasible and promising regarding gynaecological cancer survivors' support during sexual rehabilitation, and regular dilator use (**chapter 7**). Our intervention can be seen as a stepped care model, such as for example the PLISSIT model.[196] Consistent with a stepped care model, we expect that most survivor's sexual problems can be resolved by following several levels of intervention. Greater knowledge and training of the health care provider regarding the subject is required as one moves up each

level of intervention.

Challenges in sexual health research among gynaecological cancer survivors

A strength of this thesis is that it encompasses research that successfully involved both health care professionals, including radiation oncologists, gynaecological oncologists, oncology nurses, sexologists, and patients and their partners. Therefore, the results of the studies and the sexual rehabilitation intervention that was developed have enjoyed wide support from the start, and may be easily implemented in future gynaecological cancer care. Furthermore, the various research methods described throughout the chapters proved to be valuable. The self-report questionnaires and psycho-physiological assessments served to quantify sexual functioning issues and associated biopsychosocial factors that patients experienced after gynaecological cancer treatment. The qualitative research provided further insight in survivors', referring to patients and partners, experiences with and mechanisms behind these issues, and put the quantitative survey results into perspective. Also, the interviews served both as feedback with regard to the current psychosexual support practice and needs of survivors and their partners, and as input for the development of our sexual rehabilitation intervention using vaginal dilators. The Delphi-method we used can be seen as a form of a mixed methods research; participating experts were allowed to provide comments, which gave insight regarding their clinical considerations and recommendations. The response rate of our Delphi-panel was unusually high (100% versus the advised minimum response rate of 70%), showing that our panel was very committed, and the method we used proved to be highly efficacious.[150,197]

Nonetheless, several methodological challenges should be considered. It took longer than expected to include 20 gynaecological cancer patients eligible and willing to participate in the intervention's pilot-study. Besides the relative infrequency of women with advanced cervical cancer, recruitment problems were mostly related to language barriers, culture gaps or relocation, but also to metastatic disease or psychiatric problems. Participants' dropout rate of 40% was mostly due to somatic reasons (25%). Future studies should keep in mind that eligibility and dropout rates among cervical cancer patients treated with combined EBRT and BT may differ from other populations. However, the relatively high inclusion rate of 65% was satisfying, possibly being a reflection of the relatively young cervical cancer population's high need for more extensive support during sexual recovery.

Conducting prospective research to assess pre-treatment characteristics among gynaecological cancer survivors is complicated for apparent reasons. In an attempt to target individual variations, in our intervention's pilot-study participants were asked about their sexual functioning before diagnosis in retrospective, bringing along a possible recall bias while interpreting the findings (**chapter 7**). Perhaps more importantly, the measurements conducted among survivors could not always be compared to age-matched controls and no normative data was available (**chapter 2 and 7**). Therefore, we could not reliably establish that the reported levels of a variety of symptoms should only be attributed to the gynaecological cancer (treatment) and were significantly higher than in a normal population.

Another drawback of sexual functioning research among gynaecological cancer survivors is that recruiting participants can be difficult. In the current studies regarding long-term survivors (**chapter 2, 3, 4 and 6**), one-third to half of the eligible survivors declined participation, often stating reasons such as that the topic was too intimate, confronting, or reminded them of their cancer (treatment), or because they had a negative experience during sexual rehabilitation after treatment. Also, due to the conducted self-report methods, participants had to have sufficient knowledge of the Dutch language and to be willing to talk about the current topics. Consequently, current participants may have been relatively more eloquent and open regarding sexual problems. Also, only a limited number of the available questionnaires in sex research are validated to measure sexual concerns among gynaecological cancer survivors. Some of these questionnaires include items unintentionally excluding sexually inactive participants, or participants that do not focus on having sexual contact through coitus, possibly introducing a selection bias as well. The aforementioned matters urge us to develop more dedicated questionnaires.

Future considerations to further improve sexual health care after gynaecological cancer treatment

Central to our findings were the clinical recommendations that could be made in consultation with multidisciplinary health care professionals, patients and partners. Although the policy and practical recommendations serve as a valuable starting point in the improvement of gynaecological cancer care, it is important to first confirm the (cost-)effectiveness of several aspects. Several research directions regarding our developed patient information booklet and intervention, vaginal dilator use, the benefits of patient participation in this field of research, and also regarding support for minority groups and other pelvic cancer survivors, should be considered for future reference.

Developing an effective sexual rehabilitation intervention for survivors treated with radiotherapy

When gynaecological cancer survivors evaluated our patient information booklet during its development, most stated that the booklet was very useful and would have fulfilled the informational needs they experienced after radiotherapy. Therefore, in order to provide optimal care to current patients, Dutch gynaecological and radiation oncology centres are currently integrating the information booklet, together with standard instructions regarding sexual and medical treatment related issues, and vaginal dilator use, in their gynaecological cancer care. However, as was mentioned earlier, providing psycho-education 'only' may not be sufficiently effective in supporting patients during sexual recovery.

To follow-up on the promising nurse-led sexual rehabilitation intervention, its (cost-) effectiveness in improving sexual functioning among survivors after pelvic radiotherapy in comparison to standard care should be investigated. In order to do so, a national multicentre randomized trial should be initiated together with all Dutch gynaecological oncology centres. In every Dutch gynaecological oncology centre, two nurses should be specifically trained to be able to conduct this intervention. This trial should compare the intervention's effectiveness to optimal standard care

consisting of information provided by the patient's radiation oncologist, the patient information booklet, and a set of vaginal dilators. The intervention group would additionally receive four nurse-led rehabilitation consultation sessions during 12 months after treatment. It should also be investigated whether the intervention increases compliances with dilator use, reduces sexual distress, fear of penetration or sexual contact, and psychological distress, and improves body image, generic health-related quality of life and relationship satisfaction.

If proven effective, it would be possible to implement the findings in cancer care almost directly since (1) the intervention has been developed and evaluated in collaboration with all the end-users; (2) specialized nurses will be available with experience in conducting the intervention in all Dutch gynaecological oncology centres after the national trial; and (3) the personnel and material costs of implementing the intervention are relatively low.

Vaginal dilator use as a sexual rehabilitation strategy

Our sexual rehabilitation intervention uses, amongst others, vaginal dilator use as a sexual rehabilitation strategy. Although vaginal dilator use has been associated with less vaginal shortening and/or tightening after radiotherapy[39,62,63], no firm data exists on the effectiveness of regular dilator use in preventing these vaginal symptoms.[65] Also, although dilator use is advocated worldwide, data showing that regular dilator use improves sexual functioning among survivors is lacking. Therefore, vaginal treatment sequelae should be measured systematically, both in relation to vaginal symptoms and sexual functioning. Physician reporting is usually less accurate than patient reporting regarding, amongst others, vaginal symptoms.[198] Thus, patient-reported outcome measures are indispensable to evaluate type and severity of symptoms, and problems encountered. Also, investigators should agree on definitions or measurement tools to assess vaginal symptoms (varying from atrophic changes, bleeding from telangiectasia, vaginal dryness to tightening and shortening) since this probably caused the incidence of such symptoms after radiotherapy to vary in the literature.[65,67,199] Furthermore, the consequences of regular dilator use should be investigated during a longer follow-up period of at least 12 months, since the question remains whether it leads to long-lasting improvements of the patients' sexual functioning.

In response to the abovementioned lack of evidence, it is important to investigate the working mechanism of our developed sexual rehabilitation intervention. It should be analysed whether an improvement in vaginal symptoms, such as shortening and/or tightening, and in turn sexual functioning, is mediated by the reported frequency of vaginal dilator use. Other possible working mechanisms of the intervention, such as a reduction in worries about pain during sexual contact, will also be explored.

Patient participation in improving survivorship care

In the last decades, patient participation is increasingly recognized as an important component in patient cancer care. Patients' reported needs for information and support are considered as valuable directions regarding how to improve survivorship care.[200–202] Although in this thesis patients reported a need for more extensive infor-

mation, researchers and health care providers should not neglect to critically review this suggestion in light of the available evidence-based knowledge. Observational studies did show that cancer patients with a fulfilled need for, and satisfaction with, the received information and counselling are known to report a better quality of life, and experience less anxiety and depression.[202] However, although randomized controlled intervention studies providing more extensive information on disease and treatment consequences, and other support or rehabilitation options lead to satisfaction with the received information, the information did not necessarily lead to a better quality of life or less psychological distress.[202] One randomized controlled trial even showed no beneficial effect of information provision on satisfaction with the information and care, and worse psychosocial adjustment after cancer (treatment).[203] Although our pilot-study participants received additional nurse-led consultations to support them with sexual recovery, it should be investigated in a randomized trial whether survivors are satisfied with the information by itself.

The patients' and nurses' exit-interviews, and audio recordings, demonstrated that the patient-centred nurse-led consultations did not only address sexual, relational and dilator use issues. The consults were naturally directed at patients' other psychosocial concerns after treatment as well, such as their experiences with the cancer (treatment), physical concerns such as tiredness, or work reintegration. Thus, although cancer care providers are advised to address survivors' sexual recovery, they should address this besides, but not instead of, other needs for psychosocial support, since it is but one part of providing high quality survivorship care corresponding to the patients' needs. Nevertheless, it is the responsibility of the health care provider not to avoid targeting possible sexual concerns after treatment, being a burdensome and, to some patients, an embarrassing subject, particularly for those who need for regular dilator use after radiotherapy. During our future trial, the intervention's effectiveness should be controlled for how much time nurses spend on providing support for other psychosocial issues besides sexual recovery.

Sexual health care for minority groups and other pelvic cancer survivors

There is a paucity of data regarding certain minority groups who have limited access to support during sexual recovery in view of language or cultural barriers.[204,205] If proven effective, our intervention and clinical recommendations should be extended to these groups of women. Women with other cultural backgrounds or language problems may be in need of leaflets making more extensive use of drawings and culturally sensitive wording.[206,207] Such materials should be developed together with dedicated input from psychologists or health care workers from different cultural backgrounds and specialists in the field of low health literacy.

Studies into sexual problems among gynaecological cancer survivors have mainly addressed the needs of women treated for cervical cancer, as these are relatively often treated with extensive surgery or primary EBRT with BT, and are often young, pre-menopausal and sexually active. However, although in a less profound manner, other gynaecological cancer patients treated with pelvic EBRT also suffer from radiation-induced sexual problems. Less specific information is available with regard to vaginal and vulvar cancer survivors.[33,208] A less extensive and/or tailored version of

the sexual rehabilitation intervention may be supportive for these other groups of gynaecological cancer patients as well, but also for women treated with EBRT for other pelvic cancers, such as women treated for rectal, anal or bladder cancer. Ideally, our developed rehabilitation intervention should be made available to all female pelvic cancer survivors, with different modules tailored to specific situations. A treatment protocol for these patients could focus more on sexual functioning and rehabilitation in general, and less on vaginal dilation, being just one possible component among, for example, endometrial cancer patients treated with postoperative EBRT. All other issues during the recovery phase, such as reduced lubrication, reduced libido, menopausal symptoms, fatigue, and fear (for sexual contact), would be similar. We expect such a tailored protocol to be helpful to all female pelvic cancer survivors in need of sexual health support. Evidently, it would be worthwhile to address sexual dysfunction in male pelvic cancer survivors as well.[33]

Both the findings and multidisciplinary methods that this thesis brought forward will assist in providing the appropriate education and/or support to improve gynaecological cancer survivors' sexual recovery and wellbeing. It proved to be important for gynaecological cancer survivorship care to follow a biopsychosocial approach, taking not only treatment consequences but also psychosocial circumstances into account. We consider it necessary to continue gaining insight in the (cost-)effectiveness of our proposed sexual rehabilitation strategies in view of the favourable evaluations of our promising nurse-led sexual rehabilitation intervention for patients treated with radiotherapy. International colleagues may be inspired to deploy the methods that we used in order to tailor the recommendations to their possibly differing cultural settings and clinical infrastructures. Until we gain further knowledge regarding their (cost-)effectiveness, the practical and policy recommendations that were made, provide guidance to professionals, and policy-makers, and contribute to providing optimal clinical care for gynaecological cancer patients in the near future.

References

1. Vereniging van Integrale Kankercentra (2015) Dutch Cancer Registry. Retrieved from http://www.cijfersoverkanker.nl
2. Foley G, Alston R, Geraci M, Brabin L, Kitchener H, et al. (2011) Increasing rates of cervical cancer in young women in England: An analysis of national data 1982–2006. *British Journal of Cancer* 105(1):177–184. doi:10.1038/bjc.2011.196.
3. Perkins RB (2016) HPV vaccination: Clinical potential, implementation challenges, and future directions. *Human Vaccines & Immunotherapeutics* 12(6):1327–1331. doi:10.1080/21645515.2016.1177680.
4. Werkgroep Oncologische Gynaecologie (WOG) (2012) Cervixcarinoom. Landelijke richtlijn met regionale toevoegingen. Versie 3.0. *Nederlandse Vereniging van Obstetrie en Gynaecologie*. Retrieved from http://www.oncoline.nl/cervixcarcinoom
5. Waggoner SE (2003) Cervical cancer. *Lancet* 361(9376):2217–2225. doi:10.1016/S0140-6736(03)13778-6.
6. Vale C (2008) Reducing uncertainties about the effects of chemoradiotherapy for cervical cancer: A systematic review and meta-analysis of individual patient data from 18 randomized trials. *Journal of Clinical Oncology* 26(35):5802–12. doi:10.1200/JCO.2008.16.4368.
7. Sedlis A, Bundy BN, Rotman MZ, Lentz SS, Muderspach LI, et al. (1999) A randomized trial of pelvic radiation therapy versus no further therapy in selected patients with stage IB carcinoma of the cervix after radical hysterectomy and pelvic lymphadenectomy: A Gynecologic Oncology Group Study. *Gynecologic Oncology* 73(2):177–183. doi:10.1006/gyno.1999.5387.
8. Monk BJ, Tewari KS, & Koh W-J (2007) Multimodality therapy for locally advanced cervical carcinoma: State of the art and future directions. *Journal of Clinical Oncology* 25(20):2952–65. doi:10.1200/JCO.2007.10.8324.
9. Rijkmans EC, Nout RA, Rutten IHHM, Ketelaars M, Neelis KJ, et al. (2014) Improved survival of patients with cervical cancer treated with image-guided brachytherapy compared with conventional brachytherapy. *Gynecologic Oncology* 135(2):231–238. doi:10.1016/j.ygyno.2014.08.027.
10. Potter R, Knocke TH, Fellner C, Baldass M, Reinthaller A, et al. (2000) Definitive radiotherapy based on HDR brachytherapy with iridium 192 in uterine cervix carcinoma: report on the Vienna University Hospital findings (1993-1997) compared to the preceding period in the context of ICRU 38 recommendations. *Cancer/Radiothérapie* 4(2):159–172. doi:10.1016/S1278-3218(00)88900-3.
11. Benedet JL (2000) Progress in gynecologic cancer detection and treatment. *International Journal of Gynecological Cancer* 70(1):135–147. doi:10.1016/S0020-7292(00)00232-0.
12. Vistad I, Fossa SD, & Dahl AA (2006) A critical review of patient-rated quality of life studies of long-term survivors of cervical cancer. *Gynecologic Oncology* 102(3):563–572.doi:10.1016/j.ygyno.2006.03.050.

13. Pieterse QD, Kenter GG, Maas CP, de Kroon CD, Creutzberg CL, et al. (2013) Self-reported sexual, bowel and bladder function in cervical cancer patients following different treatment modalities: Longitudinal prospective cohort study. *International Journal of Gynecological Cancer* 23(9):1717–25. doi:10.1097/IGC.0b013e3182a80a65.
14. Ferrandina G, Mantegna G, Petrillo M, Fuoco G, Venditti L, et al. (2012) Quality of life and emotional distress in early stage and locally advanced cervical cancer patients: a prospective, longitudinal study. *Gynecologic Oncology* 124(3):389–394. doi:10.1016/j.ygyno.2011.09.041.
15. Korfage IJ, Essink-Bot ML, Mols F, Poll-Franse L, Kruitwagen R, et al. (2009) Health-related quality of life in cervical cancer survivors: A population-based survey. *International Journal of Radiation Oncology Biology Physics* 73(5):1501–1509. doi:10.1016/j.ijrobp.2008.06.1905.
16. Meirow D, & Nugent D (2001) The effects of radiotherapy and chemotherapy on female reproduction. *Human Reproduction Update* 7(6):535–43. doi:10.1093/HUMUPD/7.6.535.
17. Kirchheiner K, Potter R, Tanderup K, Lindegaard JC, Haie-Meder C, et al. (2016) Health-related quality of life in locally advanced cervical cancer patients after definitive chemoradiation therapy including image guided adaptive brachytherapy: An analysis from the EMBRACE Study. *International Journal of Radiation Oncology Biology Physics* 94(5):1088–1098. doi:10.1016/j.ijrobp.2015.12.363.
18. Bergmark K, Avall-Lundqvist E, Dickman PW, Henningsohn L, & Steineck G (1999) Vaginal changes and sexuality in women with a history of cervical cancer. *New England Journal of Medicine* 340(18):1383–1389. doi:10.1056/NEJM199905063401802.
19. Abbott-Anderson K, & Kwekkeboom KL (2012) A systematic review of sexual concerns reported by gynecological cancer survivors. *Gynecologic Oncology* 124(3):477–489. doi:10.1016/j.ygyno.2011.11.030.
20. Frumovitz M, Sun CC, Schover LR, Munsell MF, Jhingran A, et al. (2005) Quality of life and sexual functioning in cervical cancer survivors. *Journal of Clinical Oncology* 23(30):7428–7436. doi:10.1200/JCO.2004.00.3996.
21. Lindau ST, Gavrilova N, & Anderson D (2007) Sexual morbidity in very longterm survivors of vaginal and cervical cancer: A comparison to national norms. *Gynecologic Oncology* 106(2):413–418. doi:10.1016/j.ygyno.2007.05.017.
22. Pieterse QD, Maas CP, ter Kuile MM, Lowik M, van Eijkeren MA, et al. (2006) An observational longitudinal study to evaluate miction, defecation, and sexual function after radical hysterectomy with pelvic lymphadenectomy for early stage cervical cancer. *International Journal of Gynecological Cancer* 16(3):1119–1129. doi:10.1111/j.1525-1438.2006.00461.x.
23. Grumann M, Robertson R, Hacker NF, & Sommer G (2001) Sexual functioning in patients following radical hysterectomy for stage IB cancer of the cervix. *International Journal of Gynecological Cancer* 11(5):372–380. doi:10.1046/j.1525-1438.2001.01051.x.
24. Gilbert E, Ussher JM, & Hawkins Y (2009) Accounts of disruptions to sexuality following cancer: The perspective of informal carers who are partners of a person with cancer. *Health* 13(5):523–541. doi:10.1177/1363459308336795.
25. Jensen PT, & Froeding LP (2015) Pelvic radiotherapy and sexual function in women. *Translational andrology and urology* 4(2):186–205. doi:10.3978/j.issn.2223-4683.2015.04.06.
26. Aerts L, Enzlin P, Verhaeghe J, Poppe W, Vergote I, et al. (2014) Long-term sexual functioning in women after surgical treatment of cervical cancer stages IA to IB: A prospective control led study. *International Journal of Gynecological Cancer* 24(8):1527–1534. doi:10.1097/IGC.0000000000000236.
27. Lammerink EA, de Bock GH, Pras E, Reyners AK, & Mourits MJ (2012) Sexual functioning of cervical cancer survivors: A review with a female perspective. *Maturitas* 72(4):296–304. doi:10.

1016/j.maturitas.2012.05.006.
28. Le Borgne G, Mercier M, Woronoff AS, Guizard A V, Abeilard E, et al. (2013) Quality of life in long-term cervical cancer survivors: A population-based study. *Gynecologic Oncology* 129(1): 222–228. doi:10.1016/j.ygyno.2012.12.033.
29. Park SY, Bae D-S, Nam JH, Park CT, Cho C-H, et al. (2007) Quality of life and sexual problems in disease-free survivors of cervical cancer compared with the general population. *Cancer* 110(12): 2716–2725. doi:10.1002/cncr.23094.
30. Jensen PT, Groenvold M, Klee MC, Thranov I, Petersen MA, et al. (2003) Longitudinal study of sexual function and vaginal changes after radiotherapy for cervical cancer. *International Journal of Radiation Oncology Biology Physics* 56(4):937–949. doi:10.1016/S0360-3016(03)00362-6.
31. Jensen PT, Groenvold M, Klee MC, Thranov I, Petersen MA, et al. (2004) Early-stage cervical carcinoma, radical hysterectomy, and sexual function - A longitudinal study. *Cancer* 100(1):97–106. doi:10.1002/cncr.11877.
32. Bergmark K, Avall-Lundqvist E, Dickman PW, Henningsohn L, & Steineck G (2002) Patient-rating of distressful symptoms after treatment for early cervical cancer. *Acta Obstetricia et Gynecologica Scandinavica* 81(5):443–450. doi:10.1034/j.1600-0412.2002.810512.x.
33. Incrocci L, & Jensen PT (2013) Pelvic radiotherapy and sexual function in men and women. *Journal of Sexual Medicine* 10(S1):53–64. doi:10.1111/jsm.12010.
34. Rees PM, Fowler CJ, & Maas CP (2007) Sexual function in men and women with neurological disorders. *Lancet* 369(9560):512–525. doi:10.1016/S0140-6736(07)60238-4.
35. Butler-Manuel SA, Buttery LDK, A'Hern RP, Polak JM, & Barton DPJ (2000) Pelvic nerve plexus trauma at radical hysterectomy and simple hysterectomy - The nerve content of the uterine supporting ligaments. *Cancer* 89(4):834–841. doi:10.1002/1097-0142(20000815)89:4<834::AID-CNCR16>3.0.CO;2-7.
36. Levin RJ (1980) The physiology of sexual function in women. *Clinics in obstetrics and gynaecology* 7(2):213–52.
37. Katz A, Njuguna E, Rakowsky E, Sulkes A, Sulkes J, et al. (2001) Early development of vaginal shortening during radiation therapy for endometrial or cervical cancer. *International Journal of Gynecological Cancer* 11(3):234–235. doi:10.1046/j.1525-1438.2001.01019.x.
38. Kirchheiner K, Nout RA, Tanderup K, Lindegaard JC, Westerveld H, et al. 2014) Manifestation pattern of early-late vaginal morbidity after definitive radiation (chemo)therapy and image-guided adaptive brachytherapy for locally advanced cervical cancer: An analysis from the EMBRACE study. *International Journal of Radiation Oncology Biology Physics* 89(1):88–95. doi:10.1016/j.ijrobp.2014.01.032.
39. Velaskar SM, Martha R, Mahantashetty U, Badakare JS, & Shrivastava SK (2007) Use of indigenous vaginal dilator in radiation induced vaginal stenosis. *Indian Journal of Occupational Therapy* 39(1):3–6.
40. Flay LD, & Matthews JHL (1995) The effects of radiotherapy and surgery on the sexual function of women treated for cervical-cancer. *International Journal of Radiation Oncology Biology Physics* 31(2):399–404.
41. Stinesen Kollberg K, Waldenström A-C, Bergmark K, Dunberger G, Rossander A, et al. (2015) Reduced vaginal elasticity, reduced lubrication, and deep and superficial dyspareunia in irradiated gynecological cancer survivors. *Acta Oncologica* 54(5):772–779. doi:10.3109/0284186X.2014.1001036.
42. Abitbol MM, & Davenport JH (1974) The irradiated vagina. *Obstetrics and Gynecology* 44(2): 249–56.
43. Bruner DW, Lanciano R, Keegan M, Corn B, Martin E, et al. (1993) Vaginal stenosis and sexual

function following intracavitary radiation for the treatment of cervical and endometrial carcinoma. *International Journal of Radiation Oncology Biology Physics* 27(4):825–830. doi:10.1016/0360-3016(93)90455-5.

44. Grigsby PW, Russell A, Bruner D, Eifel P, Koh WJ, et al. (1995) Late injury of cancer-therapy on the female reproductive-tract. *International Journal of Radiation Oncology Biology Physics* 31(5):1281–1299. doi:10.1016/0360-3016(94)00426-L.
45. Sexual Dysfunctions (2013). *Diagnostic and Statistical Manual of Mental Disorders* (American Psychiatric Association). doi:10.1176/appi.books.9780890425596.dsm13.
46. Greimel ER, Winter R, Kapp KS, & Haas J (2009) Quality of life and sexual functioning after cervical cancer treatment: A long-term follow-up study. *Psycho-Oncology* 18(5):476–482. doi:10.1002/pon.1426.
47. Seibel M, Freeman MG, & Graves WL (1982) Sexual function after surgical and radiation-therapy for cervical-carcinoma. *Southern Medical Journal* 75 (10):1195–1197.
48. Rice AM (2000) Sexuality in cancer and palliative care 1: Effects of disease and treatment. *International Journal of Palliative Nursing* 6(8):392–397. doi:10.12968/ijpn.2000.6.8.9064.
49. Brand AH, Bull CA, & Cakir B (2006) Vaginal stenosis in patients treated with radiotherapy for carcinoma of the cervix. *International Journal of Gynecological Cancer* 16(1):288–293. doi:10.1111/j.1525-1438.2006.00348.x.
50. Donovan KA, Taliaferro LA, Alvarez EM, Jacobsen PB, Roetzheim RG, et al. (2007) Sexual health in women treated for cervical cancer: Characteristics and correlates. *Gynecologic Oncology* 104(2):428–434. doi:10.1016/j.ygyno.2006.08.009.
51. Basson R, Berman J, Burnett A, Derogatis L, Ferguson D, et al. (2000) Report of the international consensus development conference on female sexual dysfunction: Definitions and classifications. *The Journal of Urology* 163(3):888–893. doi:10.1016/S0022-5347(05)67828-7.
52. Stephenson KR, & Metz ME (2016) Consequences of impaired female sexual functioning: Individual differences and associations with sexual distress. *Sexual and Relationship Therapy* 27(4):344–357. doi:10.1080/14681994.2012.738905.
53. Hayes RD, Dennerstein L, Bennett CM, Sidat M, Gurrin LC, et al. (2008) Risk factors for female sexual dysfunction in the general population: exploring factors associated with low sexual function and sexual distress. *Journal of Sexual Medicine* 5(7):1681–1693. doi:10.1111/j.1743-6109.2008.00838.x.
54. Bradford A, Fellman B, Urbauer D, Gallegos J, Meaders K, et al. (2015) Asessment of sexual activity and dysfunction in medically underserved women with gynecologic cancers. *Gynecologic Oncology* 139(1):134–140. doi:10.1016/j.ygyno.2015.08.019.
55. Stead ML, Brown JM, Fallowfield L, & Selby P (2003) Lack of communication between healthcare professionals and women with ovarian cancer about sexual issues. *British Journal of Cancer* 88(5):666–671. doi:10.1038/sj.bjc.6600799.
56. Hill EK, Sandbo S, Abramsohn E, Makelarski J, Wroblewski K, et al. (2011) Assessing gynecologic and breast cancer survivors' sexual health care needs. *Cancer* 117(12):2643–2651. doi:10.1002/cncr.25832.
57. Vermeer WM, Bakker RM, Kenter GG, de Kroon CD, Stiggelbout AM, et al. (2015) Sexual issues among cervical cancer survivors: How can we help women seek help? *Psycho-Oncology* 24(4):458–464. doi:10.1002/pon.3663.
58. Maas CP (2004) Nerve-sparing radical pelvic surgery. *International Journal of Gynecological Cancer* 14(2):398. doi:10.1111/j.1048-891X.2004.014231.x.
59. Trimbos JB, Maas CP, Deruiter MC, Peters AAW, & Kenter GG (2001) A nerve-sparing radical hysterectomy: Guidelines and feasibility in Western patients. *International Journal of Gynecolo-*

gical Cancer 11(3):180–186. doi:10.10 46/j.1525-1438.2001.01023.x.
60. Trimbos JB, van den Tillaart SAHM, Maas CP, Peters AAW, Gaarenstroom KN, et al. (2008) The Swift operation: A modification of the Leiden nerve-sparing radical hysterectomy. *Gynecological Surgery* 5(5):193–198. doi:10.1007/s10397-008-0382-1.
61. Krumm S, & Lamberti J (1993) Changes in sexual behavior following radiation therapy for cervical cancer. *Journal of Psychosomatic Obstetrics and Gynaecology* 14(1):51–63.
62. Decruze SB, Guthrie D, & Magnani R (1999) Prevention of vaginal stenosis in patients following vaginal brachytherapy. *Clinical Oncology* 11(1):46–48. doi:10.1053/clon.1999.9008.
63. Gondi V, Bentzen SM, Sklenar KL, Dunn EF, Petereit DG, et al. (2012) Severe late toxicities following concomitant chemoradiotherapy compared to radio-therapy alone in cervical cancer: An inter-era analysis. *International Journal of Radiation Oncology Biology Physics* 84(4):973–982.
64. Law E, Kelvin JF, Thom B, Riedel E, Tom A, et al. (2015) Prospective study of vaginal dilator use adherence and efficacy following radiotherapy. *Radiotherapy and Oncology* 116(1):149–155. doi: 10.1016/j.radonc.2015.06.018.
65. Miles T, & Johnson N (2014) Vaginal dilator therapy for women receiving pelvic radiotherapy. *Cochrane Database of Systematic Reviews* 9:CD007291. doi:10.1002/14651858.CD007291.pub3.
66. Johnson N, Miles TP, & Cornes P (2010) Dilating the vagina to prevent damage from radiotherapy: Systematic review of the literature. BJOG: *An International Journal of Obstetrics and Gynaecology* 117(5):522–531. doi:10.1111/j.1471-0528.2010.02502.x.
67. Miles T (2012) International Guidelines on Vaginal Dilation after Pelvic Radio-therapy. *International Clinical Guideline group*. Retrieved from http://www.ncsi. org.uk/wp-content/uploads/Inter-Best-Practice-Guide-Vaginal-Dilators-July-2012.pdf
68. Cullen K, Fergus K, Dasgupta T, Kong I, Fitch M, et al. (2013) Toward clinical care guidelines for supporting rehabilitative vaginal dilator use with women recovering from cervical cancer. *Supportive Care in Cancer* 21(7):1911–1917. doi:10.1007/s00520-013-1726-6.
69. Bonner C, Nattress K, Anderson C, Carter J, Milross C, et al. (2012) Chore or priority? Barriers and facilitators affecting dilator use after pelvic radiotherapy for gynaecological cancer. *Supportive Care in Cancer* 20(10):2305–2313. doi:10.1007/s00520-011-1337-z.
70. Juraskova I, Butow P, Robertson R, Sharpe L, McLeod C, et al. (2003) Post-treatment sexual adjustment following cervical and endometrial cancer: A qualitative insight. *Psycho-Oncology* 12(3):267–279. doi:10.1002/pon.639.
71. White ID, & Faithfull S (2006) Vaginal dilation associated with pelvic radiotherapy: A UK survey of current practice. *International Journal of Gynecological Cancer* 16(3):1140–1146. doi:10.1111/j.1525-1438.2006.00452.x.
72. Lancaster GA, Dodd S, & Williamson PR (2004) Design and analysis of pilot studies: Recommendations for good practice. *Journal of Evaluation in Clinical Practice* 10(2):307–12. doi:10.1111/j.2002.384.doc.x.
73. Jeffries SA, Robinson JW, Craighead PS, & Keats MR (2006) An effective group psychoeducational intervention for improving compliance with vaginal dilation: A randomized controlled trial. *International Journal of Radiation Oncology Biology Physics* 65(2):404–411. doi:10.1016/j.ijrobp.2005.12.009.
74. Robinson JW, Faris PD, & Scott CB (1999) Psychoeducational group increases vaginal dilation for younger women and reduces sexual fears for women of all ages with gynecological carcinoma treated with radiotherapy. *International Journal of Radiation Oncology Biology Physics* 44(3):497–506. doi:10.1016/S0360-3016(99)00048-6.
75. Friedman LC, Abdallah R, Schluchter M, Panneerselvam A, & Kunos CA (2011) Adherence to vaginal dilation following high dose rate brachytherapy for endometrial cancer. *International Journal*

*of Radiation Oncology*Biology* Physics* 80(3):751–757. doi:10.1016/j.ijrobp.2010.02.058.
76. Brand AH, Do V, & Stenlake A (2012) Can an educational intervention improve compliance with vaginal dilator use in patients treated with radiation for a gynecological malignancy? *International Journal of Gynecological Cancer* 22(5):897–904. doi:10.1097/IGC.0b013e31824d7243.
77. Cullen K, Fergus K, Dasgupta T, Fitch M, Doyle C, et al. (2012) From "sex toy" to intrusive imposition: A qualitative examination of women's experiences with vaginal dilator use following treatment for gynecological cancer. *Journal of Sexual Medicine* 9(4):1162–1173. doi:10.1111/j.1743-6109.2011.02639.x.
78. Brotto LA, Yule M, & Breckon E (2010) Psychological interventions for the sexual sequelae of cancer: A review of the literature. *Journal of Cancer Survivorship* 4(4):346–360. doi:10.1007/s11764-010-0132-z.
79. Candy B, Jones L, Vickerstaff V, Tookman A, & King M (2016) Interventions for sexual dysfunction following treatments for cancer in women. *Cochrane Database of Systematic Review*s. doi:10.1002/14651858.CD005540.pub3.
80. Brotto LA, Heiman JR, Goff B, Greer B, Lentz GM, et al. (2008) A psychoeducational intervention for sexual dysfunction in women with gynecologic cancer. *Archives of Sexual Behavior* 37(2):317–329. doi:10.1007/s10508-007-9196-x.
81. Caldwell R, Classen C, Lagana' L, McGarvey E, Baum L, et al. (2003) Changes in sexual functioning and mood among women treated for gynecological cancer who receive group therapy: A pilot study. *Journal of Clinical Psychology in Medical Settings* 10(3):149–156. doi:10.1023/A:1025402610404.
82. Maughan K, & Clarke C (2001) The effect of a clinical nurse specialist in gynaecological oncology on quality of life and sexuality. *Journal of Clinical Nursing* 10(2):221–229. doi:10.1111/j.1365-2702.2001.00465.x.
83. Dennerstein L, Guthrie JR, Hayes RD, Derogatis LR, & Lehert P (2008) Sexual function, dysfunction, and sexual distress in a prospective, population-based sample of mid-aged, Australian born women. *Journal of Sexual Medicine* 5(10):2291–2299. doi:10.1111/j.1743-6109.2008.00936.x.
84. Shifren JL, Monz BU, Russo PA, Segreti A, & Johannes CB (2008) Sexual problems and distress in United States women: prevalence and correlates. *Obstetrics and Gynecology* 112(5):970–8. doi:10.1097/AOG.0b013e3181898cdb.
85. Ussher JM, Perz J, & Gilbert E (2014) Women's sexuality after cancer: A qualitative analysis of sexual changes and renegotiation. *Women & Therapy* 37 (3–4):205–221. doi:10.1080/02703149.2014.897547.
86. Flink IL, Boersma K, & Linton SJ (2013) Pain catastrophizing as repetitive negative thinking: A development of the conceptualization. *Cognitive Behaviour Therapy* 42(3):215–223. doi:10.1080/16506073.2013.769621.
87. Watkins ER (2008) Constructive and unconstructive repetitive thought. *Psychological Bulletin* 134(2):163–206. doi:10.1037/0033-2909.134.2.163.
88. Bishop SR, & Warr D (2003) Coping, catastrophizing and chronic pain in breast cancer. *Journal of Behavioral Medicine* 26(3):265–281. doi:10.1023/A:1023464621554.
89. Fischer DJ, Villines D, Kim YO, Epstein JB, & Wilkie DJ (2010) Anxiety, depression, and pain: Differences by primary cancer. *Supportive Care in Cancer* 18 (7):801–810. doi:10.1007/s00520-009-0712-5.
90. Bakker RM, Vermeer WM, Creutzberg CL, Mens JWM, Nout RA, et al. (2015) Qualitative accounts of patients' determinants of vaginal dilator use after pelvic radiotherapy. J*ournal of Sexual Medicine* 12(3):764-773. doi:10.1111/jsm.12776.
91. ter Kuile MM, Brauer M, & Laan E (2006) The Female Sexual Function Index (FSFI) and the

Female Sexual Distress Scale (FSDS): Psychometric properties within a Dutch population. *Journal of Sex & Marital Therapy* 32(4):289–304. doi:10.1080/00926230600666261.
92. Greimel ER, Vlasic KK, Waldenstrom AC, Duric VM, Jensen PT, et al. (2006) The European Organization for Research and Treatment of Cancer (EORTC) quality-of-life questionnaire cervical cancer module - EORTC QLQ-CX24. *Cancer* 107(8):1812–1822. doi:10.1002/cncr.22217.
93. Spinhoven P, Ormel J, Sloekers PPA, Kempen GIJM, Speckens AEM, et al. (1997) A validation study of the Hospital Anxiety and Depression Scale (HADS) in different groups of Dutch subjects. *Psychological Medicine* 27:363–370.
94. Arrindell WA, Boelens W, & Lambert H (1983) On the psychometric properties of the Maudsley Marital Questionnaire (MMQ) - Evaluation of self-ratings in distressed and normal volunteer couplesbased on the Dutch version. *Personality and Individual Differences* 4(3):293–306. doi:10.1016/0191-8869(83)90151-4.
95. Hayes AF (2013) *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach* (The Guilford Press, New York) Available at: http://www.personal.psu.edu/jxb14/M554/specreg/templates.pdf.
96. Preacher KJ, & Hayes AF (2008) Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods* 40(3):879–891. doi:10.3758/BRM.40.3.879.
97. ter Kuile MM, Both S, & van Lankveld JJ (2010) Cognitive behavioral therapy for sexual dysfunctions in women. *Psychiatric Clinics of North America* 33(3):595–610. doi:10.1016/j.psc.2010.04.010.
98. ter Kuile MM, Melles RJ, Tuijnman-Raasveld CC, de Groot HE, & van Lankveld JJ (2015) Therapist-aided exposure for women with lifelong vaginismus: Mediators of treatment outcome: A tandomized waiting list control trial. *Journal of Sexual Medicine* 12(8):1807–1819. doi:10.1111/jsm.12935.
99. Davis SN, Bergeron S, Bois K, Sadikaj G, Binik YM, et al. (2015) A prospective 2-year examination of cognitive and behavioral correlates of provoked vestibulodynia outcomes. *The Clinical Journal of Pain* 31(4):333–341. doi:10.1097/AJP.0000000000000128.
100. Leclerc B, Bergeron S, Brassard A, Belanger C, Steben M, et al. (2015) Attachment, sexual assertiveness, and sexual outcomes in women with provoked vestibulodynia and their partners: A mediation model. *Archives of Sexual Behavior* 44(6):1561–1572. doi:10.1007/s10508-014-0295-1.
101. Bakker RM, Ter Kuile MM, Vermeer WM, Nout RA, Mens JWM, et al. (2014) Sexual rehabilitation after pelvic radiotherapy and vaginal dilator use: Consensus using the Delphi method. *International Journal of Gynecological Cancer* 24(8):1499-1506. doi:10.1097/IGC.0000000000000253.
102. Classen CC, Chivers ML, Urowitz S, Barbera L, Wiljer D, et al. (2013) Psychosexual distress in women with gynecologic cancer: A feasibility study of an online support group. *Psycho-Oncology* 22(4):930–935. doi:10.1002/pon.3058.
103. Brotto LA, Erskine Y, Carey M, Ehlen T, Finlayson S, et al. (2012) A brief mind-fulness-based cognitive behavioral intervention improves sexual functioning versus wait-list control in women treated for gynecologic cancer. *Gynecologic Oncology* 125(2):320–325. doi:10.1016/j.ygy-no.2012.01.035.
104. Salani R (2013) Survivorship planning in gynecologic cancer patients. *Gynecologic Oncology* 130(2):389–397. doi:10.1016/j.ygyno.2013.05.022.
105. Gilbert E, Ussher JM, & Perz J (2011) Sexuality after gynaecological cancer: A review of the material, intrapsychic, and discursive aspects of treatment on women's sexual-wellbeing. *Maturitas* 70(1):42–57. doi:10.1016/j.maturitas.2011.06.013.
106. Hill EK, Sandbo S, Abramsohn E, Makelarski J, Wroblewski K, et al. (2011) Assessing gynecologic and breast cancer survivors' sexual health care needs. *Cancer* 117(12):2643–2651. doi:10.

1002/cncr.25832.
107. Stead ML, Fallowfield L, Brown JM, & Selby P (2001) Communication about sexual problems and sexual concerns in ovarian cancer: Qualitative study. *British Medical Journal* 323(7317):836–837. doi:10.1136/bmj.323.7317.836.
108. Gilbert E, Ussher JM, & Perz J (2013) Embodying sexual subjectivity after cancer: A qualitative study of people with cancer and intimate partners. *Psychology & Health* 28(6):603–619. doi:10.1080/08870446.2012.737466.
109. Hawkins Y, Ussher J, Gilbert E, Perz J, Sandoval M, et al. (2009) Changes in sexuality and intimacy after the diagnosis and treatment of cancer the experience of partners in a sexual relationship with a person with cancer. *Cancer Nursing* 32(4):271–280. doi:10.1097/NCC.0b013e31819b5a93.
110. Maughan K, Heyman B, & Matthews M (2002) In the shadow of risk: How men cope with a partner's gynaecological cancer. *International Journal of Nursing Studies* 39(1):27–34. doi:10.1016/S0020-7489(01)00004-9.
111. Stafford L, & Judd F (2010) Partners of long-term gynaecologic cancer survivors: Psychiatric morbidity, psychosexual outcomes and supportive care needs. *Gynecologic Oncology* 118(3):268–273. doi:10.1016/j.ygyno.2010.05.019.
112. Ussher JM, Perz J, Gilbert E, Wong WKT, & Hobbs K (2013) Renegotiating sex and intimacy after cancer: Resisting the coital imperative. *Cancer Nursing* 36(6):454–462. doi:10.1097/NCC.0b013e3182759e21.
113. Lalos A, Jacobsson L, Lalos O, & Stendahl U (1995) Experiences of the male partner in cervical and endometrial Cancer - A prospective interview study. *Journal of Psychosomatic Obstetrics and Gynecology* 16(3):153–165. doi:10.3109/01674829509024464.
114. White ID, Faithfull S, & Allan H (2013) The re-construction of women's sexual lives after pelvic radiotherapy: A critique of social constructionist and biomedical perspectives on the study of female sexuality after cancer treatment. *Social Science & Medicine* 76(1):188–196. doi:10.1016/j.socscimed.2012.10.025.
115. Nelson IA (2010) From quantitative to qualitative: Adapting the Life History Calendar method. *Field methods* 22(4):413–428. doi:10.1177/1525822X10379793.
116. Ltd QIP (2012) NVivo qualitative data analysis Software. *Version 10* (10).
117. Pope C, Ziebland S, & Mays N (2000) Qualitative research in health care. Analysing qualitative data. *British Medical Journal* 320(7227):114–116. doi:10.1136/bmj.320.7227.114.
118. Mays N, & Pope C (1995) Rigour and qualitative research. *BMJ* 311(6997):109–112.
119. Murray SH, & Milhausen RR (2012) Sexual desire and relationship duration in young men and women. *Journal of Sex & Marital Therapy* 38(1):28–40. doi:10.1080/0092623X.2011.569637.
120. Hordern AJ, & Street AF (2007) Communicating about patient sexuality an intimacy after cancer: Mismatched expectations and unmet needs. *Medical Journal of Australia* 186(5):224–227.
121. Papadakos J, Bussière-Côté S, Abdelmutti N, Catton P, Friedman AJ, et al. (2012) Informational needs of gynecologic cancer survivors. *Gynecologic Oncology* 124(3):452–457. doi:10.1016/j.ygyno.2011.10.030.
122. Rasmusson E-M, & Thomé B (2008) Women's wishes and need for knowledge concerning sexuality and relationships in connection with gynecological cancer disease. *Sexuality and Disability* 26(4):207–218. doi:10.1007/s11195-008-9097-5.
123. Bloomberg LP (1998) Steve Jobs on Apple's Resurgence "'Not a One-Man Show.'" *Bloomberg Business Week: New York*.
124. Hockel M, Horn LC, Hentschel B, Hockel S, & Naumann G (2003) Total mesometrial resection: High resolution nerve-sparing radical hysterectomy based on developmentally defined surgical anatomy. *International Journal of Gynecological Cancer* 13(6):791–803. doi:10.1111/j.1525-1438.

2003.13608.x.
125. Maas CPP, ter Kuile MM, Laan E, Tuijnman CCC, Weijenborg PTMTM, et al. (2004) Objective assessment of sexual arousal in women with a history of hysterectomy. BJOG: *An International Journal of Obstetrics and Gynaecology* 111(5):456–462. doi:10.1111/j.1471-0528.2004.00104.x.
126. Maas K, Moriya Y, Kenter G, Trimbos B, & van de Velde C (1999) A plea for preservation of the pelvic autonomic nerves. *Lancet* 354(9180):772–773.
127. Meston CM, & Frohlich PF (2000) The neurobiology of sexual function. *Archives of General Psychiatry* 57(11):1012–1030.
128. Basson R (2002) A model of women's sexual arousal. *Journal of Sex & Marital Therapy* 28(1):1–10. doi:10.1080/009262302317250963.
129. Laan E, Everaerd W, van V D, & Geer JH (1995) Determinants of subjective experience of sexual arousal in women: Feedback from genital arousal and erotic stimulus content. *Psychophysiology* 32(5):444–451. doi:10.1111/j.1469-8986.1995.tb02095.x.
130. Levin RJ, Both S, Georgiadis J, Kukkonen T, Park K, et al. (2016) The physiology of female sexual function and the pathophysiology of female sexual dysfunction (Committee 13A). *Journal of Sexual Medicine* 13(5):733–59. doi:10.1016/j.jsxm.2016.02.172.
131. Pieterse QD, ter Kuile MM, Deruiter MC, Trimbos JBMZ, Kenter GG, et al. (2008) Vaginal blood flow after radical hysterectomy with and without nerve sparing. A preliminary report. *International Journal of Gynecological Cancer* 18(3):576–583. doi:10.1111/j.1525-1438.2007.01046.x.
132. Pras E, Wouda J, Willemse PH, Midden ME, Zwart M, et al. (2003) Pilot study of vaginal plethysmography in women treated with radiotherapy for gynecological cancer. *Gynecologic Oncology* 91(3):540–546. doi:10.1016/j.ygyno.2003.08.002.
133. Laan E, & Lunsen RHW van (1997) Hormones and sexuality in postmenopausal women: A psychophysiological study. *Journal of Psychosomatic Obstetrics & Gynecology* 18(2):126–133. doi:10.3109/01674829709085579.
134. Speroff L, Glass L, & Kase N (2009) *Clinical gynecology, endocrinology and infertility* (Baltimore: Ed. Lippingott William-Wilkins). 4th Ed.
135. Masters W, & Johnson VE (1966) Human Sexual Response (Boston, Little Brown).
136. Sintchak G, & Geer JH (1975) A vaginal photoplethysmograph system. *Psychophysiology* 12:113–115.
137. Hatch JP (1979) Vaginal photoplethysmography: Methodological considerations. *Archives of Sexual Behavior* 8(4):357–374. doi:10.1007/BF01541879.
138. Laan E, Everaerd W, & Evers A (1995) Assessment of female sexual arousal: Response specificity and construct validity. *Psychophysiology* 32(5):476–485. doi:10.1111/j.1469-8986.1995.tb02099.x.
139. Laan E, Everaerd W, Van BG, & Hanewald G (1994) Women's sexual and emotional responses to male- and female-produced erotica. *Archives of Sexual Behavior* 23(2):153–169. doi:10.1007/BF01542096.
140. Heiman JR, & Rowland DL (1983) Affective and physiological sexual response patterns: The effects of instructions on sexually functional and dysfunctional men. *Journal of Psychosomatic Research* 27(2):105–116. doi:10.1016/0022-3999(83)90086-7.
141. Derogatis LR, Rosen R, Leiblum S, Burnett A, & Heiman J (2002) The Female Sexual Distress Scale (FSDS): Initial validation of a standardized scale for assessment of sexually related personal distress in women. *Journal of Sex & Marital Therapy* 28(4):317–330. doi:10.1080/00926230290001448.
142. Cohen J (1988) *Statistical power analysis for the behavioral sciences* (Hillsdale, NJ: Lawrence Erlbaum Associates.).
143. Papka RE, & Mowa CN (2003) Estrogen receptors in the spinal cord, sensory ganglia, and pelvic autonomic ganglia. *International Review of Cytology* 231:91–127. doi:10.1016/S0074-7696(03)

31003-4.
144. Gebhart JB, Rickard DJ, Barrett TJ, Lesnick TG, Webb MJ, et al. (2001) Expression of estrogen receptor isoforms α and β messenger RNA in vaginal tissue of premenopausal and postmenopausal women. *American Journal of Obstetrics and Gynecology* 185(6):1325–1331. doi:10.1067/mob.2001.119627.
145. Laan E, van Lunsen RH, & Everaerd W (2001) The effects of tibolone on vaginal blood flow, sexual desire and arousability in postmenopausal women. *Climacteric* 4(1):28–41. doi:10.1080/cmt.4.1.28.41.
146. Thakar R, Ayers S, Clarkson P, Stanton S, & Manyonda I (2002) Outcomes after total versus subtotal abdominal hysterectomy. *New England Journal of Medicine* 347(17):1318–1325. doi:10.1056/NEJMoa013336.
147. Ussher JM, Perz J, & Gilbert E (2015) Perceived causes and consequences of sexual changes after cancer for women and men: A mixed method study. *BMC Cancer* 15:268-. doi:10.1186/s12885-015-1243-8.
148. Crowther ME, Corney RH, & Shepherd JH (1994) Psychosexual implications of gynecological cancer. *British Medical Journal* 308(6933):869–870.
149. Lancaster L (2004) Preventing vaginal stenosis after brachtherapy for gynaecological cancer: An overview of Australian practices. *European Journal of Oncology Nursing* 8(1):30–39. doi:10.1016/S1462-3889(03)00059-0.
150. Keeney S, Hasson F, & McKenna H (2006) Consulting the oracle: Ten lessons from using the Delphi technique in nursing research. *Journal of Advanced Nursing* 53(2):205–212. doi:10.1111/j.1365-2648.2006.03716.x.
151. Greatorex J, & Dexter T (2000) An accessible analytical approach for investigating what happens between the rounds of a Delphi study. *Journal of Advanced Nursing* 32(4):1016–1024. doi: 10.1046/j.1365-2648.2000.t01-1-01569.x.
152. Murphy MK, Black NA, Lamping DL, McKee CM, Sanderson CF, et al. (1998) Consensus development methods, and their use in clinical guideline development. *Health Technology Assessment* 2(3):i-88. doi:10.3310/hta2030.
153. Jones J, & Hunter D (1995) Consensus methods for medical and health services research. *British Medical Journal* 311(7001):376–80.
154. Linstone HA, & Turoff M (1975) *The Delphi method: techniques and applications* (Addison-Wesley Pub. Co., Advanced Book Program).
155. Faithfull S, & White I (2008) Delivering sensitive health care information: Challenging the taboo of women's sexual health after pelvic radiotherapy. *Patient Education and Counseling* 71(2):228–233. doi:10.1016/j.pec.2007.12.011.
156. Booth K, Beaver K, Kitchener H, O'Neill J, & Farrell C (2005) Women's experiences of information, psychological distress and worry after treatment for gynaecological cancer. *Patient Education and Counseling* 56(2):225–232. doi:10.1016/j.pec.2004.02.016.
157. Krychman M, Millheiser LS, Ganz PA, Rowland JH, Desmond K, et al. (2013) Sexual health issues in women with cancer. *Journal of Sexual Medicine* 10:5–15. doi:10.1111/jsm.12034.
158. Schover LR, Fife M, & Gershenson DM (1989) Sexual dysfunction and treatment for early stage cervical-cancer. *Cancer* 63(1):204–212.
159. Schwarzer R, Lippke S, & Luszczynska A (2011) Mechanisms of health behavior change in persons with chronic illness or disability: The Health Action Process Approach (HAPA). *Rehabilitation Psychology* 56(3):161–170. doi:10.1037/a0024509.
160. Guest G, Bunce A, & Johnson L (2006) How many interviews are enough? An experiment with data saturation and variability. *Field methods* 18(1):59–82. doi:10.1177/1525822X05279903.

161. Punt L, Greimel ER, Winter R, Kapp KS, Haas J, et al. (2011) Patient compliance with the use of vaginal dilators following pelvic radiotherapy for a gynaecological cancer. *Journal of Radiotherapy in Practice* 10(1):13–25. doi:10.1017/S1460396910000476.
162. Carter J, Goldfrank D, & Schover LR (2010) Simple strategies for vaginal health promotion in cancer survivors. *Journal of Sexual Medicine* 8(2):549–559. doi:10.1111/j.1743-6109.2010.01988.x.
163. Hettema J, Steele J, & Miller WR (2005) Motivational interviewing. *Annual Review of Clinical Psychology* 1:91–111. doi:10.1146/annurev.clinpsy.1.102803.143833.
164. Scott JL, & Kayser K (2009) A review of couple-based interventions for enhancing women's sexual adjustment and body image after cancer. *Cancer Journal* 15(1):48–56. doi:10.1097/PPO.0b013e31819585df.
165. Bakker RM, Kenter GG, Creutzberg CL, Stiggelbout AM, Derks M, et al. (2016) Sexual distress and associated factors among cervical cancer survivors: A cross-sectional multicenter observational study. *Psycho-Oncology* epub. doi:10.1002/pon.4317
166. Juraskova I, & Lubotzky F (2015) Recovering after pelvic radiation therapy: A guide for women. *Centre for Medical Psychology and Evidence-based Decision–making (CeMPED) at the University of Sydney.* Available at http:// www.targetingcancer.com.au/wp-content/uploads/2015/10/Recovering-after-Pelvic-Radiation-Therapy-a-guide-for-women.pdf
167. Lubotzky F (2015) The development, pilot and randomised controlled trial of a psychosexual rehabilitation information booklet for women undergoing pelvic radiation therapy for gynaecological or anorectal cancer. PhD-thesis. Available at https://ses.library.usyd.edu.au/handle/2123/12819
168. Lubotzky F, Butow P, Nattress K, Hunt C, Carroll S, et al. (2015) Facilitating psychosexual adjustment for women undergoing pelvic radiotherapy: Pilot of a novel patient psycho-educational resource. *Health Expectations*. doi:10.1111/hex.12424.
169. Weijenborg PTM, & ter Kuile MM (2000) The effect of a group programme on women with the Mayer-Rokitansky-Kuster-Hauser syndrome. *British Journal of Obstetrics and Gynaecology* 107(3):365–368. doi:10.1111/j.1471-0528.2000.tb13232.x.
170. ter Kuile MM, & Weijenborg PTM (2006) A cognitive-behavioral group program for women with vulvar vestibulitis syndrome (VVS): Factors associated with treatment success. *Journal of Sex & Marital Therapy* 32(3):199–213. doi:10.1080/00926230600575306.
171. Miller W, & Rollnick S (2012) *Motivational interviewing: Helping people change* (Guilford press).
172. Palacio A, Garay D, Langer B, Taylor J, Wood BA, et al. (2016) Motivational interviewing improves medication adherence: A systematic review and meta-analysis. *Journal of General Internal Medicine* 31(8):929–940. doi:10.1007/s11606-016-3685-3.
173. Madson MB, Loignon AC, & Lane C (2009) Training in motivational interviewing: A systematic review. *Journal of Substance Abuse Treatment* 36(1):101–9. doi:10.1016/j.jsat.2008.05.005.
174. ter Kuile MM, Melles R, Tuijnman CC, Groot HE, & van Lankveld JJDM (2013) Therapist-aided exposure for women with lifelong vaginismus: A randomized waiting-list controlled trial of efficacy. *Journal of Consulting and Clinical Psychology* 81(6):1127–1136. doi:10.1037/a0034292.
175. van Lankveld JJDM, ter Kuile MM, de Groot HE, Melles R, Nefs J, et al.(2006) Cognitive-behavioral therapy for women with lifelong vaginismus: A randomized waiting-list controlled trial of efficacy. *Journal of Consulting and Clinical Psychology* 74(1):168–178. doi:10.1037/0022006X.74.1.168.
176. Baser RE, Li Y, & Carter J (2012) Psychometric validation of the female sexual function index (FSFI) in cancer survivors. *Cancer* 118(18):4606–4618. doi:10.1002/cncr.26739.
177. Arrindell WA, & Schaap C (1985) The Maudsley Marital Questionnaire (MMQ): An extension of

its construct validity. *The British Journal of Psychiatry* 147(3): 295–299. doi:10.1192/bjp.147.3.295.
178. Hertzog MA (2008) Considerations in determining sample size for pilot studies. *Research in Nursing & Health* 31(2):180–191. doi:10.1002/nur.20247.
179. Rasmusson E-M, Plantin L, & Elmerstig E (2013) "Did they think I would understand all that on my own?" A questionnaire study about sexuality with Swedish cancer patients. *European Journal of Cancer Care* 22(3):361–369. doi:10.1111/ecc.12039.
180. Vermeer WM, Bakker RM, Stiggelbout AM, Creutzberg CL, Kenter GG, et al. (2014) Psychosexual support for gynecological cancer survivors: professionals' current practices and need for assistance. *Supportive Care in Cancer* 23(3):831-839. doi:10.1007/s00520-014-2433-7
181. Flynn KE, Reese JB, Jeffery DD, Abernethy AP, Lin L, et al. (2012) Patient experiences with communication about sex during and after treatment for cancer. *Psycho-Oncology* 21(6):594–601. doi:10.1002/pon.1947.
182. White ID, Allan H, & Faithfull S (2011) Assessment of treatment-induced female sexual morbidity in oncology: Is this a part of routine medical follow-up after radical pelvic radiotherapy? *British Journal of Cancer* 105(7):903–910. doi:10.1038/bjc.2011.339.
183. Scanlon M, Blaes A, Geller M, Majhail NS, Lindgren B, et al. (2012) Patient satisfaction with physician discussions of treatment impact on fertility, menopause and sexual health among premenopausal women with cancer. *Journal of Cancer* 3(3). doi:10.7150/jca.4408.
184. Ussher JM, Perz J, Gilbert E, Wong WKT, Mason C, et al. (2013) Talking about sex after cancer: A discourse analytic study of health care professional accounts of sexual communication with patients. *Psychology & Health* 28(12):1370–1390. doi:10.1080/08870446.2013.811242.
185. McCallum M, Lefebvre M, Jolicoeur L, Maheu C, & Lebel S (2012) Sexual health and gynecological cancer: Conceptualizing patient needs and overcoming barriers to seeking and accessing services. *Journal of Psychosomatic Obstetrics & Gynecology* 33(3):135–142. doi:10.3109/0167482X.2012.709291.
186. Wiggins DL, Wood R, Granai CO, & Dizon DS (2007) Sex, intimacy, and the Gynecologic oncologist: Survey results of the new England association of gynecologic oncologists (NEAGO). *Journal of Psychosocial Oncology* 25(4):61– 70. doi:10.1300/J077v25n04_04.
187. Aktaş D, & Terzioğlu F (2015) Effect of home care service on the sexual satisfaction of patients with gynecologic cancer. *Sexuality and Disability* 33(2):243–252. doi:10.1007/s11195-014-9370-8.
188. Perz J, Ussher JM, Greenfield D, Walters S, Coleman R, et al. (2015) A randomized trial of a minimal intervention for sexual concerns after cancer: A comparison of self-help and professionally delivered modalities. *BMC Cancer* 15(1):629. doi:10.1186/s12885-015-1638-6.
189. Schover LR, Yuan Y, Fellman BM, Odensky E, Lewis PE, et al. (2013) Efficacy trial of an Internet-based intervention for cancer-related female sexual dysfunction. *Journal of the National Comprehensive Cancer Network* 11(11):1389–1397.
190. Scott JL, Halford WK, & Ward BG (2004) United we stand? The effects of a couple-coping intervention on adjustment to early stage breast or gynecological cancer. *Journal of Consulting and Clinical Psychology* 72(6):1122–1135.
191. Cain E, Kohorn E, Quinlan D, & Latimer K (1986) Psychosocial benefits of a cancer support group. *Cancer* 57(1):183–189.
192. Flynn P, Kew F, & Kisely SR (2009) Interventions for psychosexual dysfunction in women treated for gynaecological malignancy. *Cochrane Database of Systematic Reviews* (2):CD004708-. doi:10.1002/14651858.CD004708.pub2.
193. Günzler C, Berner MM, Heiman JR, Laumann EO, Paik A, et al. (2012) Efficacy of psychosocial interventions in men and women with sexual dysfunctions-A systematic review of controlled clinical trials. *Journal of Sexual Medicine* 9 (12):3108–25. doi:10.1111/j.1743-6109.2012.02965.x.

194. Heiman JR, & Meston CM (1997) Evaluating sexual dysfunction in women: Clinical obstetrics and gynecology. *Clinical Obstetrics & Gynecology* 40(3):616–629.
195. Brotto LA, Yule M, & Breckon E (2010) Psychological interventions for the sexual sequelae of cancer: A review of the literature. *Journal of Cancer Survivorship* 4(4):346–360. doi:10.1007/s11764-010-0132-z.
196. Annon J (1976) The PLISSIT model: A proposed conceptual scheme for the behavioral treatment of sexual problems. *Journal of Sex Education and Therapy* 2(1):1–15.
197. Hsu CC, & Sandford BA (2007) The Delphi technique: Making sense of consensus. *Practical Assessment, Research & Evaluation* 12(10):1–8.
198. Di Maio M, Gallo C, Leighl NB, Piccirillo MC, Daniele G, et al. (2015) Symptomatic toxicities experienced during anticancer treatment: Agreement between patient and physician reporting in three randomized trials. *Journal of Clinical Oncology* 33(8):910–915. doi:10.1200/JCO.2014.57.9334.
199. Rosa LM da, Hammerschmidt KS de A, Radünz V, Ilha P, Tomasi AVR, et al.(2016) Evaluation and classification of vaginal stenosis after brachytherapy. *Texto & Contexto - Enfermagem* 25(2). doi:10.1590/0104-07072016003010014.
200. World Health Organisation World Alliance for Patient Safety (2005) Global patient safety challenge 2005-2006: Clean care is safer care. 1–25. Retrieved from http://www.who.int/patientsafety/events/05/GPSC_Launch_ENGLISH_FINAL.pdf
201. Mallinger JB, Griggs JJ, & Shields CG (2005) Patient-centered care and breast cancer survivors' satisfaction with information. *Patient Education and Counseling* 57(3):342–349. doi:10.1016/ j.pec.2004.09.009.
202. Husson O, Mols F, & van de Poll-Franse L V (2011) The relation between information provision and health-related quality of life, anxiety and depression among cancer survivors: a systematic review. *Annals of Oncology* 22(4):761–72. doi:10.1093/annonc/mdq413.
203. Nicolaije KAH, Ezendam NPM, Vos MC, Pijnenborg JMA, Boll D, et al. (2015) Impact of an automatically generated cancer survivorship care plan on patient-reported outcomes in routine clinical practice: Longitudinal outcomes of a pragmatic, cluster randomized trial. *Journal of Clinical Oncology* 33(31):3550–9. doi:10.1200/JCO.2014.60.3399.
204. Siminoff LA, Graham GC, & Gordon NH (2006) Cancer communication patterns and the influence of patient characteristics: Disparities in information-giving and affective behaviors. *Patient Education and Counseling* 62(3):355–360. doi:10.1016/j.pec.2006.06.011.
205. Aziz NM, & Rowland JH (2002) Cancer survivorship research among ethnic minority and medically underserved groups. *Oncology Nursing Forum* 29(5):789–801. doi:10.1188/02.ONF.789-801.
206. Doak CC, Doak LG, Friedell GH, & Meade CD (1998) Improving comprehension for cancer patients with low literacy skills: Strategies for clinicians. *CA: A Cancer Journal for Clinicians* 48(3):151–162. doi:10.3322/canjclin.48.3.151.
207. Davis TC, Williams M V., Marin E, Parker RM, & Glass J (2002) Health literacy and cancer communication. *CA: A Cancer Journal for Clinicians* 52(3):134–149. doi:10.3322/canjclin.52.3.134.
208. Philip EJ, & Merluzzi T V (2016) Psychosocial issues in post-treatment cancer survivors: Desire for support and challenges in identifying individuals in need. *Journal of Psychosocial Oncology* 34(3):223–239. doi:10.1080/07347332.2016.1157716.

Summary

Sexual functioning is an important aspect of quality of life that can be severely affected by gynaecological cancer and its treatment. Treatment options include radical surgery, primary or postoperative radiotherapy with or without brachytherapy and chemotherapy, and often involves combinations of these. Attention to sexual problems caused by side effects, such as vaginal shortening and/or tightening, vaginal dryness, pain during sexual contact, or negative emotions resulting from changes in their sexual relationships, is essential in survivorship care of gynaecological cancer survivors. However, survivors and their partners with sexual concerns often do not receive the information or professional help that they desire or need. Also, no proven effective psychological interventions exist to support survivors with sexual problems after treatment.

In this thesis, quantitative and qualitative evidence was gathered in an attempt to improve and extend the current sexual health care of gynaecological cancer survivors. Although surgery has a major impact on sexual functioning, vaginal changes and symptoms have been shown to be more profound after intensive radiotherapy. Therefore, the studies in this thesis were especially focused on gynaecological cancer survivors who received radiotherapy, and mainly concerned cervical cancer patients; a relatively young patient population often treated with intensive external-beam radiation therapy (EBRT) in combination concurrent chemotherapy, and intrauterine and vaginal brachytherapy (BT), although the results are equally relevant to other gynaecological cancer patients treated with EBRT with or without BT.

In order to assess what type of patient education and/or support would be needed to minimise the impact of gynaecological cancer treatment on sexual functioning, and to improve the survivors' sexual recovery we followed several approaches: (i) assessment of survivors' experience with sexual distress after treatment, and unmet needs for psychosexual counselling and support; (ii) it was explored how survivors and professionals could best deal with treatment-induced vaginal changes; and, partly based on the previous findings, (iii) a sexual rehabilitation intervention was developed and evaluated in a pilot study.

Sexual distress and related needs after gynaecological cancer treatment

Gynaecological cancer survivors may experience sexual distress and health care needs related to recovery of their sexual functioning after completion of treatment. In **chapter 2** we conducted a cross-sectional questionnaire study showing that, in con-

cordance with previous results, about one-third (33%) of the sexually active cervical cancer survivors reported clinically relevant levels of sexual distress. Among survivors that were of comparable age but sexually inactive, possibly due to problems after cancer treatment, this rate was even higher (54%). Furthermore, the findings in **chapter 2 and 3** confirmed previous reports that sexual problems and sexual distress were more profound when treatment included radiotherapy as compared to treatment with surgery alone, especially regarding treatment-induced vaginal changes, and both vaginal symptom-related and overall cancer-related sexual problems.

Thus far, empirical research had rarely focused on the extent to which sexual distress can be attributed to the vaginal symptoms or other changes due to gynaecological cancer treatment. **Chapter 2** demonstrated that sexual distress among cervical cancer survivors was related to different kinds of biopsychosocial concerns. Higher levels of sexual distress were associated with physical treatment consequences, namely the higher levels of vaginal symptoms, possibly due to radiation-induced atrophy and fibrosis or anatomical changes. But higher levels of sexual distress were also related with psychological and interpersonal concerns that are frequently reported after treatment, such as sexual pain worry, body image concerns, and relationship dissatisfaction. In **chapter 3** an interview study was conducted among cervical cancer survivors and their partners. These qualitative findings confirmed that sexual distress had multidimensional determinants. Confirming the findings of **chapter 2**, in **chapter 3** we concluded that professional support should not only take vaginal symptoms as a consequence of treatment into account, but also psychosocial factors, such as anxiety related to pain or penetration while resuming sexual activity during recovery, and the level of relationship satisfaction and communication.

In **chapter 2** we found that the relationship between vaginal symptoms and higher levels of sexual distress was partly mediated by the degree to which survivors worried about sexual pain. Furthermore, as was hypothesized in **chapter 2**, and further discussed based on patient interviews in **chapter 3**, (worry about) sexual pain among gynaecological cancer survivors and their partners may lead to avoidance of sexual activity as a coping strategy, or to feeling inhibited during intercourse, and subsequent feelings of sexual distress such as guilt, grief, or feeling lonely in the sexual relationship.

In order to develop and provide appropriate measures, there was a need for more clear information regarding the psychosexual supportive care needs among gynaecological cancer survivors. Cervical cancer survivors and partners that were interviewed in **chapter 3** reported a need for more extensive, and less medically oriented, information and practical psychosexual counselling and support after treatment. Participants considered written and online information a useful first resource of information. Also, their oncologists were perceived as the primary professional to consult in case of sexual distress, and nurses were specifically appreciated because of their empathy and accessibility. Sexologists were perceived to be suitable for more complex sexual problems.

The study results described in **part II** of this thesis complemented the first chapters in search for what psychosexual counselling and support was needed. In **chapter 5** the results were reported of an online Delphi-study that was conducted among radiation oncologists, gynaecological oncologists and oncology nurses from all Dutch gynaecological cancer centres. In this study, the professional experts reached consensus and agreed that, amongst others, it is part of their responsibility to provide information about treatment-induced changes and practical advice on how to cope with sexual problems. Additionally, corresponding with survivors' suggestions, the professionals also decided that more extensive psychosexual support should preferably be initiated and given by specifically trained oncology nurses.

Gynaecological cancer survivors, their partners and professionals that were assessed in **chapter 3, 5 and 6**, generally thought that it was important to involve partners during psychosexual support. In **chapter 7** we described the feasibility study of a newly developed intervention among a pilot-sample of survivors and their partners after radiotherapy. During the exit-interviews participating women stated to value their partners' social support during sexual rehabilitation and/or vaginal dilator use. Some women added, however, that their partners' presence or engagement was not needed with regard to dilator use, only in case of sexual concerns. Therefore, the suggestion made by the experts in **chapter 5** to provide the opportunity the include partners, but to let the patient ultimately decide, seemed most appropriate.

Reducing treatment-induced vaginal consequences

In **part II** of this thesis it was explored whether vaginal changes due to treatment can be targeted, since these may precede sexual distress and related needs for support (**chapter 2 and 3**). Therefore, in **chapter 4** we conducted a psychophysiological controlled study among early-stage cervical cancer survivors treated with surgery with or without postoperative pelvic radiotherapy. It was found that treatment with conventional radical hysterectomy resulted in a lower vaginal blood flow response during sexual, while treatment with a nerve-sparing modification resulted in a vaginal blood flow response comparable to the response of healthy women. We concluded that nerve-sparing surgery could preserve the vaginal blood flow response. The vaginal blood flow among women treated with nerve-sparing surgery and postoperative EBRT did not significantly differ from the other treatment groups, although this should be interpreted with caution since this treatment group was small. The levels of subjective arousal and sexual dysfunction, however, were comparable between all treatment groups. Therefore, the results indicated that in the current sample, a lower vaginal blood flow did not necessarily induce sexual problems. This seemed to be in line with part I of this thesis showing that the experience of sexual concerns is not only determined by physical changes, but is affected by other factors as well, such as the survivors' psychological and relationship functioning. Thus, the provision of psychosexual patient support should not only depend on the type of treatment that survivors received, but it should rather be tailored to the survivors' self-reported sexual (dys)functioning.

Reducing vaginal treatment consequences of more advanced cervical tumours treated with radiotherapy largely focuses on vaginal dilator use to prevent vaginal

adhesions, tightening and shortening. As a starting point, the Delphi-study results that were described in **chapter 5** added to previous literature that consensus was reached, not only on the roles of the multidisciplinary health care providers, but also on the required patient information and support after radiotherapy. The panel agreed that information about sexual rehabilitation using vaginal dilators should be provided by radiation oncologists prior to treatment, and should always be provided to sexually active cervical and vaginal cancer patients, younger than 70. Patients with vulvar and endometrial cancer, patients older than 70 and/or patients that were sexually inactive before treatment, should receive tailored information depending on their age, wish to retain sexual activity, personal and medical situation. The panel advised to start dilation around 4 weeks after treatment once the epithelia is heeled, to perform dilation 2-3 times a week, for 1-3 minutes, and to continue dilation for 9-12 months. Therefore, the panel offered clear consensus-based recommendations for the content of the aftercare of gynaecological cancer patients treated with pelvic radiotherapy.

According to the qualitative reports in **chapter 6** and in line with previous research, however, only one-fourth of the survivors were able to use dilators according to the instructions that were summarised in **chapter 5**. Almost all survivors intended and attempted to perform long-term regular vaginal dilator use because of the expectation that it would prevent the development of vaginal stenosis. Only about a quarter of the survivors were able to maintain long-term regular dilator use, because they were planning dilator use and making it part of a routine, e.g., using dilators while taking a shower, and using lubricants, a smaller dilator size or vibrators. Factors that negatively influenced survivors' dilator use were a lack of instrumental, informational and social support, negative associations with BT, the dilators' hard plastic design, and (being anxious for) pain or blood loss. We suggested that survivors could benefit from planning and preparing for situations in which they might tend to stop using dilators. Therefore, interventions should help these women change their routine, counteract negative emotions about dilator use or enlarge their perceived self-efficacy, by dealing with behavioural skills and motivational issues.

The development of a sexual rehabilitation intervention

The findings described in the preceding chapters, **chapter 5 and 6** in particular, were used to develop a sexual rehabilitation intervention in combination with a patient information booklet in collaboration with radiation oncologists, gynaecologic oncologists, oncology nurses and sexologists from all gynaecological oncology centres in the Netherlands.

The specific information booklet was evaluated by means of short questionnaires and semi-structured interviews among radiotherapy patients, independent specialists, healthy lower educated women and a patient organization. Participants found the booklet very relevant, informative and of good length (**chapter 7**). The intervention was directed at increasing the patients' knowledge on sexual problems and benefits of dilator use, offering coping strategies to both patients (and their possible partners) regarding sexual issues and increasing long-term compliance with dilator use, after gynaecological cancer treatment with external and internal radiotherapy. Dedicated radiation oncology and gynaecology nurses and an advanced practitio-

ner brachytherapy conducted the intervention after a 50-hour skills training covering the basic principles of gynaecological cancer treatment (consequences), sexology, cognitive behavioural interventions relevant for fear & avoidance behaviour, motivational interviewing and the treatment protocol. Three psychologist-sexologists designed and conducted the training among the nurses.

A prospective multicentre pilot-study was conducted to assess the feasibility of the intervention among patients treated with EBRT in combination with BT, and their partners in **chapter 7**. The trained nurses reported to have obtained sufficient expertise and counselling skills to conduct the intervention. In contrast to the moderate and short-term compliance rates that were achieved in previous intervention studies, the results showed that the current intervention helped most of the participating gynaecological cancer survivors to maintain long-term regular vaginal dilation or resuming sexual activity after radiotherapy. Also, although this was a non-randomised feasibility study, the results were promising with regard to the recovery of their long-term sexual functioning. The intervention was received as feasible and supportive during sexual rehabilitation and regular dilator use.

General discussion and concluding remarks

It was established what education and/or support was needed according to health care professionals, patients and their partners to minimise the impact of gynaecological cancer treatment on sexual functioning, and to improve the survivors' sexual recovery and wellbeing. Both the findings and variety of research methods that this thesis brought forward successfully involved both health care professionals, including radiation oncologists, gynaecological oncologists, oncology nurses, sexologists, and patients and their partners. Therefore, the promising sexual rehabilitation strategies that were developed and integrated in the sexual rehabilitation intervention have enjoyed wide support from the start. The methodological challenges that we encountered and should be considered in future sex research among gynaecological cancer survivors were related to the inability to obtain prospective baseline data, difficulties with recruiting eligible participants, and possibly unintentionally investigating an eloquent and relatively open-minded sample with regard to talking about sexual health issues. Furthermore, to follow-up on the promising nurse-led sexual rehabilitation intervention, the (cost-)effectiveness of the four-session dedicated rehabilitation intervention will be investigated in a national randomized trial. Its effectiveness on sexual functioning will be compared to standard care consisting of information provided by the radiation oncologist, the patient information booklet, and a set of vaginal dilators. If proven cost-effective, the intervention can be easily generally implemented and complement the standard gynaecological cancer care. Future studies should also develop a tailor-made protocol of the sexual rehabilitation intervention for minority groups who have limited access to sexual health support and/or with different cultural backgrounds, and explore a less extensive version of the intervention to be used for gynaecological cancer survivors who received EBRT alone or were treated with surgery only, and for patients treated for other pelvic cancers. The developed information booklet and the practical and policy recommendations that were made, provide valuable guidelines to improve current clinical care for gynaecological cancer patients.

Nederlandse samenvatting

In Nederland worden er jaarlijks ongeveer 4500 vrouwen gediagnosticeerd met gynaecologische kanker, waaronder baarmoederkanker (endometriumcarcinoom), eierstokkanker (ovariumcarcinoom), baarmoederhalskanker (cervixcarcinoom), vaginakanker en vulvakanker. De behandeling van gynaecologische kanker bestaat vaak uit combinaties van chirurgie, radiotherapie en/of chemotherapie. Gynaecologische kanker en de behandeling daarvan hebben vaak een negatieve invloed op de seksuele gezondheid, en daarmee de kwaliteit van leven, van vrouwen en hun partners. Ongeveer de helft van de vrouwen rapporteert na de behandeling dan ook seksuele problemen, zoals een verkorte of vernauwde vagina, verminderde lubricatie, pijn tijdens seksueel contact, maar ook negatieve emoties als gevolg van de veranderingen binnen de seksuele relatie. Indien vrouwen veel last en persoonlijke hinder, oftewel *sexual distress*, ondervinden van seksuele problemen kan dit leiden tot seksuele disfunctie. Doordat de screening en de behandeling van gynaecologische kanker in de afgelopen decennia zijn verbeterd, zijn de overlevingskansen toegenomen en daarmee ook de aandacht voor de kwaliteit van leven, waaronder seksualiteit, na de behandeling. Echter, gynaecologische kankerpatiënten en hun partners die seksuele problemen ervaren na de behandeling, geven vaak aan niet de informatie of ondersteuning te ontvangen waar ze behoefte aan hebben. Ook zijn er geen bewezen effectieve interventies bekend waarmee de patiënten na de behandeling kunnen worden ondersteund tijdens hun seksuele herstel.

In dit proefschrift werden kwantitatieve en kwalitatieve gegevens verzameld met als doel om de huidige nazorg tijdens het herstel van gynaecologische kankerpatiënten met betrekking tot seksualiteit aan te vullen en te verbeteren. Chirurgie heeft een grote impact op het seksueel functioneren, maar vaginale veranderingen en symptomen ontstaan vooral door een behandeling met de combinatie van uitwendige en inwendige bestraling. De studies in dit proefschrift beschrijven daarom met name gynaecologische kankerpatiënten die zijn behandeld met radiotherapie en betreffen vooral baarmoederhals kankerpatiënten; een relatief jonge patiëntenpopulatie die vaak wordt behandeld met uitwendige bestraling in combinatie met chemotherapie, en intra-uteriene en vaginale brachytherapie, al zijn de resultaten zeker ook relevant voor andere gynaecologische kankerpatiënten die zijn behandeld met alleen uitwendige radiotherapie, alleen brachytherapie, of door middel van chirurgie.

Om te onderzoeken welke specifieke vormen van informatie en ondersteuning er nodig zijn om de impact van gynaecologische kanker(behandeling) te verminde-

ren en het seksuele herstel van de patiënten te verbeteren, werd onderzocht (i) in hoeverre vrouwen *sexual distress* en gerelateerde zorgbehoeften ervaren; (ii) hoe vaginale veranderingen na de behandeling zoveel mogelijk kunnen worden beperkt volgens zorgverleners, patiënten en hun partners; en of, gedeeltelijk gebaseerd op bevindingen uit de voorgaande studies in dit proefschrift, (iii) een door ons ontwikkelde seksuele rehabilitatie interventie toepasbaar was en als behulpzaam werd ervaren in de klinische praktijk.

Sexual distress en gerelateerde zorgbehoeften

Vrouwen kunnen na (behandeling van) gynaecologische kanker seksuele problemen en daaraan gerelateerd *sexual distress* ervaren, waardoor zijn vaak extra zorgbehoeften hebben. In **hoofdstuk 2** wordt een cross-sectionele vragenlijststudie beschreven uit waaruit bleek dat, overeenkomstig met de literatuur, ongeveer een derde (33%) van de seksueel actieve vrouwen die zijn behandeld voor baarmoederhalskanker last heeft van *sexual distress*. Dit percentage was nog hoger (54%) onder vrouwen van vergelijkbare leeftijd die niet seksueel actief waren. Mogelijk dat deze vrouwen niet seksueel actief waren als gevolg van de behandeling. Daarnaast hebben de resultaten van **hoofdstuk 2 en 3** eerdere onderzoekresultaten bevestigd: aangetoond werd dat seksuele problemen en *sexual distress* vaker voorkwamen wanneer vrouwen waren behandeld met radiotherapie, in vergelijking met een chirurgische behandeling. Dit was voornamelijk te relateren aan vaginale symptomen en kanker gerelateerde seksuele problemen.

Onderzoek hield zich tot nu toe voornamelijk bezig met de vaginale veranderingen die worden veroorzaakt door gynaecologische kankerbehandeling. Uit **hoofdstuk 2** bleek dat *sexual distress* na baarmoederhalskanker een biopsychosociaal fenomeen was. De mate waarin *sexual distress* werd gerapporteerd, hing samen met de hoeveelheid fysieke gevolgen die vrouwen ervaarden na de behandeling, zoals vaginale symptomen veroorzaakt door atrofie, fibrose en anatomische veranderingen na radiotherapie. Maar *sexual distress* hing ook samen met vaak gerapporteerde psychologische en sociale problemen, zoals zorgen over pijn tijdens seksueel contact, een verstoord lichaamsbeeld en ontevredenheid binnen de relatie. In **hoofdstuk 3** werd een interview studie uitgevoerd onder vrouwen die waren behandeld voor baarmoederhalskanker en hun partners. Deze kwalitatieve resultaten bevestigden dat *sexual distress* samenhangt met meerdere biopsychosociale factoren en dat de klinische nazorg zich op meer dan alleen vaginale symptomen zou moeten richten. Professionele ondersteuning zou zich niet alleen moeten richten op de vaginale symptomen ten gevolge van de behandeling, maar ook op de psychosociale factoren, zoals angst voor pijn of penetratie tijdens het oppakken van seksuele activiteit, en de mate waarin men tevreden is over de relatie en communicatie met hun partner.

In **hoofdstuk 2** werd aangetoond dat de relatie tussen de fysieke vaginale symptomen en *sexual distress* gedeeltelijk werd beïnvloed door de hoeveelheid zorgen over pijn tijdens seksueel contact die de vrouwen rapporteerden. Daarnaast leiden, zoals werd gesuggereerd in **hoofdstuk 2** en verder beschreven in **hoofdstuk 3**, (zorgen over) pijn tijdens de seks onder gynaecologische kankerpatiënten en hun

partners na de behandeling mogelijk tot vermijding van seksuele activiteit als coping strategie, of het zich belemmerd voelen tijdens het seksuele contact, en met *sexual distress* tot gevolg. Tijdens de interviews rapporteerden vrouwen gevoelens van *sexual distress* zoals schuldgevoelens, rouw, en eenzaamheid in de relatie.

Om vrouwen na gynaecologische kanker goed te kunnen bijstaan, was er meer kennis nodig over welke behoefte aan psychoseksuele ondersteuning zij hadden. De meeste vrouwen die in het verleden waren behandeld voor baarmoederhalskanker en hun partners die werden geïnterviewd in **hoofdstuk 3** gaven aan behoefte te hebben gehad aan uitgebreidere, en minder medisch georiënteerde, informatie en praktisch advies na de behandeling. De deelnemers gaven aan online en schriftelijke informatie te zien als een bruikbare eerste bron van informatievoorziening. Daarnaast werden de artsen (radiotherapeut-oncologen en gynaecologen) gezien als de eerst aangewezen zorgverlener om hulp te vragen in het geval van *sexual distress*, en verpleegkundigen werden vooral gewaardeerd om hun empathie en toegankelijkheid. Seksuologen werden meer geschikt geacht in het geval van meer complexe seksuele problemen.

De studieresultaten die worden beschreven in het tweede deel van dit proefschrift vulden de resultaten van de eerste hoofdstukken aan in het onderzoek naar welke psychoseksuele ondersteuning nodig was. In **hoofdstuk 5** worden de resultaten gerapporteerd van een online Delphi-studie die werd uitgevoerd onder radiotherapeut-oncologen, gynaecoloog-oncologen en gespecialiseerde verpleegkundigen (radiotherapie of gynaecologie) afkomstig uit elk Nederlands gynaecologisch oncologisch centrum. In deze studie bereikten de experts onder andere de consensus dat het onder andere ook hun verantwoordelijkheid is om informatie over de gevolgen van de behandeling te geven, tezamen met praktisch advies met betrekking tot het seksuele herstel. Daarnaast was er consensus onder de professionals, overeenkomstig met de suggesties van de ex-patiënten in **hoofdstuk 3**, dat de meer uitgebreidere ondersteuning bij voorkeur zou moeten worden geïnitieerd en gegeven door daartoe specifiek getrainde verpleegkundigen.

De vrouwen die waren behandeld voor gynaecologische kanker, hun partners en de professionals, die werden onderzocht in **hoofdstuk 3, 5 en 6**, vonden het in het algemeen belangrijk dat partners werden betrokken bij de gesprekken tijdens de nazorg. In **hoofdstuk 7** wordt een nieuw ontwikkelde interventie voor seksuele rehabilitatie na radiotherapie beschreven, die werd onderzocht in een pilot-studie bij 20 gynaecologische kankerpatiënten en hun partners. De deelnemende vrouwen rapporteerden dat ze de sociale steun van hun partners tijdens het seksuele herstel en/of vaginale pelottegebruik erg waardeerden. Sommige vrouwen gaven echter aan dat zij de aanwezigheid of betrokkenheid van hun partner niet nodig vonden, alleen in het geval van seksuele problemen. De suggestie van de zorgverleners in **hoofdstuk 5** om de mogelijkheid te bieden om partners te betrekken bij de ondersteuning lijkt daarom het best passend.

Verminderen van vaginale veranderingen na de behandeling

In het tweede deel van dit proefschrift werd onderzocht in hoeverre preventie van

vaginale veranderingen ten gevolge van gynaecologische kankerbehandeling mogelijk was (**hoofdstuk 2 en 3**). In **hoofdstuk 4** voerden we een observationele gecontroleerde studie uit bij vrouwen die waren behandeld voor baarmoederhalskanker door middel van een radicale operatie of een zenuwsparende variant daarvan in combinatie met of zonder postoperatieve radiotherapie. Het bleek dat vrouwen na radicale hysterectomie een verminderde vaginale doorbloedingsrespons hadden tijdens seksuele opwinding, terwijl vrouwen na een zenuwsparende operatie een vergelijkbare doorbloeding hadden als de gezonde controlegroep. We concludeerden dat zenuwsparende radicale hysterectomie de genitale opwindingsrespons kon behouden. De vaginale doorbloedingsrepons van vrouwen die waren behandeld met een zenuwsparende radicale hysterectomie in combinatie met postoperatieve EBRT verschilden niet significant van de andere behandelgroepen. Echter dit resultaat moet met voorzichtigheid moet worden geïnterpreteerd, omdat deze groep deelnemers klein was. De mate van subjectieve opwinding en het seksueel functioneren was vergelijkbaar tussen de vier groepen. Een lagere vaginale doorbloeding hing dus niet per definitie samen met seksuele problemen. Dit bevestigde de eerder getrokken conclusie in het eerste deel van dit proefschrift dat het ervaren van seksuele problemen niet alleen samenhangt met fysieke veranderingen, maar ook met andere factoren samenhangt, zoals het psychologisch en relationeel functioneren (**hoofdstuk 2 en 3**). De psychoseksuele ondersteuning van patiënten tijdens het herstel zou dus niet alleen af moeten hangen van het type behandeling dat patiënten hebben ondergaan, maar kan beter worden afgestemd op hoe de individuele patiënt haar seksueel functioneren ervaart na de behandeling.

Het voorkomen van vaginale veranderingen bij vrouwen met een gevorderd-stadium baarmoederhalstumoren die intensieve radiotherapie hebben ondergaan is vooral gericht op vaginaal pelottegebruik ter voorkoming van vaginale verklevingen, verkorting en vernauwing na radiotherapie. Als uitgangspunt werd er door middel van de Delphi-studie, beschreven in hoofdstuk 5, consensus bereikt niet alleen over de taakverdeling onder de multidisciplinaire zorgverleners, maar ook met betrekking tot welke informatie en ondersteuning patiënten moeten krijgen na radiotherapie. Het panel was het erover eens dat de eerste voorlichting met betrekking tot seksuele bijwerkingen, het herstel en pelottegebruik moet worden gegeven door de radiotherapeut-oncoloog, voorafgaand aan de behandeling, aan alle seksueel actieve baarmoederhals- en vaginakankerpatiënten onder de 70 jaar, vooral indien zij zowel uitwendige als inwendige radiotherapie krijgen. Vulva- en baarmoederkankerpatiënten, patiënten ouder dan 70 jaar, en patiënten die niet seksueel actief waren voor de behandeling, moeten informatie krijgen die is aangepast aan de eventuele wens om seksueel actief te blijven, hun persoonlijke en medische toestand. De vrouwen zouden ongeveer 4 weken na de behandeling moeten starten met het gebruik van vaginale dilatoren, bij voorkeur pelottes, en dit gedurende 9 tot 12 maanden twee tot driemaal per week enkele minuten volhouden. Door middel van dit panel werd er consistent en uniform aanbevelingen gegeven over de inhoud van de nazorg van vrouwen die worden behandeld voor gynaecologische kanker met radiotherapie in het bekkengebied.

Volgens de kwalitatieve studie in **hoofdstuk 6** en eerder onderzoek, is echter

slechts een kwart van de vrouwen in staat om vaginale pelottes te (blijven) gebruiken volgens de instructies die werden aanbevolen in **hoofdstuk 5**. Bijna alle vrouwen hadden de intentie om langdurig en regelmatig pelottes te gebruiken, omdat zij vaginale verklevingen wilden voorkomen. Echter, slechts een kwart van de vrouwen was in staat om dit minstens 9 maanden lang en twee keer per week vol te houden. Vrouwen die hierin slaagden, gaven aan hiertoe in staat te zijn doordat zij het pelottegebruik planden en een onderdeel lieten zijn van hun dagelijkse routine, bijvoorbeeld door pelottes te gebruiken onder de douche, en glijmiddel, een kleinere maat pelotte en/of vibratoren gebruikten. Factoren die een negatieve invloed hadden op het gebruik van pelottes waren een gebrek aan instrumentele, informationele en sociale ondersteuning, negatieve associaties met de behandeling, de harde plastic vormgeving en (angst voor) pijn of bloedverlies. We suggereerden dat de vrouwen baat kunnen hebben bij planning en voorbereiding op situaties waarin ze geneigd zullen zijn om te stoppen met het pelottegebruik. Interventies zouden deze groep vrouwen moeten helpen bij het aanpassen van hun routine, omgaan met negatieve emoties en ambivalente gevoelens rondom pelottegebruik, en het vergroten van zelfredzaamheid door gedragsvaardigheden en motivatieproblemen aan te pakken.

De ontwikkeling van een seksuele rehabilitatie interventie

In het derde deel van dit proefschrift werd op basis van de eerder beschreven resultaten, **hoofdstuk 5 en 6** in het bijzonder, een seksuele rehabilitatie interventie ontworpen in combinatie met een patiënten informatiebrochure in samenwerking met radiotherapeut-oncologen, gynaecoloog-oncologen, gespecialiseerde verpleegkundigen en seksuologen, afkomstig uit alle gynaecologisch oncologische centra in Nederland.

De specifiek ontworpen patiënten informatiebrochure werd geëvalueerd door het afnemen van korte vragenlijsten en semi-gestructureerde interviews bij vrouwen die waren behandeld voor gynaecologische kanker met radiotherapie, onafhankelijke specialisten, gezonde lager opgeleide vrouwen en een patiëntenvereniging. Deelnemers vonden de informatiebrochure erg relevant, nuttig en van gepaste lengte (**hoofdstuk 7**). De interventie beoogde voorlichting te geven en coping strategieën aan te leren bij gynaecologische kankerpatiënten (en hun eventuele partners), met betrekking tot seksuele problemen en langdurig, en regelmatig vaginaal pelottegebruik na een behandeling met uitwendige bestraling in combinatie met inwendige brachytherapie. Gespecialiseerde verpleegkundigen gynaecologie en radiotherapie en een advanced practitioner brachytherapie voerden de interventie uit na een vaardigheidstraining van 50 uur over de basisprincipes van de gevolgen van de kanker(behandeling), seksuologie, cognitieve gedragstherapeutische interventies gericht op angst en vermijdingsgedrag, motiverende gespreksvoering en het behandelprotocol. Drie ervaren seksuologen hebben de training ontworpen en leidden de verpleegkundigen op.

In **hoofdstuk 7** onderzochten we door middel van een prospectieve multicenter pilot-studie of de ontwikkelde interventie toepasbaar was in de klinische praktijk in een groep van 20 gynaecologische kankerpatiënten die werden behandeld met uitwendige radiotherapie in combinatie met brachytherapie. De getrainde verpleegkundi-

gen rapporteerden door middel van de training voldoende expertise en vaardigheden te hebben opgedaan om de interventie te kunnen uitvoeren. Daarnaast hielp de interventie, in tegenstelling tot de matige en kortdurende compliance in voorgaande interventie studies, de meeste deelnemers hielp om langdurig en regelmatig pelottes te gebruiken en/of seksuele activiteit weer op te pakken na de radiotherapie. De resultaten waren daarnaast veelbelovend met betrekking tot het herstel van het seksueel functioneren van de vrouwen op de lange termijn. De interventie bleek uitvoerbaar en veelbelovend te zijn ter ondersteuning van de seksuele revalidatie en het regelmatig pelottegebruik.

Algemene discussie en slotopmerkingen

In de studies in dit proefschrift werd vastgesteld welke specifieke vormen van informatie en ondersteuning er volgens zorgverleners, (ex-)patiënten en hun partners gewenst zijn om de impact van gynaecologische kanker(behandeling) op het seksueel functioneren te minimaliseren, en het seksuele herstel te verbeteren. In dit proefschrift werden resultaten beschreven en een variatie aan onderzoeksmethoden toegepast waarin zowel zorgverleners, waaronder radiotherapeut oncologen, gynaecologisch oncologen, gespecialiseerde verpleegkundigen, en seksuologen, als (ex-)patiënten en hun partners werden betrokken. De veelbelovende seksuele revalidatie strategieën die werden ontwikkeld en geïntegreerd in de seksuele rehabilitatie interventie werden daardoor van begin af aan breed gedragen. We ondervonden een aantal methodologische uitdagingen tijdens de uitvoering van seksuologisch onderzoek bij vrouwen die zijn behandeld voor gynaecologische kanker, waaronder de onmogelijkheid om prospectieve baseline data te verzamelen en het soms moeilijk kunnen werven van geschikte deelnemers. Ook zorgde het onderzoeksonderwerp er mogelijk voor dat we onbedoeld een welbespraakte en open-minded sample onderzochten.

Als vervolg op de pilot-studie naar het seksuele revalidatie programma zal de (kosten-)effectiviteit ervan moeten worden onderzocht in een landelijke gerandomiseerde gecontroleerde multicenter trial. De effectiviteit van de interventie bestaande uit vier sessies ter verbetering van het seksueel functioneren van de vrouwen zal worden vergeleken met de standaard zorg. Indien de interventie (kosten-)effectief blijkt te zijn dan kan deze relatief eenvoudig worden geïmplementeerd en de huidige standaard zorg voor gynaecologische kankerpatiënten aanvullen. Toekomstig onderzoek zou vervolgens ook een op maat gemaakt behandelprotocol moeten ontwikkelen voor vrouwen met een taalbarrière en/of een andere culturele achtergrond die in de minderheid zijn en beperkt toegang hebben tot seksuologische ondersteuning. Ook moet worden nagegaan of er een minder intensieve versie van de interventie kan worden ingezet voor gynaecologische kankerpatiënten die alleen met EBRT of door middel van chirurgie zijn behandeld en voor patiënten die zijn behandeld voor andere vormen van kanker in het bekkengebied. De ontwikkelde informatiebrochure, het seksuele rehabilitatie programma en de praktische en beleidsmatige aanbevelingen die zijn gedaan, vormen waardevolle richtlijnen om de huidige psychoseksuele nazorg van gynaecologische kankerpatiënten te optimaliseren.

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List of publications

Peer-reviewed publications

- Bakker RM, Pieterse QD, van Lonkhuijzen, LCRW, Trimbos JBMZ, Creutzberg CL, Kenter GG, de Kroon CD, ter Kuile MM. A controlled study on vaginal blood flow during sexual arousal among early stage cervical cancer survivors treated with conventional radical or nerve-sparing surgery with or without radiotherapy. *International Journal of Gynecological Cancer* 2017; in press.
- Bakker RM, Kenter GG, Creutzberg CL, Stiggelbout AM, Derks M, Mingelen W, de Kroon CD, Vermeer WM, ter Kuile MM. Sexual distress and associated factors among cervical cancer survivors: A cross-sectional multicenter observational study. *Psycho-Oncology* 2016; epub. doi:10.1002/pon.4317
- Bakker RM, Mens JWM, de Groot HE, Tuijnman-Raasveld CC, Braat C, Hompus WCP, Poelman JGM, Laman MS, Velema LA, de Kroon CD, van Doorn HC, Creutzberg CL, ter Kuile MM. A nurse-led sexual rehabilitation intervention after radiotherapy for gynaecological cancer. *Supportive Care in Cancer* 2017; 25: 729-737. doi:10.1007/s00520-016-3453-2
- Derks M, van Lonkhuijzen LRCW, Bakker RM, Stiggelbout AM, Westerveld GH, Roovers JPWR, Kenter GG, ter Kuile MM. Long-term morbidity and quality of life in cervical cancer survivors; a multicentre comparison between surgery and radiotherapy as primary treatment. *International Journal of Gynecological Cancer* 2017; in press. doi:10.1097/IGC.0000000000000880
- Vermeer WM, Bakker RM, Kenter GG, Stiggelbout AM, ter Kuile MM. Cervical cancer survivors' and partners' experiences with sexual dysfunction and psychosexual support. *Supportive Care in Cancer* 2016; 24: 1679-1687. doi:10.1007/s00520-015-2925-0
- Bakker RM, Vermeer WM, Creutzberg CL, Nout RA, Mens JWM, ter Kuile MM. Qualitative accounts of patients' determinants of vaginal dilator use after pelvic radiotherapy. *Journal of Sexual Medicine* 2015; 12: 764-773. doi:10.1111/jsm.12776
- Bakker RM, ter Kuile MM, Vermeer WM, Nout RA, Mens JWM, van Doorn HC, de Kroon CD, Hompus WCP, Braat C, Creutzberg CL. Sexual rehabilitation after pelvic radiotherapy and vaginal dilator use: Consensus using the Delphi method. *International Journal of Gynecological Cancer* 2014; 24: 1499-1506. doi:10.1097/IGC.0000000000000253
- Vermeer WM, Bakker RM, Stiggelbout AM, Creutzberg CL, Kenter GG, ter Kuile MM. Psychosexual support for gynecological cancer survivors: professionals'

current practices and need for assistance. *Supportive Care in Cancer* 2014; 23: 831-839. doi:10.1007/s00520-014-2433-7
- Vermeer WM, Bakker RM, Kenter GG, de Kroon CD, Stiggelbout AM, ter Kuile MM. Sexual issues among cervical cancer survivors: how can we help women seek help? *Psycho-Oncology* 2014; 24: 458-464. doi:10.1002/pon.3663
- Garvelink MM, ter Kuile MM, Bakker RM, Geense WJ, Jenninga E, Louwe LA, Hilders CGJM, Stiggelbout AM. Women's experiences with information provision and deciding about fertility preservation in the Netherlands: 'satisfaction in general but unmet needs'. *Health expectations 2013*; 28:956-968. doi:10.1111/hex.12068

Other publications

- Bakker RM, Mens JWM, Creutzberg CL, de Groot HE, Tuijnman-Raasveld CC, Braat C, Hompus WCP, Poelman JGM, Laman MS, de Kroon CD, van Doorn HC, ter Kuile MM. Aandacht voor het herstel van de seksualiteit: Begeleiding na radiotherapie bij gynaecologische kanker. *Oncologica* 2016; 33: 30-34.
- Bakker RM, ter Kuile MM, Vermeer WM, Nout RA, Mens JWM, van Doorn HC, de Kroon CD, Hompus WCP, Braat C, Creutzberg CL. Seksuele problemen na radiotherapie bij gynaecologisch oncologische tumoren. In: Slager E., editors. *Reproductieve geneeskunde, Gynaecologie en Obstetrie anno 2015*. Haarlem: DCHG., pp 55-60.
- Vermeer WM, Stiggelbout AM, Kenter GG, Bakker RM, ter Kuile MM. Behoefte van vrouwen en hun partners aan seksuologische ondersteuning na behandeling van baarmoederhalskanker. *Tijdschrift voor Seksuologie* 2014; 38(3): 111-116.

In the press

- Transler C. Het gebruik van vaginale pelotteset: Het herstel van seksualiteit na radiotherapie. *Olijfschrift* 2015; 30: 5-7.
- Vegter MA. Klachten na de behandeling van gynaecologische kanker. *Olijfschrift* 2015. Beschikbaar via https://www.kanker.nl/organisaties/olijf/6834-klachten-na-de-behandeling-van-gynaecologische-kanker
- Tamminga SJ. Interventie uitgelicht. Psychosociale Oncologie NVPO 2015; 23: 10.
- Schultz WCM. Het orakel heeft gesproken: Over de begeleiding bij de seksuele rehabilitatie na bestraling voor gynaecologische kanker. *Nederlands Tijdschrift voor Obstetrie & Gynaecologie* 2015; 28: 51.
- Hillen MA. Onderzoeker uitgelicht. *Psychosociale Oncologie NVPO* 2013; 21:10.

Conference presentations

Oral presentations

- Cervical cancer survivors' sexual distress, associated factors and sexual pain worry: A cross-sectional multicenter observational study. 2016: 42nd Annual International Academy of Sex Research (IASR) Conference, Malmö, Sweden.
- Seksueel revalidatieprogramma voor gynaecologische kankerpatiënten na radiotherapie: Een pilot-studie. 2016: WOG/DGOG symposium, Driebergen.
- Seksuele problemen na radiotherapie bij gynaecologische oncologische tumo-

ren. 2015: 20e Doelencongres Infertiliteit, Gynaecologie en Obstetrie, Rotterdam.
- Kwalitatief onderzoek naar determinanten van vaginale dilator gebruik onder gynaecologische kankerpatiënten behandeld met radiotherapie op het bekkengebied. 2015: 21e Nederlandse Vereniging voor Psychosociale Oncologie (NVPO) Congres, Utrecht.
- Qualitative accounts of patients' determinants of vaginal dilator use after pelvic radiotherapy. 2015: 4th Association for Researchers in Psychology and Health (ARPH) Conference, Gent, België.
- Kwalitatief onderzoek naar determinanten van vaginale dilator gebruik onder gynaecologische kankerpatiënten na radiotherapie. 2014: Nederlandse Vereniging voor Seksuologie (NVVS) Wetenschapsdag, Amsterdam.
- Sexual rehabilitation after radiotherapy for gynecological cancer: Consensus among professionals using the Delphi method. 2014: 13th International Congress of Behavioural Medicine (ICBM), Groningen.
- Seksuele revalidatie na radiotherapie voor gynaecologische kanker. 2014: WOG/DGOG symposium, Driebergen.
- Sexual complaints among cervical cancer survivors: Who suffers the most? 2013: 2nd Annual Association for Researchers in Psychology and Health (ARPH) Conference, Enschede.
- Objective measurement of sexual arousal in women with Diabetes Mellitus type I. 2012: Wetenschappelijke Vereniging voor Seksuele Dysfunctie (WVSD) Congres, Ede-Wageningen.
- Cervical cancer survivors' sexual distress, associated factors and sexual pain worry: A cross-sectional multicenter study. 2017: 6th Annual Association for Researchers in Psychology and Health (ARPH) Conference, Leiden.
- Pelottebehandeling bij vrouwen met gynaecologische kanker na radiotherapie. 2017: 21e Nederlands-Vlaams Doelencongres Infertiliteit, Gynaecologie en Obstetrie, Rotterdam.

Poster presentations
- Bakker RM, Mens JWM, de Groot HE, Tuijnman-Raasveld CC, Braat C, Hompus WCP, Poelman JGM, Laman MS, Velema LA, de Kroon CD, van Doorn HC, ter Kuile MM, Creutzberg CL. A sexual rehabilitation programme for gynaecological cancer patients after radiation therapy: Final results of a pilot-study. 2016: 16th Biennial Meeting of the International Gynecologic Cancer Society (IGCS), Lissabon, Portugal.
- Bakker RM, Mens JWM, de Groot HE, Tuijnman-Raasveld CC, Braat C, Hompus WCP, Poelman JGM, Laman MS, Velema LA, de Kroon CD, van Doorn HC, Creutzberg CL, ter Kuile MM. A sexual rehabilitation programme for gynaecological cancer patients after radiation therapy: Final results of a pilot-study. 2016: 18th International Psycho Oncology Society (IPOS) Congress, Dublin, Ireland
- ter Kuile MM, Mens JWM, de Groot HE, Tuijnman-Raasveld CC, Braat C, Hompus WCP, Poelman JGM, Laman MS, Velema LA, de Kroon CD, van Doorn HC, Creutzberg CL, Bakker RM. A pilot study of a sexual rehabilitation programme for gynaecological cancer patients after pelvic radiation therapy. 2016: 42nd Annual International Academy of Sex Research (IASR) Conference, Malmö, Sweden.

- Bakker RM, Mens JWM, de Groot HE, Tuijnman-Raasveld CC, Braat C, Hompus WCP, Poelman JGM, Laman MS, Velema LA, de Kroon CD, van Doorn HC, Creutzberg CL, ter Kuile MM. A pilot-study of a sexual rehabilitation programme for gynecological cancer patients after radiotherapy. 2015: 19th European Gynaecological Oncology (ESGO) congress, Nice, France.
- Bakker RM, Vermeer WM, Stiggelbout AM, Kenter GG, ter Kuile MM. Factors related to sexual distress among cervical cancer survivors and their partners: A cross-sectional multicenter observational study. 2015: World Congress American Psychosocial Oncology Society & International Psycho-Oncology Society (APOS/IPOS), Washington DC, United States.
- Bakker RM, Vermeer WM, Creutzberg CL, Mens JWM, Nout RA, ter Kuile MM. Sexual rehabilitation after pelvic radiotherapy: Patient-reported determinants of vaginal dilator use. 2014: 40th Annual International Academy of Sex Research (IASR) Conference, Dubrovnik, Kroatië.
- Bakker RM, Mens JWM, de Groot HE, Tuijnman-Raasveld CC, Braat C, Hompus WCP, Poelman JGM, Laman MS, Velema LA, de Kroon CD, van Doorn HC, Creutzberg CL, ter Kuile MM. A nurse-led sexual rehabilitation intervention after radiotherapy for gynaecological cancer. 2017: 6th Annual Association for Researchers in Psychology and Health (ARPH) Conference, Leiden.

Curriculum vitea

Rinske Bakker werd op 7 oktober 1985 geboren te Amsterdam. Tijdens haar middelbareschooltijd woonde zij in Lelystad, alwaar zij in 2003 haar VWO-diploma haalde op de Interconfessionele Scholengemeenschap Arcus. In datzelfde jaar startte zij met de Bachelor Psychobiologie aan de Universiteit van Amsterdam. Na haar Bachelordiploma te hebben behaald (2006) (bene meritum, met genoegen) kwam ze - na een half jaar reizen in Zuidoost Azië - tot de conclusie minder in het lab en meer in de praktijk geïnteresseerd te zijn. In de jaren die volgden werden zowel de Bachelor Klinische Psychologie (2010) als de Honoursmaster Gezondheidszorgpsychologie (2011) afgerond (bene meritum, met genoegen) aan de Universiteit van Amsterdam. Tijdens haar afstudeerstage in 2010-2011 was ze 10 maanden werkzaam op de polikliniek Psychosomatische Gynaecologie en Seksuologie, afdeling Gynaecologie, in het Leids Universitair Medisch Centrum (LUMC) te Leiden. Na het behalen van haar masterdiploma in 2011 startte ze daar als onderzoeksassistent op het KWF-project “Sexual complaints in female cancer survivors: Is there a need for treatment?”. Vanaf begin 2012 werd zij op deze afdeling aangesteld als PhD-kandidaat.

Haar promotieonderzoek is zij blijven combineren met een dag per week patiëntenzorg; tijdens de eerste drie jaar in een psychotherapiepraktijk in Amsterdam en in het laatste jaar op de polikliniek Psychosomatische Gynaecologie en Seksuologie in het LUMC. Daarnaast heeft zij in 2015 de post-masteropleiding ‘Basiscursus Cognitieve Gedragstherapie’ afgerond. Van 2015 tot 2017 is Rinske tevens actief lid geweest van de werkgroep Wetenschappelijk Onderzoek van de Nederlandse Vereniging voor Psychosociale Oncologie (NVPO).

Na het afronden van haar PhD start zij per 1 april 2017 met de opleiding tot Gezondheidszorgpsycholoog op de polikliniek Seksuologie/Psychosomatische Gynaecologie en de afdeling Medische Psychologie in het Academisch Medisch Centrum (AMC) te Amsterdam.

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