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Original Article

Brachytherapy for locally advanced cervical cancer: A survey of UK provision of care and support

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ABSTRACT

Background and purpose: Gynaecological brachytherapy can cause anxiety, distress and discomfort. It is not known how variation in delivery impacts women's experiences. To inform future research an online survey was carried out to identify variations in brachytherapy and support available to women receiving treatment for locally advanced cervical cancer (LACC).

Materials and methods: An online survey was sent to 44 UK brachytherapy centres using the Qualtrics® survey platform. It included questions about brachytherapy scheduling, inpatient/day case treatment, anaesthetic/analgesia, non-pharmacological support and health professionals' opinions regarding holistic care. A mixture of closed questions with pre-specified options and open questions were employed. Descriptive statistics were generated to identify variance in UK practice. Free text responses were analysed using inductive content analysis.

Results: Responses were received from 39/43 eligible centres (91% response rate). Brachytherapy was predominantly given on an inpatient basis at 65% and day case at 35% of centres. Eleven scheduling regimes were reported with typical duration of brachytherapy ranging from three to 52 h. The main categories identified in response to what worked well were: 'consistency of staff'; 'good information provision' and 'experienced/skilled/senior staff'. The main categories identified as needing improvement were: 'training of different staff groups' and 'follow up and support' with many suggestions for service improvements.

Conclusion: The survey provided a comprehensive overview of brachytherapy services for LACC demonstrating wide variability in scheduling regimes, duration of treatment and holistic care. The findings support the need to explore women's experiences with a range of treatment regimes and anaesthesia and analgesia techniques to inform improvements to future clinical care.

A systematic literature review has shown that brachytherapy for gynaecological cancer causes patients varying levels of pain, anxiety and distress and that there is a need for better pain management, patient information and support and the development of non-pharmacological interventions to improve experiences [1]. To date, previous research has not explored non-pharmacological support services (such as psychological support or use of complementary therapies) or the impact of treatment schedules on women's experiences of brachytherapy. To inform future research in this area it is first necessary to acquire knowledge of the ways that brachytherapy is currently provided and the range of existing support offered to women to help them cope with pain, anxiety and distress due to brachytherapy. The aim of this study was to identify current UK service provision for women having brachytherapy for locally advanced cervical cancer.

The objectives were to find out current brachytherapy treatment scheduling, and anaesthesia and analgesia provision for women receiving treatment for locally advanced cervix cancer to inform the development of an interview schedule; and to identify non-pharmacological support currently offered to women before, during and after brachytherapy.

Materials and methods

A cross-sectional survey was developed to gather information from UK centres carrying out gynaecological brachytherapy for locally advanced cervical cancer. Survey questions were informed by research literature [1–4] and discussion with the study team,

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a brachytherapy anaesthetist, a clinical oncologist and two patient research partners.

The survey was piloted by four brachytherapy radiographers resulting in rewording of some questions, to minimise misinterpretation and improve consistency of responses. The final survey consisted of 30 questions covering brachytherapy techniques and scheduling, anaesthetic/analgesia protocols, inpatient/day case treatment and non-pharmacological support such as psychologist input. The survey is provided in supplementary data.

Ethical approval was given by the University Health and Applied Sciences Faculty Research Ethics Committee (UWE REC REF No: HAS.18.08.008).

The survey was distributed via the Qualtrics® survey platform to the 44 UK centres reported to be carrying out brachytherapy for locally advanced cervical cancer listed on the national cancer statistics database. Responses were requested from the lead brachytherapy radiographer as the person most likely to have an overview of the whole brachytherapy service. For three departments there was no lead radiographer identifiable. Email contact was made with these departments and an oncologist or physicist was invited to complete the survey with assistance from nurse or radiographer colleagues.

The on-line survey invitation was emailed out and responses collected over a three-month period from November 2018 to January 2019. For non-respondents a reminder was sent out after one month. The data obtained did not contain personal demographic information although professional opinions were requested. All identifiable features were removed from the data by the doctoral research fellow (PH) prior to sharing with the research team.

Descriptive statistics were used to analyse data from closed questions. Respondents free text comments to closed questions were grouped and summarised. The data from the three open-ended questions were analysed using content analysis. As survey data is uni-directional, without opportunities for co-creation between participant and the researcher, it can be used to provide "quasi- qualitative" data. The analytical process was informed by methods described by Kondracki et al [5], Hsieh and Shannon [6], and Elo and Kyngäs [7] using an inductive or "grounded" approach, with codes and categories arising from the data rather than applying a theory or preconceived ideas to the data. Frequency of codes was used to provide a sense of the significance of the results. The data were initially examined by PH by reading and rereading, to "achieve immersion and obtain a sense of the whole" [6]. Analysis began with open coding of responses. NVivo® software was used to provide a rigorous approach for counting code frequency. Codes that shared a similar meaning were grouped into categories.

Results

One of the 44 UK centres invited to take part in the survey was not eligible as their brachytherapy services had recently been transferred. Of the 43 remaining centres, 39 responses were received (91% response rate); including two from Scotland, one from Northern Ireland and 36 in England. The centre in Wales did not respond.

Most centres reported using high dose rate brachytherapy (36/39, 92%) and only four centres using pulsed dose rate (10%), with one using both HDR and PDR. Table 1 shows responses for type of brachytherapy, intracavitary, interstitial or hybrid (combination of intracavitary and interstitial in the same procedure), and predominant inpatient or day case service.

Eight respondents selected more than one fractionation regime from the nine options provided. Four responses were removed from the data as they did not correlate with responses to other questions, therefore likely to be errors of option selection. Fig. 1 shows the fractionation regimes selected by the respondents with "other" regimes described as "3 fractions (one insertion) over 3 days" and "3 fractions over 2–3 weeks".

Table 1
Type of brachytherapy and inpatient or day case service.

Type of brachytherapy (n = 39)	
Intracavitary	16 (41%)
Interstitial	1 (3%)
Hybrid	2 (5%)
Intracavitary + interstitial	4 (10%)
Intracavitary + hybrid	4 (10%)
Intracavitary + interstitial + hybrid	12 (31%)
Predominant inpatient or day case (n = 37)	
Inpatient	24 (62%)
Day case	13 (33%)

The average duration that applicators were in place for a typical insertion, measured from the start of the applicator insertion to applicator removal, ranged from 3 to 52 h with a median of 16 h. Interrogation of the data, including free text comments, showed the number of insertions predominantly used at each centre (Table 2).

The data indicates that there are 17 centres using long duration regimes involving overnight stays with applicators in place, and 17 centres using shorter duration regimes.

Respondents' comments showed that duration was influenced by factors such as scheduling choice, which is dependent on complexity of treatment (may choose multiple fractions for one insertion for a very complex case) and patient factors such as co-morbidities or contraindications (may choose shorter regime). Respondents provided examples of ways in which duration was shortened including using a Smit sleeve (indwelling intrauterine tube) for subsequent treatments; copy plans; and imaging/re-planning not used before subsequent fractions. Seven respondents commented on delays caused by increased planning time due to increased complexity; new addition of MRI imaging/planning; addition of interstitial needles; doctors in training requiring longer for planning (contouring) and limited access to MRI scanner. Other examples of causes of delays were limited clinician availability for applicator removal, medical complications needing clinician input; variable time needed in recovery room after general anaesthetic and number of cases that day, that is, more cases increases duration.

General anaesthetic (GA) was the most reported type of anaesthesia, by 82% (n = 31/38). Fig. 2 shows the responses for types of anaesthesia routinely used.

Eighteen respondents added free text comments on anaesthesia. Most comments referred to patient suitability, contraindications or medical reasons for anaesthesia selection. Four respondents mentioned patient choice or preference, for example:

"Patients are given a choice of GA or spinal. Most prefer a GA but occasionally we have a patient who would prefer a spinal"

One respondent indicated a different anaesthetic regime for initial and subsequent insertions:

"We only use general anaesthetic for the first fraction. Lorazepam is given 1 hour before subsequent fractions".

Most respondents indicated the use of four or five analgesia options. Fig. 2 shows type of analgesia used and number of respondents selecting each option.

The use of additional analgesia for applicator removal was reported by 68% of respondents (n = 26/38). Details of additional analgesia for applicator removal was provided in a free text comments box by 25 respondents (Fig. 2).

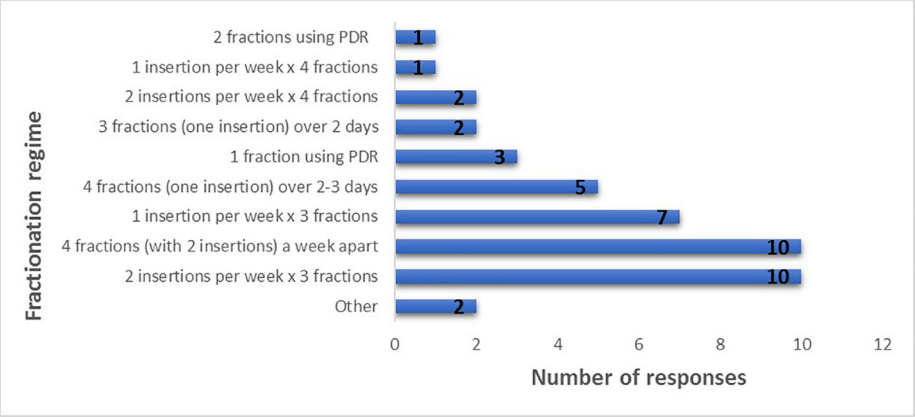

Fig. 1. Fractionation regimes routinely used (n = 34).

Respondents indicated that in most centres information/support was provided by radiographers before and during brachytherapy and by radiographers or specialist nurses after brachytherapy. In addition to the pre-defined categories, in free text comments some respondents reported that additional support was available from clinical psychology and counselling when required instead of routinely, and some patients had access to support facilities at on-site charitable organisations. Fig. 3 shows the type of support routinely provided before, during and after brachytherapy.

Participants were asked to rate how well they thought women were supported before, during and after brachytherapy in their department. Fig. 4 shows the 38 responses.

For the questions relating to what works well, what needs to be improved and adaptations for patients with special needs these data for each question were open-coded and grouped into categories and the number of responses in each category was counted. For each question an example from each category is shown in Table 3. Data from further comments at the end of the survey were managed in the same way and examples presented in Table 3.

Discussion

Survey responses indicated wide variation in insertion regimes with 17 respondents reporting a predominant use of a one or two applicator insertion regime which involved overnight stays with applicators in place, and 17 reporting three or four insertion regimes of shorter durations. This variation in regime choice has led to the large range of typical duration of applicators in place, from three to 52 h. The free text comments indicated that this wide disparity had arisen for complex operational reasons, such as access to operating theatres, availability of ward beds, numbers of oncologists and physicists and access to imaging facilities such as MRI. There was no evidence of patient input into individual treatment plans or service design, although this was not explicitly asked in the survey. Brachytherapy for cervical cancer causes patients varying levels of pain, anxiety and distress, and it has been proposed that the duration of the procedure and repetition of the procedure will impact on women's experiences [1]. Interstitial or hybrid techniques and use of MRI planning has been recommended and widely implemented, with the aim of improving local tumour control [2,4,8–12]. However, decisions on how to implement this development have been left to individual centres, as they have many different logistical factors to consider. Although service users cannot comment on lived experiences of different regimes, it would be useful to obtain their feedback on the brachytherapy insertion regime that they experienced so their views can be taken into consideration when deciding future fractionation regimes.

Table 2
Typical number of applicator insertions (n = 34).

Typical number of applicator insertions	1	2	3	4
Number of respondents (n = 34)	10	7	14	3

It is widely recognised that interstitial brachytherapy is likely to cause patients more pain than intracavitary brachytherapy [10,13,14]. Two studies which reported anaesthesia/analgesia regimes with long durations of interstitial brachytherapy had good outcomes using Patient Controlled Analgesia (PCA) after a general anesthetic [15] or a combined epidural medication [13]. In this survey six respondents reported no use of PCAs or epidural with long duration regimes. Further research is needed to assess women's experiences of pain with or without the use of continuous pain management (PCA or epidural) and for long duration procedures with interstitial needles.

Applicator removal has been reported to be the most problematic part of brachytherapy. One study reported that instrument removal was "the most physically uncomfortable aspect" and another that "maximal levels of pain coincided with applicator manipulation during insertion and removal" [16,17]. Smith et al. [18] reported a sudden increase in pain during applicator removal, at a time when other analgesia had worn off. They concluded that inhalation of nitrous oxide gas was appropriate to minimise this short term discomfort as it is short acting, easy to administer and has a rapid effect due to absorption into the blood stream through lung alveoli. A retrospective five year analysis in a single centre recommended that regional anaesthesia should continue until the end of the brachytherapy, including applicator removal [19]. In the current survey almost a third of respondents reported no additional analgesia being routinely offered at applicator removal. Where it was offered, the most popular additional drug at applicator removal was nitrous oxide and oxygen gas (Entonox®/gas and air). For some respondents the use of continuous pain management with PCA or epidural or spinal anaesthetic for short procedures may be considered sufficient for applicator removal. However, there were four centres that did not use continuous pain management techniques and did not routinely offer any additional analgesia at applicator removal. This was corroborated with some free text comments about analgesia needing to be improved. Therefore, inadequate pain management, especially for applicator removal is likely to still be a problem for some patients.

Some respondents indicated little experience of patients with special needs such as learning disabilities, dementia, victims of sexual abuse or female genital mutilation. This may reflect the

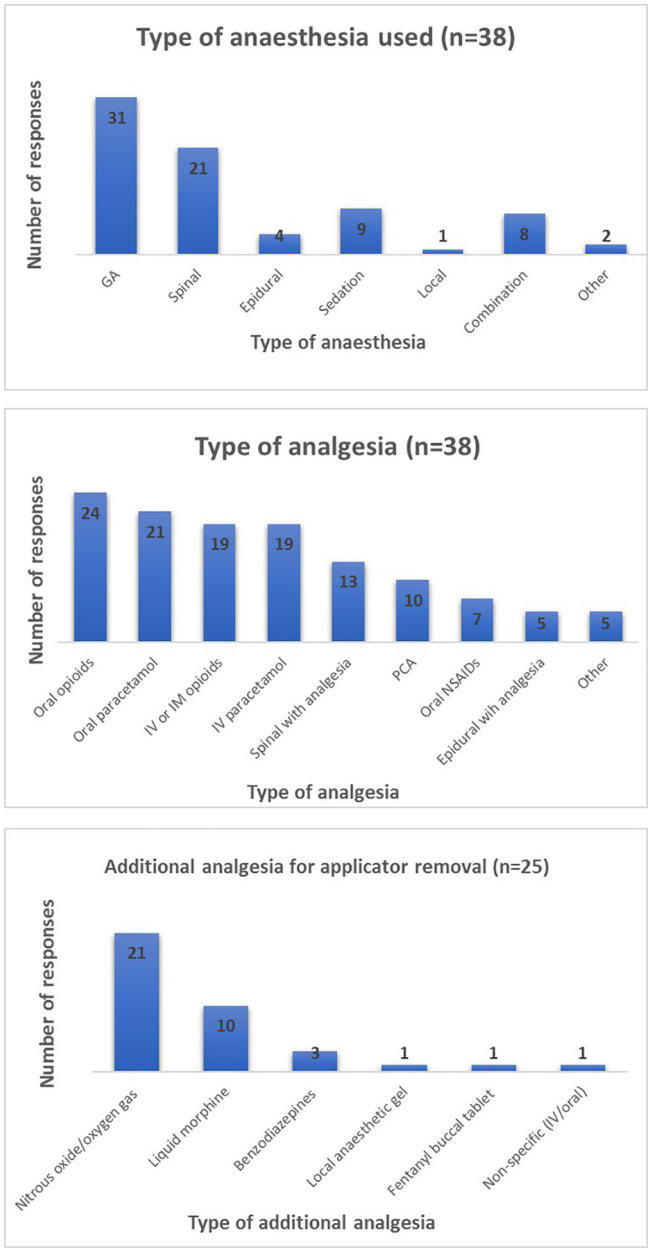

Fig. 2. Type of anaesthesia; Type of analgesia; Additional analgesia for applicator removal. Abbreviations: IV = Intravenous; IM = Intramuscular; PCA = Patient controlled analgesia; NSAIDS = Non-steroidal anti-inflammatory drugs.

low numbers of women having this type of brachytherapy, especially in smaller centres. However, it is important to consider that in the UK the incidence of women who experience domestic violence during their lifetime is one in four, and one in five for sexual assault [20]. Therefore, it may be assumed that clinicians will sometimes be unaware of patients' histories and access to additional support for brachytherapy would not have been sought. However, it is encouraging to see that many respondents in this survey reported that they have access to specialist support services and would assess and adapt their provision according to individual patient needs, assuming that those with special needs are identified.

Respondents rated highly the support given to patients at their centre before, during and after brachytherapy. In relation to what worked well, respondents referred to continuity of care, experienced staff, building trust and rapport and dedicated staff.

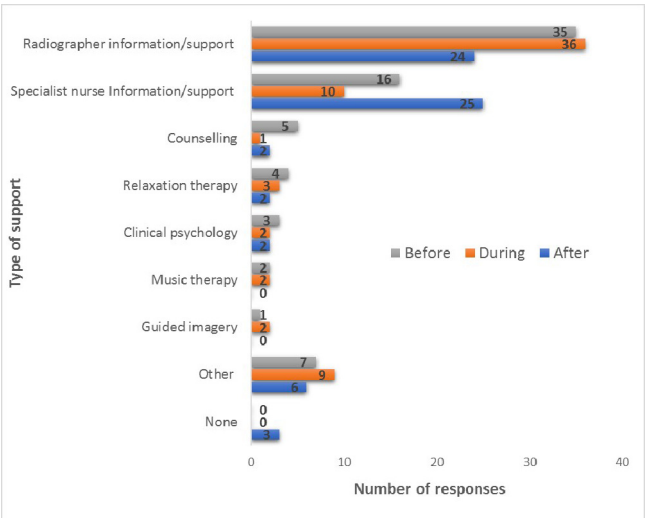

Fig. 3. Support routinely provided before, during and after brachytherapy (n = 38).

However, some responses regarding what needed to be improved identified care on the wards and education of ward and other staff. In a previous interview study, many women commented on their "Supportive treatment team (specialized staff members brachytherapy)" [21]. This contrasts with a report of the lived experiences of receiving LDR or PDR brachytherapy, where women reported some negative aspects of care, mostly relating to nursing care on the wards. Some women were distressed by nurses "lack of understanding of the technology associated with the treatment" and an uncaring attitude or awareness of the ordeal that they were going through. Participants reported inconsistent care in pain management, and a lack of help with basic hygiene and empathy and understanding [22]. Overall, the literature suggests mixed experiences that may be dependent on the level of knowledge, skill and experience of individual members of the brachytherapy or ward nursing teams and the supportive relationship they develop with patients. This is similar to contrasting and sometimes contradictory findings in this survey, that staff views on provision of support are highly positive but some state that provision of care and staff education needs improvement. Further research is therefore warranted to explore patients' views of care and support at each stage of treatment.

Survey respondents commented on the good provision of information and frequent opportunities for patients to ask questions.

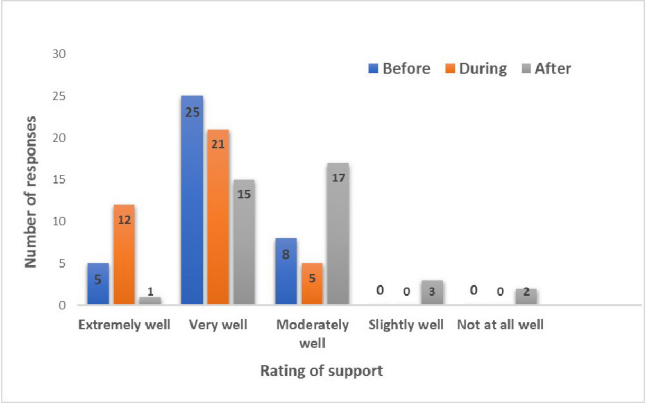

Fig. 4. How well do you think women are supported before, during and after brachytherapy in your department? (n = 38).

Table 3
Free text answers and comments.

SURVEY Question	Category	Example of response	n^*
WHAT WORKS WELL IN YOUR DEPARTMENT? NUMBER OF RESPONSES TO QUESTION = 33 (85% OF TOTAL SAMPLE)	Consistency of staff	*. . .knowing the same radiographer from the start of EBRT to brachy support on day.*	19
	Good information from staff	*I feel that we give a lot of information at different times during the EBRT pathway so that patients are well informed about the brachytherapy treatment.*	18
	Experienced, skilled, senior staff	*We have a very focussed female oncologist, 2x CNS and specialist gynae surgical ward nurses plus brachytherapy/review radiographer.*	13
	Appropriate analgesia	*Pain relief is assessed from one week to the next to discuss which drug will best suit the patient in the PCA.*	6
	Service improvements and developments	*MDT team looking for ways to improve patient experience and service developments to reduce pathway length on the day for patients.*	6
	Relationships of trust, rapport and empathy from staff	*They are treated by a small team, all who have met the patient before, so there is already a relationship and a rapport with the patient.*	5
	Good follow up/aftercare	*We do radiographer led calls and follow ups at 3 and 6 weeks for support and to offer advice re dilators. Patients find it helpful to know they can contact us at any time. . .*	4
	Provision of good facilities	*We have our own theatre which is on the day unit where the patients are cared for and this is a great bonus.*	4
	Patient care on wards	*. . .dedicated HDR sisters provide one to one care during inpatient stay.*	4
	Good teamwork	*Good relationships and communication between all staff members involved in patient care.*	2
	Access to psychological support	*. . .ongoing support during treatment and referrals for Psych Onc where appropriate.*	1
WHAT NEEDS TO BE IMPROVED IN YOUR DEPARTMENT? NUMBER OF RESPONSES TO QUESTION = 32 (82% OF TOTAL SAMPLE)	*Training for different staff group*	*Support for radiographers, ongoing training etc to deal with the emotional side of the treatment experience.*	12
	Follow up and support after brachytherapy	*Patients have a 10 day telephone F/U following completion of Brachy. They have a 3 month F/U in Gynae. I don't feel this is adequate for some women.*	10
	Pharmacological management	*It is being discussed whether to provide GA patients with a spinal block to aid with the control of the discomfort.*	6
	Appropriate allocation of staff	*We have no dedicated brachy radiographer- very physics and technician led. . .*	6
	The patient pathway	*Access to the MRI facilities at the times required improved to save the waiting time*	6
	Obtain and use patient feedback	*Since introducing hybrid technique (interstitial/intracavitary) we have not got patient feedback.*	4
	Care on wards	*Improvements in the care and understanding of the procedure on the ward.*	3
	Ward facilities	*Although we try and allocate a side room to each patient, it isn't always possible.*	2
	Access to complementary therapies	*Need more therapists to provide relaxation while patients on ward.*	2
	Information and support	*I would like to ask some of our patients to consider writing a short paragraph about their experience to show to future patients to alleviate their concerns/provide support before treatment.*	2
	Technical developments	*Patients often report that they are transferred a great deal and the ward is at the opposite end of the hospital to the scanner. If we moved to MRI planning scan only this would reduce the moving.*	2
ADAPTATIONS FOR PATIENTS WITH SPECIAL NEEDS, FOR EXAMPLE LEARNING DISABILITIES, DEMENTIA, VICTIMS OF SEXUAL ABUSE OR FEMALE GENITAL MUTILATION NUMBER OF RESPONSES TO QUESTION = 33 (85% OF TOTAL SAMPLE)	Access to specialist support	*We have an 'additional needs team' that we can call on if we have patients that need extra help or support.*	14
	Identify and assess individual patients' needs	*Each patient is treated as an individual and everything is tailored to individual needs as far as possible.*	13
	Counselling or psychological support	*We have involved clinical psychologists early on to prep ahead for particularly anxious patients/ history of sexual abuse.*	8
	Extra CNS or radiographer support	*Unfortunately that support is limited to CNS and radiographers, we do not have routine counselling services.*	5
	Adaptations to treatment	*Altered fractionation and library plan available for patients unable to tolerate/cope with inpatient procedure.*	5
	Involvement of family/carers	*On occasion we have had family members present in theatre for patients with learning difficulties for example.*	4
	Appropriate information and support throughout	*Information and communication throughout.*	3
	Staff get to know the patient over time	*. . .we get to know the patient well from first consultation and support them throughout the entire course of treatment.*	2
	Consistency of staff/familiar face	*We also follow the patients through the dept from theatre to MRI then CT and back to the ward, so they have a familiar face with them throughout the procedure.*	2
	Extra time	*Allow extra time for information and support meetings with the patients.*	2
	Earlier involvement	*. . .we would arrange to meet with the patient earlier in their pathway to sensitively address any*	2

Table 3 (*continued*)

SURVEY Question	Category	Example of response	n^*
		issues and individualise our approach accordingly.	
	Consider gender of staff	*Both male and female staff are available according to the patients … requests.*	2
	Accommodate patient's requests	*I am not sure we have needed it but will always work with requests from patients.*	2
FURTHER COMMENTS NUMBER OF RESPONSES TO QUESTION = 13 (33% OF TOTAL SAMPLE)	Follow up support and late effects	*…I suspect that this type of treatment could have significant mental effect and that survivorship support needs to address this as well as long term physical effects…*	4
	Treatment duration/number of treatments	*The possible option of moving to a 4 fraction technique will have implications- a longer stay or multiple implants (both will be harder for the patient).*	4
	Pain management at applicator removal	*…removal of the applicators using 'gas + air' has triggered thoughts about child-birth and has been described by one as the most horrendous part of her whole treatment.*	3
	Success/survival rates/ outcomes	*… it is heart breaking to realise how little there is in place to assist patients who don't have a good treatment outcome.*	3
	Resource heavy- time consuming and labour intensive	*It is a very labour intensive, time consuming process and relies very much on the co-operation of a huge team of people.*	2
	Interstitial needle introduction	*One of our consultants is keen to move towards interstitial needles for these patients, which is something we currently do not offer.*	2

*n = the number of open-ended responses in each category.

However, Velji and Fitch [22] reported that despite information provision, women did not feel fully prepared for their experience of brachytherapy. The effectiveness of information provision in reducing anxiety and distress is therefore questionable. A study of LDR brachytherapy reported women's satisfaction with information provision, but some negative views caused by a gap between theoretical knowledge and the actual experience of brachytherapy [23]. A study of the informational needs of women having brachytherapy for locally advanced cervical cancer reported significant unmet needs, such as information about side-effects, sexual intercourse, treatment preparation and appointments [24]. Their findings were used to develop patient-centred guidelines for use by multidiscplinary team members, to integrate patient experience into the development process [25]. The findings from this survey support the need to explore women's experiences of brachytherapy and suggestions for improvement in different UK settings. Recommendations from a recent study to improve well-being for women receiving vaginal brachytherapy (post hysterectomy) will be considered for comparison [26].

There are some limitations to this study as questionnaires do not provide an opportunity for the researcher to clarify ambiguities or check that questions have been interpreted correctly. It is also not possible to seek additional information via survey although the opportunity for respondents to provide free text comments did add valuable detail.

Conclusions

The excellent response rate to the survey provided a comprehensive overview of brachytherapy service provision for LACC which is highly likely to be representative of service provision in the UK. This survey has demonstrated a wide variability in scheduling regimes and duration of treatment. Anaesthesia (GA or spinal) was reported to be used in all centres but analgesia after applicator insertion and for applicator removal was more variable. Whilst these factors are highly likely to impact on women's experiences it is important not to make assumptions but to ask the service users directly. The findings therefore support the need to explore women's experiences with a range of different treatment regimes and anaesthesia and analgesia techniques to inform improvements to future clinical care.

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Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.radonc.2021.03.007.

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