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One-week adjuvant breast radiotherapy: Retrospective outcomes from a Johannesburg oncology unit

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Background: A 1-week, ultra-hypofractionated adjuvant radiation regimen has been found to be non-inferior to the standard 3-week regimen in women with early breast cancer.

Aim: The study aimed to compare the patient and treatment characteristics of women receiving a 1-week (26 Gy in 5 fractions) and standard 3-week (40 Gy in 15 fractions) adjuvant radiotherapy schedule.

Setting: A radiation oncology unit in a quaternary state hospital, Charlotte Maxeke Johannesburg Academic Hospital, in South Africa.

Methods: A retrospective review of medical records of women who received adjuvant breast radiotherapy between June 2020 and February 2022. Patient characteristics, treatment characteristics and acute toxicities were compared between those treated with the 1-week (26 Gy in 5 fractions) and the standard 3-week (40 Gy in 15 fractions) regimens.

Results: Of 123 patients included, the median age was 51 years (range 29–75); 53.6% had stage III disease. Thirteen per cent received the 1-week regimen, and 87% received the 3-week protocol. Rates of acute dermatitis (p = 0.37), pneumonitis (p = 1.00), and fatigue (p = 1.00) were similar between groups. Waiting time to treatment was not significantly different (p = 0.67).

Conclusion: Early toxicity profiles of the 1-week regimen are comparable to the standard 3-week protocol, supporting its feasibility in a public sector, low and middle-income country (LMIC) setting.

Contribution: This study contributes to the growing body of research on breast cancer treatment and outcomes in LMICs.

Keywords: adjuvant breast radiation; breast cancer; hypo-fractionation; radiation planning; adjuvant treatment; oncology.

Introduction

The incidence of breast cancer has increased globally with GLOBOCAN (Global Cancer Statistics) 2020 reporting that the worldwide incidence of breast cancer surpassed lung cancer as the most frequently diagnosed cancer. In South Africa, breast cancer was ranked the most prevalent with a 14.3% incidence and ranked as the third most prevalent cause of cancer-related mortality.[1] The 3-year survival of women diagnosed with breast cancer in sub-Saharan Africa is estimated at 50%.[2] This contrasts to women in high-income countries (such as the United States) with a reported 3-year survival of 90.2% for women treated between 2000 and 2014.[3] In sub-Saharan Africa, a shortage of radiation therapy services, advanced disease stage at presentation, presence of multiple co-morbid diseases, and sub-optimal treatment are some factors contributing to poorer outcomes and increased mortality among breast cancer patients.[4]

Adjuvant radiation therapy to the breast, following breast-conserving surgery (BCS), is the standard of care for early breast cancer and accounts for a third of radiation treatments prescribed.[5] The conventional regimen of 50 Gy delivered in 25 daily fractions (2 Gy per fraction over 5 weeks) was first described in the landmark 1973 Milan trial, which compared radical mastectomy to BCS followed by whole-breast irradiation. This pivotal study marked the beginning of a new era in early breast cancer treatment, demonstrating that disfiguring surgery could be avoided without compromising outcomes.[6]

Hypofractionated radiotherapy schedules were designed to minimise radiotherapy toxicity, maximise tumour control and potentially minimise treatment time.[7] The Early Breast Cancer Trialists' Collaborative Group evaluated the safety and efficacy of hypofractionated radiotherapy for breast cancer in the randomised START (standardisation of breast radiotherapy hypofractionation for the treatment of early breast cancer) trials.[8] This moderately hypofractionated radiation therapy schedule of 40 Gy – 42.5 Gy in 15–16 daily fractions (3-week schedule) became the internationally accepted standard of care, alongside the 50 Gy (5-week) schedule, following evidence from the START A and B trials that confirmed the shorter regimen to be non-inferior to the standard treatment schedule.[9,10]

The UK FAST-Forward trial further evaluated 2 ultra-hypofractionated regimens of 5 fractions each, to the whole breast or the chest wall post-surgery.[11] Patients were randomised to 40 Gy in 15 fractions (3-week) as the standard of care arm (moderate hypofractionation) with the 1-week ultra-hypofractionated arms scheduled as 27 Gy in five weekly fractions over 5 weeks or 26.5 Gy in five daily fractions over 1 week. A 26 Gy in 5 daily fractions (5.2 Gy per fraction) schedule demonstrated non-inferiority to the standard of care 3-week regimen with milder early skin reactions and comparable rates of late adverse effects.[11] In this article, we compare a 1-week adjuvant breast cancer radiation therapy regimen to the 3-week regimen – the latter having been implemented in our department during the coronavirus disease 2019 (COVID-19) pandemic.

Methods

Patient selection and work-up

The medical records of all patients with non-metastatic (invasive or in situ) breast cancer who were prescribed adjuvant breast radiation therapy between 01 June 2020 and 28 February 2022 at Charlotte Maxeke Johannesburg Academic Hospital (CMJAH) were assessed. All patients over the age of 18 years with non-metastatic breast cancer who had undergone BCS or mastectomy were included in the study. Anatomic and prognostic disease staging was defined according to the American Joint Committee on Cancer (AJCC) 8th edition based on the tumour, node, and metastatic (TNM) status. Tumour grade and biomarker status (hormone receptor [HR] and human epidermal growth factor receptor 2 [HER2] status) were also considered.[12] The medical records of patients who received adjuvant chemotherapy and/or endocrine therapy were included. Patients treated before the introduction of the 1-week regimen and those with metastatic disease were excluded.

Data collection

A digital data collection form was used to extract the following information from patient medical records: age at the time of referral for radiation therapy, gender, race, TNM stage, laterality of disease (invasive or in situ), histological diagnosis, molecular subtype classification, and the time interval from surgery to initiation of radiation therapy. Additional treatment-related parameters were obtained from the radiation treatment planning system, including the radiation schedule administered (3-week vs. 1-week), use of a boost, radiation technique employed, application of motion management techniques such as deep inspiration breath hold (DIBH), and whether radiation dose constraints were met. The acute toxicities documented included acute dermatitis, pneumonitis, oesophagitis and radiation-related fatigue, which were graded according to the Common Terminology Criteria for Adverse Events (CTCAE).[13]

Radiation therapy technique

Patients were planned according to the original FAST-Forward trial protocol, with adaptations made in accordance with institutional guidelines to meet radiotherapy planning constraints – specifically, dose limits designed to minimise normal tissue toxicity.[14] Computed tomographic (CT) simulation was performed with patients positioned supine and immobilised on a breast board with arms elevated.

For patients with left-sided tumours who were prescribed the 1-week regimen, DIBH was employed during simulation to reduce cardiac radiation exposure. Patients unable to sustain breath hold and those with risk factors for cardiotoxicity – such as underlying cardiovascular comorbidities, advanced age, or prior exposure to anthracycline-based chemotherapy or anti-HER2 agents – were reassigned to the 3-week regimen.

A three-dimensional conformal radiation therapy (3D-CRT) technique using opposed tangential fields was used in most cases. If normal tissue constraints could not be met with 3D-CRT, treatment was escalated to a Volumetric Modulated Arc Therapy (VMAT) technique.

All patients treated with the 1-week regimen were planned with VMAT. Planning constraints included limiting the volume of ipsilateral lung receiving 8 Gy to $<15\%$ and restricting the heart volume receiving ≥ 1.5 Gy and ≥ 7 Gy to $< 30\%$ and $< 5\%$, respectively.[14] The breast clinical target volume (CTV) encompassed all glandular breast tissue from 5 mm below the skin to the deep fascia, excluding the chest wall (intercostal muscles and rib cage), as per the European Society for Radiotherapy and Oncology (ESTRO) consensus guidelines.[15] The heart, both lungs, the contra-lateral breast, and the spinal cord were contoured as organs at risk for normal tissue side effects.

An additional boost to the tumour bed was given to women younger than 50 years and to older patients with high-risk features such as Grade 3 disease, lymphovascular space invasion (LVSI), or extensive ductal carcinoma *in situ* (DCIS). In the 3-week regimen, patients requiring a tumour bed boost received a simultaneous integrated boost (SIB) to a total dose

of 48 Gy, with 3.2 Gy delivered per fraction to the tumour bed over 15 fractions. This approach is supported by evidence from the phase II German ARO trial, which demonstrated the feasibility and safety of a moderately hypofractionated whole-breast schedule incorporating a simultaneous boost.[16] A single boost fraction of 5.2 Gy was prescribed sequentially in patients who received the 1-week regimen. The tumour bed was delineated using surgical clips placed at the time of surgery. In cases where clips were not available, diagnostic imaging and identification of the seroma cavity were used to define the tumour bed.

To ensure treatment accuracy, daily verification imaging was performed for patients receiving the 1-week regimen using cone beam computed tomography (CBCT). For patients treated with the 3-week departmental protocol, portal imaging was used for treatment verification.

Treatment follow-up

Patients were monitored weekly on radiation therapy treatment. Acute side effects were graded according to the CTCAE criteria. Late toxicities were documented in patients who were followed up 6 weeks after completion of radiation therapy. Patients were then seen for follow-up visits every 3 months. At the time of data collection, the 1-week protocol had not been implemented long enough to observe all enrolled patients beyond 6 weeks.

Statistical analysis

Descriptive statistics were performed on the observed variables. Categorical variables were presented as frequency and percentages with the continuous variables, such as the age and time interval from surgery to radiotherapy, being presented as median and interquartile range (IQR). The association between radiotherapy (RT) schedule and categorical variables was assessed using Pearson's Chi-Square or Fisher exact test. Mann–Whitney *U* test was used to compare continuous variables and schedules. A p-value < 0.05 was considered statistically significant. Data were analysed using Stata version 15 (StataCorp., Stata Statistical Software, College Station, TX, United States).

Ethical considerations

Consent to conduct the study at the institution and to access patient files was obtained from the Chief Executive Officer of CMJAH as well as the head of the Department of Radiation Oncology. The University of the Witwatersrand Human Research Ethics Committee (Medical) granted full ethical approval, and ethics approval was received on 06 July 2022, with ethics approval number M220424.

Results

Patient characteristics

Table 1 presents the demographic and tumour characteristics of patients treated with the 1-week and 3-week regimens. Of the total cohort, 16 patients (13%) received the 1-week regimen, while 107 patients (87%) received the 3-week regimen. The median age was 51 years (IQR: 44–59), with the majority falling within the 40–49 years (n = 38, 31%) and 50–59 years (n = 38, 31%) age groups. There was no significant difference in age distribution between the two groups (p = 0.215).

Most patients were of black race (n = 100, 81%), and left-sided tumours were present in 65 patients (53%). A majority of the cohort (n = 79, 64%) presented with stage III disease. All patients in the 1-week regimen group had T2 tumours or smaller (n = 16, 100%), whereas the 3-week group had a broader distribution with many patients presenting with T2–T4 disease (n = 107, 100%), $p < 0.001$. The most common molecular subtype was HR+/HER2– (n = 75, 61%), with no significant difference in subtype distribution between the two groups (p = 0.119).

Treatment characteristics

Table 2 summarises the treatment characteristics. Neoadjuvant chemotherapy was administered to 56 patients (46%), and adjuvant chemotherapy to 50 patients (41%). In the 1-week group, 10 patients (63%) received neoadjuvant chemotherapy compared to 46 patients (44%) in the 3-week group (p = 0.614).

All 16 patients (100%) in the 1-week group underwent BCS, while 83 patients (78%) in the 3-week group underwent mastectomy ($p < 0.001$). The median time from surgery to radiotherapy was 20.5 months in the 1-week group and 21 months in the 3-week group, with no significant difference (p = 0.404).

A VMAT technique was used in 15 of 16 patients (94%) treated with the 1-week regimen and in 28 of 107 patients (26%) in the 3-week group ($p < 0.001$). Among the 3-week group, 93 patients (87%) received 40.05 Gy in 15 fractions, and 14 patients (13%) received 42.56 Gy in 16 fractions, the previously used departmental standard. In contrast, 16 patients (13%) received 26 Gy in 5 daily fractions under the 1-week protocol.

Five patients, initially eligible for the 1-week regimen, were transitioned to the 3-week protocol due to planning challenges – either inability to meet cardiac dose constraints or failure to maintain breath hold with left-sided disease.

A boost to the tumour bed was delivered to 38 patients (31%) overall, including 10 patients (63%) in the 1-week group and 28 patients (26%) in the 3-week group (p = 0.026).

Acute toxicities and dosimetric outcomes

Acute toxicities documented were primarily skin-related. In the 1-week group, 4 of 15 patients with toxicity documentation (27%) had grade 1 skin dermatitis, described as 'faint erythema or dry desquamation' according to CTCAE criteria. No patients in the 1-week group experienced fatigue, pneumonitis, or oesophagitis (Table 2 and Table 3).

TABLE 1: Demographic and tumour characteristics of patients treated with 3-week and 1-week adjuvant radiation therapy protocols for breast cancer in a radiation oncology unit in Johannesburg, South Africa.

Variables	Total (N = 123)				1 week (n = 16)				3 weeks (n = 107)				p
	n	%	Median	IQR	*n*	%	Median	IQR	*n*	%	Median	IQR	
Age (years)	-	-	51	44–59	-	-	53	48–60	-	-	50	43–58	0.215
Age category (years)	-	-	-	-	-	-	-	-	-	-	-	-	0.609
< 40	18	15	-	-	1	6	-	-	17	16	-	-	-
40–49	38	31	-	-	4	25	-	-	34	32	-	-	-
50–59	38	31	-	-	7	44	-	-	31	29	-	-	-
60–69	23	18	-	-	4	25	-	-	19	18	-	-	-
≥ 70	6	5	-	-	0	0	-	-	6	5	-	-	-
Race	-	-	-	-	-	-	-	-	-	-	-	-	0.735
Black people	100	81	-	-	15	94	-	-	85	79	-	-	-
White people	2	2	-	-	1	6	-	-	17	16	-	-	-
Indian people	3	2	-	-	0	0	-	-	3	3	-	-	-
Mixed race people	18	15	-	-	0	0	-	-	2	2	-	-	-
Tumour stage	-	-	-	-	-		-	-	-	-	-	-	< 0.001
Tis	2	2	-	-	1	6	-	-	1	1	-	-	-
T0	1	1	-	-	0	0	-	-	1	1	-	-	-
T1	6	5	-	-	1	6	-	-	5	5	-	-	-
T2	54	44	-	-	14	88	-	-	40	37	-	-	-
T3	32	26	-	-	0	0	-	-	32	30	-	-	-
T4	28	22	-	-	0	0	-	-	28	26	-	-	-
Nodal stage	-	-	-	-	-	-	-	-	-	-	-	-	< 0.001
N0	27	22	-	-	10	63	-	-	17	16	-	-	-
N1	46	37	-	-	5	31	-	-	41	38	-	-	-
N2	45	37	-	-	0	0	-	-	45	42	-	-	-
N3	1	1	-	-	0	0	-	-	1	1	-	-	-
Nx	4	3	-	-	1	6	-	-	3	3	-	-	-
Group stage	-	-	-	-	-	-	-	-	-	-	-	-	< 0.001
1	1	1	-	-	0	0	-	-	1	1	-	-	-
2	40	32	-	-	15	94	-	-	25	34	-	-	-
3	79	64	-	-	0	0	-	-	79	74	-	-	-
4	1	1	-	-	0	0	-	-	1	1	-	-	-
DCIS-HG	2	2	-	-	1	6	-	-	1	1	-	-	-
Laterality	-	-	-	-	-		-	-	-	-	-	-	0.770
Left	65	53	-	-	9	56	-	-	56	52	-	-	-
Right	58	47	-	-	7	44	-	-	5	48	-	-	-
Histology	-	-	-	-	-		-	-	-	-	-	-	0.244
Invasive carcinoma	121	98	-	-	15	94	-	-	106	99	-	-	-
DCIS	1	1	-	-	1	6	-	-	0	0	-	-	-
Phyllodes	1	1	-	-	0	0	--	-	1	1	-	-	-
Breast cancer subtype†	-	-	-	-	-	-	-	-	-	-	-	-	0.119
HR+ HER2-	74	61	-	-	8	50	-	-	66	63	-	-	-
HR+ HER2+	24	20	-	-	2	13	-	-	22	21	-	-	-
HR- HER2+	4	3	-	-	0	0	-	-	4	4	-	-	-
HR- HER2-	19	16	-	-	6	37	-	-	13	12	-	-	-

IQR, interquartile range; Tis, Carcinoma *in situ*; DCIS-HG, high-grade ductal carcinoma *in situ*; HR, hormone receptor; HER 2; human epidermal growth factor receptor 2.
†, Missing: Molecular subtype (n = 2).

All 16 patients treated under the 1-week protocol met the protocol-defined cardiac dose constraint of <5% of heart volume receiving ≥7 Gy, with a median value of 2.61% (Table 3). However, the secondary constraint – <30% of the heart volume receiving ≥1.5 Gy – was more difficult to achieve, even with DIBH. Lung dose constraints were met in all patients, with the volume of ipsilateral lung receiving ≥8 Gy kept below 15%, and a median value of 14.39% recorded.

Discussion

This single institution study describes the implementation of an ultra-hypofractionated (1-week) adjuvant breast radiation therapy protocol in patients with early breast cancer following BCS or mastectomy. The decision to implement this protocol came after published data confirming the regimen as non-inferior to the moderately hypo-fractionated regimen used in this department. Further rationale for adopting this practice of changing regimen arose in the context of the COVID-19 pandemic, which severely impacted on patients' access to care, as well as pre-existing service delivery constraints within this resource-constrained department.

In this study of 123 women with breast cancer, 13% received the 1-week regimen and 87% received the 3-week regimen. The women who received the 1-week regimen presented

TABLE 2: Treatment characteristics of patients treated with 3-week and 1-week adjuvant radiation therapy protocols for breast cancer in a radiation oncology unit in Johannesburg, South Africa.

Variables	Total (N = 123)		1 week (n = 16)		3 weeks (n = 107)		p
	n	%	n	%	n	%	
Systemic therapy and surgery characteristics							
Systemic therapy							
Adjuvant hormonal therapy	6	5	1	6	5	5	0.614
Adjuvant chemotherapy	51	41	5	31	46	43	-
Neo- adjuvant hormonal therapy	2	2	0	0	2	2	-
Neo-adjuvant chemotherapy	57	46	10	63	47	44	-
None	7	6	0	0	7	6	-
Type of surgery							
Breast-conserving surgery	40	33	16	100	24	22	< 0.001
Mastectomy	83	67	0	0	83	78	-
Radiation characteristics							
Dose (Gy)							
26	16	13	16	100	0	0	< 0.0001
40.05/42.56	107	87	0	0	107	100	-
Boost							
Received boost	38	31	10	63	28	26	0.026
No Boost	85	69	6	37	79	74	-
Technique							
3D CRT	80	65	1	6	79	74	< 0.0001
VMAT	43	35	15	94	28	26	-
DIBH							
Yes	10	8	9	53	1	1	< 0.0001
No	113	92	7	47	106	99	-
Constraints							
Met	118	96	16	100	102	95	1
Not met for 26 GY	5	4	0	0	5	5	-
Dermatitis†							
Grade 1	15	14	4	27	11	12	0.517
Grade 2	5	5	0	0	5	6	-
Grade 3	2	2	0	0	2	2	-
None	85	79	11	73	74	80	-
Fatigue‡							
Mild	1	1	0	0	1	1	1
None	108	99	16	100	92	99	-
Pneumonitis‡							
None	109	100	16	100	93	100	-
Oesophagitis‡							
Grade 1	8	7	0	0	8	9	0.601
None	101	93	16	100	85	91	-

Note: Time from surgery to radiotherapy (months), Total: median 21, IQR 18–24; 1 week: Median 20.5, IQR 16.5–24.5; 3 weeks: Median 21, IQR 19–24; p = 0.404.
IQR, interquartile range; Gy, Gray; 3D CRT, three-dimensional conformal radiation therapy; VMAT, Volumetric Modulated Arc Therapy; DIBH, Deep Inspiration Breath Holding.
†, missing: n = 16; ‡, missing: n = 14.

with an earlier stage of disease and often received treatment planned using a VMAT technique. Overall, this group experienced minimal side effects compared to those that received the 3-week regimen.

Most of the patients observed over the study period presented with advanced-stage disease limiting the use of the 1-week protocol. As the 1-week regimen was limited to patients with early (T1-T2, N0-N1) disease, the comparison of acute toxicities could not be stage-matched. In the FAST-Forward trial, patients with disease stage pT1-T3 pN0-1 (Stage 1–3A) were randomised to the investigational ultra-fractionation schedules.[11] Most of the patients randomised to the 1-week (5 fractions) investigational arms had disease stage T1c with HR+, HER 2- disease (Luminal A).[11] In contrast, most of the patients in this study (1 and 3-week) had stage 3 disease.

TABLE 3: Constraints of patients treated with 1-week adjuvant radiation therapy protocol for breast cancer in a radiation oncology unit in Johannesburg, South Africa.

Organ	Constraint	Mean	s.d.	Median	IQR
Heart	V7Gy < 5%	2.19	1.93	2.59	0.00–3.36
Heart	V1.5Gy < 30%	74.96	22.46	76.35	64.17–91.49
Heart	Mean Heart Dose (Dmean)	2.61	0.76	2.59	2.17–2.94
Lung	V8Gy < 15%	14.70	1.91	14.39	13.83–16.23

s.d., standard deviation; IQR, interquartile range.

The predominant molecular subtype in the treated patients was still HR+, HER2-. One of the challenges in implementing this protocol was the advanced stage of disease necessitating regional nodal irradiation. Promising data are now emerging supporting the inclusion of regional nodes, which may expand the eligibility of patients for treatment with this regimen.

Acute clinical toxicities were most often related to skin changes (dermatitis). Four of the patients treated with the 1-week protocol (25%) were documented to have grade 1 skin dermatitis which is described as 'faint erythema or dry desquamation' according to the CTCAE skin toxicity grading system.[13] The side effects observed in patients receiving the 1-week treatment schedule were consistent with those reported in the original FAST-Forward trial, which documented similar adverse events in both the standard 3-week regimen and the investigational 5-fraction cohort.[17] Due to the limited sample size, a stratified analysis by disease stage for variables such as stage at presentation and acute toxicities could not be performed. The findings in this study mirrored those of published data with patients treated with the 1-week treatment schedule not observing an increase in acute toxicities. Reduction of radiation-induced heart and lung late side effects is critical in early breast cancer radiotherapy as most patients prospectively have long-term survival and may later encounter treatment-related cardiac and pulmonary morbidity that may compromise their quality of life. Radiation pneumonitis, lung fibrosis, and ischaemic and valvular heart disease are the most significant long-term complications of breast radiotherapy.[18] This is of even greater significance in younger patients who have an extended life expectancy due to improvements in breast cancer-specific mortality from multi-modality treatment approach that is the current standard of care.[19]

A boost radiation dose was administered to 31% of the patients who received either the 3- or 1-week regimen. The original study made allowance for a boost treatment of an additional 10 Gy – 16 Gy delivered in 2 Gy daily fractions.[11] The evidence for the addition of a boost dose was initially described in the European Organisation for Research and Treatment of Cancer (EORTC) Boost versus No Boost trial which escalated the radiation dose in patients with early breast cancer, who had received BCS, with a further 16 Gy after receiving 50 Gy to the whole breast.[20] The trial demonstrated that an additional boost to the tumour bed improved local disease control rates but without a statistically significant difference in overall survival.[20] In this study, 63% of patients who were treated with the 1-week protocol received a subsequent 5.2 Gy single fraction boost. None of the patients on the 1-week protocol were prescribed a conventionally fractionated boost, which therefore did not contribute to an increase in the overall treatment time. The single-fraction sequential boost is currently being evaluated in a subset analysis of the FAST-Forward trial, and data regarding its safety and toxicity have not yet been established.[21]

This study observed that 78% of the patients treated with adjuvant breast radiotherapy had node-positive disease. All but one of the patients treated with the 1-week treatment schedule in this study had less than 3 pathological axillary nodes (N1 disease) with patients being deferred to the 3-week treatment schedule if they required irradiation of the regional nodes (≥ N2 disease). Radiation to the nodes was not part of the original study, but a nodal sub-study (ISRCTN19906132) was undertaken on the same patient cohort, with the additional recruitment of 469 patients with more advanced nodal disease.[22] The sub-analysis (looking at regional nodal irradiation with the ultra-hypofractionated regimen) randomised patients with early to locally advanced disease (pT1-3 pN1-3a M0) to the same 1-week versus 3-week radiation schedules, but with irradiation of the axillary nodes (levels I-IV) where indicated.[22] Data from this prospective sub-study are awaited. An abstract by the investigators sharing their early findings was published in 2022. The preliminary evidence indicates that side effects relating to the arm or shoulder were not increased in patients receiving the 1-week regimen (26 Gy in 5 fractions) compared with the standard 15 fraction regimen (3-week).[22]

One of the primary endpoints was the waiting time from surgery to radiation. This was not statistically different at the median time interval of 21 months. This was likely impacted by the short interval of observation which precluded an assessment on whether the shortened treatment protocol (1-week vs. 3-week) had an impact in shortening the waiting time by increasing the throughput of patients to be treated. Adjuvant chemotherapy was permitted in the original study, when administered after surgery, but concurrent chemotherapy was not permitted. Endocrine therapy for HR-positive breast cancer, and trastuzumab (targeted anti-human epidermal growth factor agent) for human epidermal growth factor (HER-2)-positive patients were administered concurrently with adjuvant radiation where indicated. This was also the practice in this study. There was no significant increase in acute toxicities in these patients, as was the case with the original trial, but it was noted that the patient records were incomplete for side effects in 11% – 13% of cases.

Despite the promising findings on the benefits of shorter radiation schedules in early breast cancer, several studies have shown that there has been a delay from the publication of trial results to the use of novel radiation fractionation regimens in clinical practice. This has been attributed to physicians and patient-related factors including age, stage, need for regional nodal irradiation, and whether a boost to the tumour cavity is indicated.[23,24] The results of the UK FAST Forward trial were published during the COVID-19 pandemic.[25] The pandemic disrupted timeous radiation delivery. The need to mitigate patients' risk of exposure to the viral outbreak, without adversely compromising patients' risk of loco-regional relapse, led to the implementation of the 1-week radiation regimen for breast cancer at CMJAH.[26] The department had been robustly implementing hypofractionation across several other cancer sites including moderate hypofractionation regimens for prostate cancer[27,28] and short-course radiation therapy for rectal cancer.[29]

The inclusion of these shortened regimens in the treatment guidelines of major oncology societies – such as ESTRO, which in its latest guidelines for early breast cancer advocates for 'shorter regimens whenever indicated' – further supports their adoption in clinical practice.[30]

The study had several limitations, including a small sample size, a short follow-up period, and a limited number of variables assessed. The brief observation window constrained the ability to fully evaluate the impact on acute side effects, waiting times, costs to patients and the department, as well as the effects on radiation treatment planning and workflow. Patient-related factors also posed challenges, such as non-compliance with treatment initiation and follow-up schedules, along with missing data in patient records, which reduced the number of evaluable cases. Additionally, challenges related to radiation planning further limited the number of patients who could be treated. While the use of breath-hold techniques, such as DIBH, helped achieve cardiac dose constraints in some cases, it remained difficult in others to meet the low-dose heart constraint. With ongoing training and increased clinical exposure, it is anticipated that the experience gained by radiation therapists will support broader implementation of the 1-week protocol. The potential benefits of hypofractionation in developing countries – particularly in resource-constrained centres – are significant. These include improved access for patients facing geographical barriers, reduced waiting times for radiotherapy following surgery (which may otherwise compromise local tumour control), and lower financial burdens associated with daily travel for prolonged outpatient treatment. These factors collectively justify a more robust and proactive approach to implementing hypofractionated regimens.

Recommendations

Future research could evaluate this regimen in terms of long-term side effects, local disease control, waiting time from surgery to initiation of radiotherapy, and the quality of radiotherapy delivery, compared with the current standard 3–5-week regimens.

Conclusion

This study demonstrated that a 1-week adjuvant radiation therapy regimen is a viable treatment option that may improve the outcomes of women with early breast cancer in resource-constrained settings. While the use of a 1-week adjuvant radiation therapy regimen in early breast cancer is in its fledgling stages in this department, the initial impression is that it could have a positive impact on timeous service delivery, patient's burden of treatment, financial toxicity of treatment on patients, and ultimately patient outcomes.

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Competing interests

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Authors' contributions

T.C. conceived and designed the study, collected data from the medical files, captured the data on an electronic platform, analysed the data and took the lead in writing the article. The supervisors, D.R., B.P., N.M., D.M. and M.H. provided invaluable feedback by assessing the data, guiding the author by vetting the intellectual content and assisting in editing the article. The corresponding author, T.C., and the co-authors, B.P., N.M., M.H., D.M., D.R. granted approval of the final version to be published.

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Data availability

The raw data that support the findings of this study are available from the corresponding author, T.C. and may be provided upon reasonable request.

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