Radiation Dermatitis

A prevention protocol for patients with breast cancer

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BACKGROUND: Patients with breast cancer undergoing radiation therapy can experience dermatologic adverse events. Oncology nurses can advocate for radiation dermatitis (RD) prophylaxis to minimize dermatologic adverse events.

OBJECTIVES: This quality improvement project was conducted to evaluate the effect of implementing an RD prevention protocol. The objectives of this study were to (a) improve clinicians' knowledge of screening, assessment, and prevention of RD in patients with breast cancer and (b) decrease the incidence of RD by 10% at a tertiary care cancer center.

METHODS: Center-wide standards of care were created and implemented. A retrospective chart analysis was performed before and after protocol implementation. An education session was used to analyze protocol effectiveness.

FINDINGS: Surveys completed by nurses (N = 11) before and after the education session demonstrated a significant increase in overall confidence in assessing RD. Statistically significant increases were noted in using topical steroids for prophylaxis.

KEYWORDS
prevention; radiation dermatitis; prophylaxis; pruritus; patient education

DIGITAL OBJECT IDENTIFIER
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DERMATOLOGIC ADVERSE EVENTS ARE COMMONLY SEEN in individuals receiving cancer treatment. An estimated 50% of patients with cancer will be treated with radiation therapy and about 95% of patients who undergo radiation therapy experience radiation dermatitis (RD) (Brown, & Rzucidlo, 2011; Gosselin, Schneider, Plambeck, & Rowe, 2010; Hickok et al., 2005; Hymes, Strom, & Fife, 2006; McQuestion, 2011; Ryan, 2012; Tyldesley et al., 2011). In addition, RD incidence is higher in patients being treated for breast, head and neck, and lung cancers (Wolf & Ling, 2018). Lacouture et al. (2011) reported that patients who experience dermatologic adverse events often require a decrease in dosage by about 36% and cessation of therapy by 72%, respectively.

Acute RD lasts about three months after initial treatment; however, tissue injury ensues hours to weeks after treatment. Clinical presentation of moderate to severe RD occurs in 85%–95% of patients with breast cancer (Hymes et al., 2006; Spalek, 2016).

Radiation therapy may cause skin sensitization, skin integrity alterations, and inflammatory-mediated responses. Patients may experience an onset of an edematous response, skin breakdown, erythema, and discoloration one to four weeks after treatment. The microvasculature is particularly vulnerable to thrombus formation, increasing the likelihood for wound development in the radiation therapy field. Epidermal loss reaches severity most often one or two weeks after the final radiation therapy treatment. One of the primary skin reactions after radiation therapy is faint erythema (Bray, Simmons, Wolfson, & Nouri, 2016). In addition, patients can experience desquamation (dry and moist), skin hemorrhage, edema, and skin breakdown, which can lead to local and systemic infections. Radiation therapy skin toxicities have cumulative effects that negatively impact DNA repair (Bray et al., 2016). Patients who are on combination therapies, such as epidermal growth factor inhibitors and radiation therapy, develop higher grade RD (Burtness et al., 2009; Lacouture et al., 2011); therefore, heightened awareness is required to tailor patient-specific assessments for early detection of skin toxicities related to radiation therapy.

Pruritus with discomfort is a commonly underassessed, misdiagnosed, and inadequately managed dermatologic adverse event. Pruritus is documented to have negative impact on quality of life (QOL) and can lead to dose reductions of cancer treatment (Erturk, Arican, Omurlu, & Sut, 2012;

Lacouture et al., 2011). Xerosis (dry skin) is a common adverse event of irradiated skin, and patients who experience xerosis are more likely to experience pruritus and decreased QOL (McQuestion, 2011; Ryan, 2012; Salvo et al., 2010; Sekiguchi et al., 2015; Wolf & Ling, 2018). Somatic pain and pruritus commonly occur in patients who receive higher doses of radiation therapy (Moore-Higgs, 2007).

The Common Terminology Criteria for Adverse Events (CTCAE), version 4.0, grading system for RD is used to standardize terminology of adverse event severity by grade (1–5) and describes characteristics of adverse events and symptoms (Chen, Acharya, & Setser, 2014; National Cancer Institute, 2010). Prevention and management of RD poses difficulties related to the lack of standard terminology used and inconsistencies with topical recommendations (Meghrajani, Co, Ang-Tiu, & Roa, 2013).

TABLE 1.
EDUCATION SURVEY OF NURSE KNOWLEDGE REGARDING RD (N = 11)

	BEFORE			AFTER		
SURVEY ITEM	$\bar{X}$	SD	M	$\bar{X}$	SD	M
Rate your confidence in:						
Screening for RD	1.36	0.51	1	2.55	0.52	3
Assessing for RD	1.82	0.75	2	2.64	0.92	3
Educating patients about skin care	1.64	0.51	2	2.55	0.69	3
Preventing RD	1	0	1	2.45	0.52	2
Grading RD using CTCAE	1	0	1	2.18	0.41	2
Identifying grade 1 RD	1	0	1	2	0.45	2
Identifying grade 2 RD	1	0	1	2.55	0.69	2
Identifying grade 3 RD	1	0	1	2.45	0.69	2
Identifying grade 4 RD	1	0	1	2	0.45	2
Monitoring RD	1.27	0.47	1	2.27	0.91	2
Recommendations for preventing RD	1	0	1	2.18	0.41	2
Knowing where to locate my organization's RD prevention standards of care	1.91	0.94	2	2.64	0.67	3
Readiness for implementing RD prevention	2.45	0.69	2	3	0.78	3

CTCAE—Common Terminology Criteria for Adverse Events; M—median; RD—radiation dermatitis
Note. Scores range from 1 (not confident at all) to 5 (extremely confident).

"Radiation dermatitis can cause devastating symptoms, including infection, pain, and therapy interruption."

Practice Improvement Project

A prevention protocol was developed by an RD prevention taskforce at Memorial Sloan Kettering Cancer Center to assist healthcare professionals in minimizing the severity of RD in patients with breast cancer. Adherence to the RD protocol was validated by the number of topical prescriptions ordered per the RD prevention protocol. The aims of the project were to (a) improve provider clinicians' knowledge of screening, assessment, and prevention of RD in patients with breast cancer and (b) decrease the incidence of RD by 10%. RD prevention standards of care were implemented in December 2016 by an interprofessional RD prevention task force (comprised of MDs and RNs from the dermatology and radiation oncology departments).

Methods

A literature review was conducted using the following search strategy: "Radiodermatitis/complications"[Mesh] OR "Radiodermatitis/drug therapy"[Mesh] OR "Radiodermatitis/nursing"[Mesh] OR "Radiodermatitis/prevention and control"[Mesh] OR "Radiodermatitis/therapy"[Mesh]) OR ("radiation dermatitis" AND ("treatment" OR "management" OR "prevention" OR "control" OR "therapy") AND ("Randomized Controlled Trial"[Publication Type] OR "randomized controlled trial" OR "RCT" OR systematic[sb] OR systematic[sb] OR "systematic review"). Eligibility criteria included studies involving patients with breast cancer receiving radiation therapy; randomized, controlled trials (RCTs) and systematic reviews; with or without meta-analysis; and published from 1966–2016. Only articles written in English were included. The age and sex of the patients and type of radiation therapy given were not restricted. One hundred and thirteen articles were identified in PubMed (104 RCTs and 9 systematic reviews). After application of the inclusion criteria, 53 articles were analyzed. Skin care and prevention modalities were categorized, and the overall level of evidence was assigned a strength of recommendation taxonomy based on the American Family Physician Taxonomy (Ebell et al., 2004). Based on this information, the RD taskforce created guidelines for clinical practice. These guidelines were elevated to institutional standards of

care after medical review board proposal. The new standards included two key steps:

- Wash with soap and water to minimize or prevent RD incidence.
- Apply a mid- to high-potency steroid to the radiated field starting on day 1 of radiation therapy and continuing for two weeks after the last treatment.

To evaluate the new RD prevention standards of care, a retrospective chart review of oncology records was conducted for patients with breast cancer (based on ICD-O, ICD-9, ICD-10, and breast medical department visits) from January 1, 2016, to March 21, 2016, for the period prior to implementation of the standards of care and from January 1, 2017, to March 21, 2017, for the period after implementation of the standards of care. The review evaluated RD incidence in patients with breast cancer who were undergoing active radiation therapy or planned on receiving radiation. Criteria for the electronic health record (EHR) query included patients with breast cancer with value text containing any of the following search terms: *radiation dermatitis, rash, radiodermatitis, dermatitis radiation, moist desquamation, erythema, dry skin, xerosis, inflammation, infection, ulcer, bleeding, hyperpigmentation, atrophy, telangiectasia,* and *skin breakdown*.

For the period prior to implementation, 3,855 records (1,917 unique patients) were reviewed. For the period after implementation, 2,518 records (1,194 unique patients) were reviewed; both were extracted from an information technology query using the terms *dermatitis, erythema,* and *rash*. Patients were included in the analysis if their first week of radiation therapy was in the first week of January. No exclusions were made based on patient age and sex or type of breast cancer; patients were matched with age whenever possible. For the period prior to implementation, 57 patients were included for the final analysis. For the period after implementation, 129 patients were included for the final analysis. Data collected from the EHR included radiation therapy intensity, duration, dose per fraction, type, and radiated treatment size; combination with other anti-cancer agents; surgery and procedure type; and week of RD development.

TABLE 2.
PATIENTS RECEIVING TOPICAL AGENTS

NUMBER OF TOPICAL AGENTS	BEFORE (N = 57)		AFTER (N = 129)	
	n	%	n	%
1	10	18	30	23
2	18	32	57	44
3	19	33	26	20
4	7	12	15	12
5	2	4	1	1
7	1	2	–	–

Note. No patients received six topical agents.
Note. Because of rounding, percentages may not total 100.

TABLE 3.
COMPARISON OF DEMOGRAPHIC CHARACTERISTICS BEFORE AND AFTER PROTOCOL IMPLEMENTATION

CHARACTERISTIC	BEFORE (N = 57)		AFTER (N = 129)		
	$\bar{X}$	SD	$\bar{X}$	SD	p
Age (years)	56.61	11.3	55.22	11.64	0.45
CHARACTERISTIC	**n**	**%**	**n**	**%**	**p**
Surgery[a]					0.068
Lumpectomy	33	59	94	73	
Mastectomy (total)	19	34	31	24	
Modified radical mastectomy	2	4	2	2	
Radical mastectomy	2	4	2	2	
Surgery side					0.979
Left	21	37	49	38	
Right	28	49	63	49	
Bilateral	8	14	17	13	
Diagnosis					0.263
IDC	35	61	86	67	
IDC with DCIS	2	4	9	7	
DCIS	8	14	21	16	
ILC	5	9	9	7	
IMC	1	1	1	1	
Metastatic	3	5	1	1	
Recurrent	1	2	–	–	
IDC with ILC	1	2	1	1	
LCIS with DCIS	–	–	1	1	
Locally advanced	1	2	–	–	

[a] One patient received treatment for a fungating wound, therefore N = 56.
DCIS—ductal carcinoma in situ; IDC—intraductal carcinoma; ILC—invasive lobular carcinoma; IMC—invasive mammary carcinoma; LCIS—lobular carcinoma in situ; MRI/US bx—magnetic resonance imaging, ultrasound biopsy
Note. Because of rounding, percentages may not total 100.

Data collection for the first objective included measuring clinicians' knowledge via electronic survey created and validated by the authors. The survey was administered before and after an educational in-service session. Data collection for the second objective included evaluation of RD incidence by comparing a retrospective chart review of records from before and after protocol implementation. Charts were reviewed and data were recorded using Microsoft® Excel. Charts were evaluated for terminology consistency, including grading (per CTCAE) in clinical documentation and prescription rate written per RD protocol. Other items reviewed were use of standardized skin toxicity grading and terminology and prophylaxis of topical agents per the RD prevention protocol. This quality improvement project was exempt from institutional review board approval.

Data Analysis

OBJECTIVE 1: To evaluate knowledge of RD prevention, electronic surveys were administered to nurses before and after an education in-service session. The surveys included components that evaluated knowledge of screening, assessment, and prevention of RD. Healthcare professionals' demographic and questionnaire responses were reported in aggregate. A paired t test was used to determine improvement in provider knowledge of screening, assessment, and prevention of RD. For clinician confidence, the 13 survey items were averaged and scores were compared before and after the education session using a paired t test; a Shapiro Wilks test showed that both variables were normally distributed ($p = 0.123$ for before and $p = 0.052$ for after the educational session) (see Table 1).

OBJECTIVE 2: Compliance of prescription rates of recommended topical and systemic agents were extracted through manual chart review to assess the number of topical therapies prescribed per patient based on institutional standards. To control for seasonal variation, such as sun exposure, historical data were compared with records of patients who received care according to the new standards during a matched January to March timeframe. The number of prescriptions for topical and systemic preventive treatments were evaluated with correlations. Chi-square tests were used to compare RD grades and pruritus grades before and after protocol implementation.

The number of topical skin care medications recommended and prescribed was compared before and after protocol implementation using a Mann Whitney U test because of deviations from normality (Shapiro Wilks, $p < 0.05$) (see Table 2). The systemic therapy recommended and prescribed outcome is presented using descriptive statistics. For binomial outcomes of prophylaxis and dermatologic assessment, a Fisher's exact test was conducted to compare before and after protocol implementation.

DEMOGRAPHICS AND CLINICAL CHARACTERISTICS: Patients were compared before and after protocol implementation using independent t tests for continuous variables (age) and chi-square tests for nominal variables, such as oncology surgery, side of breast cancer, and oncologic diagnosis (see Table 3).

TYPE OF THERAPY: Radiation administration and combination cancer treatment were compared before and after protocol implementation using a chi-square test (see Tables 4 and 5). Because of deviations for normality on most of the clinical

TABLE 4.
TYPE OF RADIATION THERAPY BEFORE AND AFTER PROTOCOL IMPLEMENTATION

	BEFORE (N = 57)		AFTER (N = 129)		
TYPE	n	%	n	%	p
Adjuvant[a]	32	56	96	74	0.007
PMRT[a]	23	40	25	19	0.007
PBI	–	–	6	5	0.007
Palliative	2	4	2	2	0.007

[a]Significant differences between groups
PBI—partial breast irradiation; PMRT—post-mastectomy radiation therapy

TABLE 5.
COMBINATION CANCER TREATMENT BEFORE AND AFTER PROTOCOL IMPLEMENTATION

	BEFORE (N = 16)		AFTER (N = 31)	
THERAPY	n	%	n	%
Trastuzumab	6	38	10	32
Pertuzumab	5	31	7	23
Tamoxifen	4	25	6	19
Letrozole	3	19	6	19
Capecitabine	2	13	–	–
Leuprolide	2	13	3	10
Bevacizumab	1	6	–	–
Cisplatin	1	6	2	6
Everolimus	1	6	–	–
Irinotecan	1	6	–	–
Anastrazole	–	–	3	10
Palbociclib	–	–	3	10

Note. Some patients were on more than one combination anticancer therapy; therefore, percentages may total more than 100%.
Note. A chi-square test showed no differences before and after protocol implementation regarding combination of anticancer therapy.

TABLE 6.
PATIENTS BEFORE AND AFTER PROTOCOL IMPLEMENTATION WHO EXPERIENCED RADIATION DERMATITIS SORTED BY GRADE AND PROPHYLAXIS

VARIABLE	RECEIVED PROPHYLAXIS		DID NOT RECEIVE PROPHYLAXIS	
	BEFORE (n)	AFTER (n)	BEFORE (n)	AFTER (n)
Week 0				
Grade 1	–	–	4	1
Grade 2	–	–	–	1
Grade 3	–	–	–	–
Grade 4	–	–	1	–
Week 1				
Grade 1	3	3	32	28
Grade 2	–	–	–	–
Grade 3	–	–	1	–
Grade 4	–	–	1	–
Week 2				
Grade 1	4	14	46	79
Grade 2	–	–	1	–
Grade 3	–	–	–	–
Grade 4	–	–	2	–
Week 3				
Grade 1	4	20	39	78
Grade 2	–	–	9	8
Grade 3	–	–	–	1
Grade 4	–	–	1	–
Week 4				
Grade 1	3	18	13	56
Grade 2	–	3	13	27
Grade 3	–	–	–	1
Grade 4	–	–	1	–
Week 5				
Grade 1	1	8	3	9
Grade 2	2	4	11	18

Continued in the next column

TABLE 6. *(CONTINUED)*
PATIENTS BEFORE AND AFTER PROTOCOL IMPLEMENTATION WHO EXPERIENCED RADIATION DERMATITIS SORTED BY GRADE AND PROPHYLAXIS

VARIABLE	RECEIVED PROPHYLAXIS		DID NOT RECEIVE PROPHYLAXIS	
	BEFORE (n)	AFTER (n)	BEFORE (n)	AFTER (n)
Week 5 *(continued)*				
Grade 3	–	1	2	1
Grade 4	–	–	1	–
Week 6				
Grade 1	–	1	1	1
Grade 2	1	2	1	7
Grade 3	–	–	–	1
Grade 4	–	–	–	–

outcomes (Shapiro Wilks, $p < 0.05$), a series of Mann Whitney U tests were conducted to compare groups before and after protocol implementation on the following outcomes: total dose of radiation therapy (cGy), duration of radiation therapy (days), dose per fraction of radiation therapy, number of radiation therapy fractions, duration of boost (days), dose per fraction of boost, and number of boost fractions.

Findings

The study examined 57 patients prior to implementation and 129 after implementation. No differences were noted in patients' age, oncology surgery, side of breast cancer, or oncologic diagnosis (all $p > 0.05$). No significant differences were noted in the radiation therapy dose, duration, dose per fraction, number of fractions, duration of boost, boost fractions administered, and combination of anti-cancer therapy.

Objective 1: Improve Clinicians' Knowledge

The results from surveys completed by nurses before and after the education session were compared via t test. Clinicians reported an efficacious education module through verbal recall and expressed knowledge required to advocate for RD prevention methods.

CONFIDENCE: Eleven nurses completed the survey both before and after the education session. The paired t test showed a significant increase in overall confidence from before the education session ($\bar{X} = 1.34$, SD = 0.21) to after the education session ($\bar{X} = 2.42$, SD = 0.33) ($t[10] = -22.14$, $p < 0.001$).

Objective 2: Decrease the Incidence of Radiation Dermatitis

IMPROVE GRADING: Although topical prescription numbers did not increase from before protocol implementation to after protocol implementation, statistically significant differences were noted at weeks 1, 2, and 3 in the percentage of patients with grade 1 and 2 RD. The number of prescriptions for topical preventive treatments were inversely correlated with incidence of reported grade 2 RD. For weeks 1 and 2, more patients prior to protocol implementation (compared to after implementation) were grade 1 and more patients reported no RD after implementation (compared to prior to protocol implementation) ($p < 0.001$). For week 3, more patients prior to protocol implementation (compared to after implementation) were grade 2 ($p = 0.025$). No differences were noted before and after protocol implementation for weeks 0, 4, 5, or 6 (all $p > 0.05$). Receiver operator characteristics analyses were conducted to obtain the area under the curve using week as the test variable and RD ("yes" or "no" response) as the state variable. For the period prior to implementation, the area was 0.918; for the period after implementation, the area was 0.891. Of note, no patients in the period after implementation had grade 4 RD at any week. Therefore, the findings support the use of the RD protocol in reducing the severity of dermatologic adverse events as evidenced by a decrease in grading (see Table 6).

TABLE 7.
PATIENTS BEFORE AND AFTER PROTOCOL IMPLEMENTATION WHO EXPERIENCED PRURITUS SORTED BY GRADE AND PROPHYLAXIS

	RECEIVED PROPHYLAXIS		DID NOT RECEIVE PROPHYLAXIS	
VARIABLE	BEFORE (n)	AFTER (n)	BEFORE (n)	AFTER (n)
Week 0				
Grade 1	–	–	3	–
Grade 2	–	–	–	–
Week 1				
Grade 1	1	1	9	9
Grade 2	–	–	–	–
Week 2				
Grade 1	2	2	16	18
Grade 2	–	–	1	–
Week 3				
Grade 1	2	–	26	29
Grade 2	–	–	1	1
Week 4				
Grade 1	–	6	14	30
Grade 2	–	–	1	4
Week 5				
Grade 1	1	1	7	8
Grade 2	–	–	1	–
Week 6				
Grade 1	–	1	1	4
Grade 2	1	1	–	–

Note. No patients experienced grade 3 or 4 pruritus.

PRURITUS GRADING: Statistically significant differences were noted before and after protocol implementation at weeks 1 ($p = 0.049$), 2 ($p = 0.012$), and 3 ($p = 0.001$) in the percentage of patients with grade 1 pruritus. Specifically, more patients prior to implementation reported grade 1 (compared to the period after implementation) for those weeks. No differences were noted before and after protocol implementation for pruritus grades at weeks 0, 4, 5, or 6 (all $p > 0.05$).

TOPICAL AGENTS PRESCRIBED OR RECOMMENDED: As expected with protocol implementation, Mann Whitney U tests showed a statistically significant decrease in the number of topical agents prescribed from before protocol implementation (median = 3) to after protocol implementation (median = 2) ($z = -2.03$, $p = 0.042$). This demonstrates the effectiveness of a practice change that includes prescribing topical corticosteroids and adhering to an RD prevention protocol.

PROPHYLAXIS AND DERMATOLOGIC ASSESSMENTS: Fisher's exact test showed a statistically significant increase in prophylaxis from before protocol implementation (n = 4, 7%) to after protocol implementation (n = 24, 19%) ($p = 0.046$), and a nonsignificant decrease in dermatologic assessments from prior to protocol implementation (n = 6, 11%) to after implementation (n = 6, 5%) ($p = 0.19$). RD prevention strategies improved after protocol implementation.

TOPICAL STEROIDS: The number of topical steroids was compared before and after protocol implementation using Fisher's exact test. A significant increase was noted in prescriptions of topical steroids from before protocol implementation (n = 14, 25%) to after protocol implementation (n = 82, 64%) ($p < 0.001$). Forty-three patients (75%) prior to protocol implementation did not receive a topical steroid compared to 47 patients (36%) after implementation who did not receive a topical steroid.

PROPHYLAXIS, RD, AND PRURITUS: Four patients received prophylaxis before protocol implementation and 24 patients after implementation. Only one patient who received prophylaxis

TABLE 8.
TOPICAL AGENTS BEFORE AND AFTER IMPLEMENTATION

TOPICAL AGENT	BEFORE (N = 57) n	BEFORE (N = 57) %	AFTER (N = 129) n	AFTER (N = 129) %
A+D® ointment	1	2	–	–
Aloe vera	6	11	–	–
Ammonium lactate	–	–	2	2
Aquaphor®	24	42	54	42
Aveeno®	3	5	4	3
Bacitracin	1	2	1	1
Biafine®	1	2	–	–
Burt's Bees®	–	–	1	1
Calendula	8	14	10	8
CeraVe®	1	2	1	1
Cetaphil®	8	14	6	5
Clobetasol	–	–	2	2
Cocoa butter	4	7	–	–
Coconut oil	1	2	1	1
Corn starch	–	–	2	2
Egyptian Magic®	1	2	–	–
Eucerin®	25	44	46	36
Fluocinonide	1	2	–	–
Gold Bond® topical cream	1	2	–	–
Hydrocortisone 1%	10	18	11	9
Hydrocortisone 2.5%	–	–	2	2
Kaltostat® (for bleeding)	1	2	–	–
Kiehl's®	–	–	1	1
Lidocaine topical	–	–	1	1
Lubriderm®	2	4	2	2
MetroCream® 0.75%	2	4	–	–
Metronidazole spray	2	4	–	–
Miaderm®	1	2	2	2
Moisturizer	2	4	28	22

Continued in the next column

TABLE 8. *(CONTINUED)*
TOPICAL AGENTS BEFORE AND AFTER IMPLEMENTATION

TOPICAL AGENT	BEFORE (N = 57) n	BEFORE (N = 57) %	AFTER (N = 129) n	AFTER (N = 129) %
Mometasone	13	23	77	60
Neosporin®	2	4	3	2
Nivea®	–	–	1	1
Radia Gel®	–	–	1	1
RadiaCare® cleanse	2	4	–	–
RadiaCare® sheets/hydrogel	1	2	1	1
Silver sulfadiazine	15	26	20	16
Triamcinolone	1	2	1	1
Vaseline® intensive care	2	4	–	–
Xeroform®	4	7	1	1

Note. Percentages may total more than 100% because many patients were prescribed more than one topical agent.

developed grade 3 RD after protocol implementation. Prior to implementation, 10 patients did not receive prophylaxis and developed grade 3 or 4 RD; after implementation, 4 patients did not receive prophylaxis and developed grade 3 or 4 RD. More patients in the group that did not receive prophylaxis developed pruritus compared to the group that did receive prophylaxis. No patients either before and after protocol implementation had grade 3 or 4 pruritus (see Table 7).

Discussion

RD reactions depend on the intensity, duration, dose per fraction, type of radiation therapy, treatment area size, and combinations with cancer treatment agents (Boström, Lindman, Swartling, Berne, & Bergh, 2001; Feight, Baney, Bruce, & McQuestion, 2011; Salvo et al., 2010). This quality improvement project suggests that patients who are undergoing radiation therapy who use topical steroids as prophylaxis for RD are less likely to develop RD and pruritus. The RD prevention protocol implemented at the authors' institution significantly increased adherence to RD prevention protocol from before implementation (n = 4, 7%) to after implementation (n = 24, 18%) (p = 0.046). More than 40 different topical agents were recommended to patients before and after therapy (see Table 8), demonstrating inconsistent adoption of the standard recommendations. Patients who received prophylaxis with topical steroids in the period after implementation developed less grade 2 RD.

RD can cause devastating symptoms, including infection, pain, insomnia, diminished self-image, and therapy interruption. Nurses are at the forefront of care and can minimize emotional and psychological distress, participate in assessments and adherence to skin care treatments, and advocate for early interventions.

Limitations

The study only included patients with breast cancer, and patient ethnicity was not consistently documented; therefore, ethnicity was not included. Additional studies are needed to include other types of cancers and patient ethnicity. In addition, given the retrospective approach for chart review and interpretation, and dependence on the EHR, the included data capture a lower incidence of RD. No casual relationships between the prevention protocol and clinical outcomes were determined. Finally, the setting of the project was a single cancer center and, therefore, generalizability of data may not be applicable to other settings.

Implications for Nursing

This project demonstrated that it is feasible to implement an RD prevention protocol. Follow-up chart reviews suggest positive clinical outcomes. Nurses can tailor patient care plans aimed at preventing and decreasing severity of RD. Annual education modules for clinicians can assist in (a) improving and maintaining knowledge, (b) improving dermatologic assessment and EHR documentation to increase consistency of findings and improve knowledge and compliance of prevention efforts (providers and patients), and (c) incorporating the protocol into other clinical settings to promote better patient outcomes, continuity of care, and fluidity among healthcare professionals. Patient education strategies are aimed at early recognition of skin changes and importance of early intervention. Consistent symptom management recommendations can improve dermatologic adverse event strategies.

Conclusion

RD is a common dermatologic adverse event that causes a variety of complications, including QOL concerns from pain and discomfort. Dermatitis may lead to a disruption of therapy and dose reduction, which may result in disease progression. Education, rigorous assessment, and early interventions are integral factors in curtailing dose reductions and managing patients' pain and discomfort. Prevention and management of RD can be improved through assessment using standard terminology and consistent recommendations to apply topical corticosteroids. The findings from the current article help highlight the importance of consistent prophylaxis and early interventions in patients undergoing radiation therapy. Developing an educational initiative for patients and healthcare professionals, as well as implementing a standardized prevention protocol, can improve outcomes in individuals with breast cancer undergoing radiation therapy.

IMPLICATIONS FOR PRACTICE

- Explore the finding that patients undergoing radiation therapy who use topical steroids as prophylaxis are less likely to develop radiation dermatitis (RD) and pruritus.
- Advocate for the implementation of an RD prevention protocol to avoid inconsistent practices.
- Understand that prophylaxis with topical steroids can also reduce the grade of RD that may develop after treatment.

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