J Wound Ostomy Continence Nurs. 2019;46(2):137-142.
Published by Lippincott Williams & Wilkins

OPEN

Peristomal Moisture-Associated Skin Damage and Independence in Pouching System Changes in Persons With New Fecal Ostomies

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ABSTRACT

PURPOSE: The purpose of this study was to evaluate factors related to peristomal moisture-associated skin damage (MASD) in patients who underwent ostomy surgery because of colorectal cancer, and their independence in pouching system changes. Findings were used to determine pre- and postsurgical care for these patients.

DESIGN: Retrospective review of medical records.

SUBJECTS AND SETTING: The study setting was an 800-bed hospital in metropolitan Tokyo, Japan. The sample comprised 89 patients (median age: 65 years; male vs female: 58 vs 31) who visited a stoma clinic within 8 weeks of ostomy surgery. Fifty-two subjects had ileostomies and 37 had colostomies; data were collected between January 2008 and July 2014.

METHODS: Data were collected from outpatient and inpatient records. Potential relationships between MASD and independence in pouching system changes were evaluated via univariate tests to identify possible associations, followed by logistic regression analysis.

RESULTS: Patients living with an ileostomy were more likely to experience peristomal MASD than were patients living with a colostomy (odds ratio [OR] = 3.782; 95% confidence interval [CI]: 1.34-10.64; P = .012). Analysis also found that patients with postsurgical chemotherapy were more than 2.5 times more likely to experience peristomal MASD than patients who did not require postoperative chemotherapy (OR = 2.702; 95% CI: 1.02-7.18; P = .046). We also found that patients 65 years or older were significantly more likely to have difficulty in changing their pouching system than were younger patients (OR = 7.193; 95% CI: 2.21-23.41; P = .001), as were those with diabetes mellitus (OR = 11.842; 95% CI: 2.56-54.77; P = .002).

CONCLUSIONS: Patients undergoing ileostomy and those receiving postoperative chemotherapy are more likely to experience peristomal MASD. Older patients (>65 years) and those with diabetes mellitus are less likely to achieve independence. These findings influenced our management of persons undergoing ostomy surgery for management of colorectal cancer in our clinic. We recommend additional research using a larger and more diverse sample to confirm our findings.

KEY WORDS: Chemotherapy, Colostomy, Ileostomy, Ostomy, Ostomy surgery, Peristomal moisture-associated skin damage, Peristomal skin, Pouching, Rectal cancer, Self-care, Stoma.

INTRODUCTION

Approximately 135,800 persons living in Japan have colorectal or rectal cancer.[1] The estimated annual mortality rate of persons with colorectal cancer is 50,600. Colorectal cancer is the leading cause of cancer-related deaths in women and the second highest cause of cancer-related deaths in men, following only lung cancer. Nevertheless, advances in surgical management enable more individuals with colorectal cancer to undergo sphincter-sparing reconstructive surgery. Analysis of surgical management of colorectal cancer also reveals a growing prevalence of temporary stomas and decline in the number of individuals requiring permanent ostomies.[2] Chemotherapy for treating rectal cancer has also advanced with the development of molecular-targeted drugs such as epidermal growth factor receptor inhibitors.[3]

Ostomy nurses are charged with managing patients with new ostomies, including teaching the patient and the family the skill to care for the ostomy, peristomal skin, and pouching system, while providing support enabling the person to face challenges to body image and health-related quality of life (QOL). Knowledge of the multiple predicting factors that influence health-related QOL (QOL) of these patients is essential, but few studies have examined these factors using complex statistical modeling. Pittman and colleagues[6] conducted a multivariate analysis of patients undergoing ostomy surgery

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DOI: 10.1097/WON.0000000000000491

and reported that peristomal skin problems, fecal leakage, and difficulty adjusting significantly influenced health-related QOL of persons living with an ostomy.[4] We elected to focus on 2 factors—peristomal moisture-associated skin damage (MASD) and independence in pouching system changes (difficulty adjusting)—and its effects of nursing care in patients undergoing fecal ostomies for management of colorectal cancer. Specifically, the purpose of our study was to evaluate factors related to MASD in patients who underwent ostomy surgery because of colorectal cancer, and their independence in pouching system changes.

METHODS

We completed a retrospective survey of medical of patients with colorectal cancer treated in an 800-bed hospital located in metropolitan Tokyo, Japan. Subjects had visited the stoma clinic after ostomy surgery between January 2008 and July 2014. One of the 3 certified nurses in wound/ostomy/continence (CN-WOC) led the stoma clinic in cooperation with a colorectal surgeon and surgical nurses. The investigators recorded data in a notebook-type computer using a standardized form designed for purposes of this study. Study procedures were reviewed and approved by the Research Ethics Committee of Tokyo Medical and Dental University (Approval No. 1207).

The data form included demographic and selected clinical data including prehospital consultation, hospital stay associated with ostomy creation, and stoma clinic visits. We evaluated 16 demographic and clinical variables initially based on a review of studies that evaluated variables related to health-related QOL in persons living with an ostomy (Table 1).[4-10] Clinical variables were also evaluated by an expert panel for relevance. The panel comprised 5 experts: (1) an enterostomal therapy nurse with 30 years of experience in the stoma clinic with numerous publications related to ostomy care, (2) a surgeon with 30 years of experience in ostomy surgery and the stoma clinic, (3) a health scientist with extensive research experience, (4) a certified WOC nurse with 8 years of experience in the stoma clinic and 20 years in the subjects' hospital as a nurse, and (5) an author of this study (M.N.) with 20 years of experience in the stoma clinic. The expert panel also identified 2 outcome variables deemed particularly pertinent to nursing management of patients before and following stoma surgery for management of colorectal cancer, peristomal MASD and independence when changing a pouching system.

Peristomal moisture-associated dermatitis was defined as inflammation and denudation of skin adjacent to a stoma associated with exposure to effluent, such as urine or stool.[11] Independence when changing a pouching system was defined as demonstrating competence in changing and caring for a pouching system. Specific psychomotor skills were removal of a pouch, cleansing the peristomal skin, correct application of a new pouch, and appropriate disposal of the used pouch. Independence was based on direct observation of a pouching change in the presence of a WOC nurse. No follow-up observations were conducted, and we were unable to evaluate independence in changing under specific circumstances such as fecal leakage.

TABLE 1.
Variables Associated With Health-Related Quality of Life in Patients With Fecal Ostomies

Demographic variables	Gender Date of birth Living arrangements
Clinical variables	
Physical condition	Body mass index Heart diseases/hypertension Diabetes Stage of rectal cancer
Treatment	Colostomy/ileostomy Elective/emergent surgery Permanent/temporary stoma Days of postsurgical hospitalization Postsurgical chemotherapy
Stoma clinic	Year and date of visit Peristomal skin irritation Independence/dependence in changing a pouching system

DATA ANALYSIS

All data were analyzed via IBM SPSS software, version 21.0 (Statistical Package for the Social Sciences, Chicago, Illinois). Demographic and clinical variables were summarized using descriptive statistics. Independence in changing a pouching system and presence of peristomal MASD were documented as dichotomous variables. Associations between selected variables described previously and the outcome variables were determined by univariate analyses; P values $< .10$ were selected and entered into a multivariate logistic regression analysis and used to identify independent associated factors. Logistic regression analysis was conducted in 2 stages. P values < 0.05 on multivariate analysis were deemed statistically significant.

RESULTS

We initially reviewed records to determine the number of subjects who potentially met inclusion criteria for our retrospective review. One hundred eight patients with rectal cancer underwent ostomy surgery within the target period, of which 101 (93.5%) received care in the stoma clinic within 14 weeks after ostomy surgery. Among these patients, 89 (82.4%) received care in the stoma clinic within 8 weeks. Data analyses were drawn from this patient group. The patients in our analyses were mostly male (n = 58, 65%), older than 65 years (n = 45, 51%), and residing with a spouse or partner or another caregiver (91%, Table 2). Table 3 summarizes pertinent clinical variables of subjects; 53 (58.4%) underwent ileostomies, 52 (58.4%) underwent planned ostomies, and 42 (47.2%) required postoperative chemotherapy.

Univariate Analysis: Peristomal MASD

During 14 weeks after their surgery, these 101 patients visited the stoma clinic a total of 632 times; the proportion of patients who showed independence when changing their pouching system and those who experienced peristomal MASD between January 2008 and November 2014 are summarized in Table 4. The highest rate of peristomal MASD (14/27, 51.9%) was recorded in the eighth week (49-55 days) after ostomy surgery. Most patients (n = 2/27, 74.0%) showed independence in changing a pouching system on the seventh week after

TABLE 2.
Demographic Variables (N = 89)

Variables	n (%)
Gender	
Male	58 (65.2)
Female	31 (34.8)
Age (ostomy performed), y	
<65	44 (49.4)
≥65	45 (50.6)
Living arrangements	
Living with spouse only	41 (46.1)
Living with a nonspouse	5 (5.6)
Living with 2 or more	35 (39.3)
Living alone	8 (9.0)

TABLE 3.
Pertinent Clinical Variables (N = 89)

Variables	n (%)
Body mass index	
<18.5	17 (19.1)
18.5-26.4	63 (69.7)
≥26.5	9 (11.2)
Complication before surgery	
No heart diseases/hypertension	66 (74.2)
Heart diseases/hypertension	23 (25.8)
No diabetes	76 (85.4)
Diabetes	13 (14.6)
Stage of rectal cancer	
0	3 (3.4)
I	23 (25.8)
II	18 (20.2)
IIIa	18 (20.2)
IIIb	8 (9.0)
IV	23 (19.1)
Carcinoid	2 (2.2)
Stoma site marking	
Performed	89 (100)
Ostomy type	
Ileostomy	52 (58.4)
Colostomy	37 (41.6)
Planned/emergent surgery	
Planned	72 (80.9)
Emergent	17 (19.1)
Permanent/temporary stoma	
Temporary	52 (58.4)
Permanent	37 (41.6)
Days of postsurgical hospitalization	
<7	1 (1.1)
7-13	25 (28.1)
14-20	31 (34.8)
21-27	17 (19.8)
28-34	10 (11.3)
≥35	6 (6.7)
Postsurgical chemotherapy	
No	47 (52.8)
Yes	42 (47.2)
Changing the pouching system	
Independence	59 (66.3)
Dependence on assistant	30 (33.7)
Survival status as of November 2014	
Survived	76 (85.4)
Deceased	13 (14.6)

ostomy surgery. Univariate analysis identified 2 clinical factors associated with peristomal MASD: ostomy type (ileostomy vs colostomy) and temporary versus permanent ostomies. Subjects with ileostomies were more likely to develop MASD of the peristomal skin than those who underwent colostomy surgery (29 vs 8; $P = .017$). Patients with temporary stomas were also likely to develop peristomal MASD than were those with permanent ostomies (29 vs 8; $P = .017$). No significant differences were noted in peristomal MASD rates when age and sex were compared (male vs female: 23 vs 7; $P = .055$) and postsurgical chemotherapy (yes vs no: 23 vs 19; $P = .084$) (Table 5).

Univariate Analysis: Independence in Ostomy Pouching System Changes

Univariate analysis found that significantly more subjects 65 years or older remained dependent during pouching changes than younger subjects (independent vs dependent: 36 vs 23; $P = .003$, Table 5). Those requiring assistance with changing the pouching system were one subject aged 60 years (4.2%), 14 subjects between 60 and 69 years old (35%), and 10 subjects between 70 and 79 years old (50%). All subjects 80 years or older required assistance with pouching system changes.

Univariate analysis also revealed that a significantly higher number of subjects who lived with a spouse needed assistance in changing their pouching system than those in other living situations ($P = .032$). Subjects with diabetes were more likely to remain dependent with pouching changes ($P = .003$) as were those with hypertension and heart disease ($P = .096$) (Table 5).

Multivariate Analysis: Peristomal MASD

In the logistic regression analysis, as the majority of patients with ileostomies (n = 47, 90.4%) had temporary stomas (n = 52), ostomy type was selected and entered as 1 of the 2 variables; one of which was deleted as the selected variable for multicollinearity. Results indicated that patients living with an ileostomy were 3 times more likely to experience peristomal MASD than were patients living with a colostomy (odds ratio [OR] = 3.782; 95% confidence interval [CI]: 1.34-10.64; $P = .012$). Analysis also found that patients with postsurgical chemotherapy were more than 2.5 times more likely to experience peristomal MASD than patients who did not require postoperative chemotherapy (OR = 2.702; 95% CI: 1.02-7.18; $P = .046$, Table 6).

Multivariate Analysis: Independence in Pouching Changes

A 2-stage logistic regression analysis was completed based on the outcome variable of independence in changing the pouching system at the time of the last visit to the stoma clinic (within 8 weeks after surgery based on the prior observation of 8 weeks as the peak rate for peristomal MASD). The predictor variables selected, based on univariate analyses, were, age, living with a spouse, hypertension and heart diseases, and diabetes mellitus. Analysis found that patients 65 years or older were significantly more likely to have difficulty in changing their pouching system than were younger patients (OR = 7.193; 95%

TABLE 4.
Peristomal MASD and Independence When Changing the Pouching System Based on Postoperative Clinic Visit[a]

Postoperative Clinic Visits		Total Patient Visits	Actual	Nonperistomal MASD		Peristomal MASD		Independence in Changing the Pouching System		Dependence in Changing the Pouching System	
				Patient Visits	Actual Number (Last Visit)	Patient Visits	Actual Number (Last Visit)	Patient Visits	Actual Number (Last Visit)	Patient Visits	Actual Number (Last Visit)
Week	Day	n	Number	n (%)		n (%)		n (%)		n (%)	
2	7-13	3		2 (66.7)		1 (33.3)		3 (100.0)		0 (0.0)	
3	14-20	22		15 (68.2)		7 (31.8)		13 (59.1)		9 (40.9)	
4	21-27	25		18 (72.0)		7 (28.0)		14 (56.0)		11 (44.0)	
5	28-34	42		25 (59.5)		17 (40.5)		26 (61.9)		16 (38.1)	
6	35-41	32		20 (62.5)		12 (37.5)		19 (59.4)		13 (40.6)	
7	42-48	27		19 (70.4)		8 (29.6)		20 (74.1)		7 (25.9)	
8	49-55	27		13 (48.1)		14 (51.9)		16 (59.3)		11 (40.7)	
	Subtotal	*178*	*89*	*112 (62.9)*	*57*	*66 (37.1)*	*32*	*111 (62.4)*	*59*	*67 (37.6)*	*30*
9	56-62	16		9 (56.3)		7 (43.8)		9 (56.3)		7 (43.8)	
10	63-69	27		17 (63.0)		10 (37.0)		19 (70.4)		8 (29.6)	
11	70-76	17		14 (82.4)		3 (17.6)		7 (41.2)		10 (58.8)	
12	77-83	19		12 (63.2)		7 (36.8)		13 (68.4)		6 (31.6)	
13	84-90	19		12 (63.2)		7 (36.8)		13 (68.4)		6 (31.6)	
14	91-97	13		10 (76.9)		3 (23.1)		6 (46.2)		7 (53.8)	
≥14	≥98	343		218 (63.6)		125 (36.4)		246 (71.3)		97 (28.3)	
	Total	*632*	*101*		*71*		*30*		*73*		*28*

Abbreviation: MASD, moisture-associated skin damage.
[a]N = 632 clinic visits by 101 postoperative patients between January 2008 and November 2014.

CI: 2.21-23.41; $P = .001$), as were patients with diabetes mellitus (OR = 11.842; 95% CI: 2.56-54.77; $P = .002$, Table 7).

DISCUSSION

We identified factors associated with peristomal MASD and independence in pouching changes in patients who underwent ostomy surgery for treatment of colorectal cancer. The majority of patients were living with an ileostomy. Fecal materials contain proteolytic and lipolytic enzymes postulated to damage both protein and lipid-based elements of the skin's epithelial (and moisture) barrier.[11] Effluent from an ileostomy is typically more liquid in nature than effluent from a colostomy and contains abundant digestive enzymes.[12] These factors may explain why peristomal MASD was found in a higher percentage of patients with ileostomies than colostomies. These findings are also consistent with Pittman and colleagues,[6] who analyzed 239 patients with ostomies and reported that persons with a colostomy were less likely to experience peristomal MASD than were patients with ileostomies. We also found that persons with temporary ostomies were more likely to experience peristomal MASD than were those with permanent ostomies. We searched the literature but found no other studies evaluating this association.

Multivariate analysis also found that patients undergoing postoperative chemotherapy were more likely to experience peristomal MASD. While chemotherapy is associated with cytotoxicity, immunosuppression, peripheral neuropathy, and other adverse side effects, evidence concerning its effects on the peristomal skin is sparse.[13-15] Our results differ from those of Miyake and associates,[16] who investigated that 37 cases of peristomal skin irritation did not report a significant association between chemotherapy administration and peristomal skin irritation. It is possible that our larger sample size increased the likelihood of detecting an association between administration of postoperative chemotherapy and peristomal MASD.

Our multivariate analysis found that persons older than 65 years were less likely to achieve independence when changing systems than were younger patients. The relationship between aging and independence in pouching system changes is not entirely understood. Shibuya[17] investigated 84 persons who underwent ostomy surgery for management of colorectal cancer and reported that patients 75 years or older were more likely to have difficulty with ostomy self-management. They identified several related factors that may contribute to this observation, including impaired eyesight, dexterity, mobility, and cognitive changes associated with various forms of dementia. Pittman and colleagues[6] postulate that cognitive dysfunction also may influence the relationship between ostomy self-management and age. The relationship between dementia, physical frailty, and age is well established.[18,19]

Multivariate analysis of independence also revealed that patients with diabetes mellitus were less likely to achieve independence when changing a pouching system. Multiple factors may account for this finding; persons with diabetes mellitus are often obese, which may result in challenges with pouch placement and adherence.[20-22] Researchers found that obese individuals with diabetes and an ostomy are at greater risk for retinopathy, nephropathy, neuropathy, and immune

TABLE 5.
Demographic and Select Clinical Variables Associated With Peristomal MASD and Independence When Changing the Pouching System: Univariate Analysis (N = 89)

Variables	Peristomal MASD			Changing the Pouching System		
	No (n = 57) n (%)	Yes (n = 32) n (%)	*P* (χ^2)	Independence (n = 59) n (%)	Dependence[a] (n = 30) n (%)	*P* (χ^2)
Demographic variables						
Gender						
Male	33 (56.9)	25 (43.1)	.055	37 (63.8)	21 (36.2)	.495
Female	24 (77.4)	7 (22.6)		22 (71.0)	9 (29.0)	
Age, y						
<65	22 (50.0)	22 (50.0)	1.000	36 (61.0)	23 (39.0)	.003
≥65	22 (48.9)	23 (51.1)		8 (26.7)	22 (73.3)	
Living arrangements						
With spouse only	20 (64.5)	11 (35.5)	.946	16 (51.1)	15 (48.9)	.032
Other combinations	37 (63.8)	21 (36.2)		43 (81.8)	15 (18.2)	
Clinical variables						
Heart diseases/hypertension						
No	41 (62.1)	25 (37.9)	.522	47 (71.2)	19 (28.8)	.096
Yes	16 (69.6)	7 (30.7)		12 (52.2)	11 (47.8)	
Diabetes						
No	51 (67.1)	25 (32.9)	.146	55 (72.4)	21 (27.6)	.003
Yes	6 (46.2)	7 (53.8)		4 (30.8)	9 (69.2)	
Ostomy type						
Colostomy	29 (78.4)	8 (21.6)	.017	26 (70.3)	11 (29.7)	.503
Ileostomy	28 (53.8)	24 (46.2)		33 (63.5)	19 (36.5)	
Permanent/temporary stoma						
Permanent	29 (78.4)	8 (21.6)	.017	27 (73.0)	10 (27.0)	.261
Temporary[b]	28 (53.8)	24 (46.2)		32 (61.5)	20 (38.5)	
Postsurgical chemotherapy						
No	34 (72.3)	13 (27.7)	.084	31 (66.0)	16 (34.0)	.944
Yes	23 (54.8)	19 (45.2)		28 (66.7)	14 (33.3)	

Abbreviation: MASD, moisture-associated skin damage.
[a]Dependence of emptying the pouch (n = 3, 3.4%) included in dependence in changing the pouching system.
[b]90.4% (47/52) had a temporary Ileostomy.

TABLE 6.
Multivariate Analysis of Demographic and Select Clinical Variables Associated With Peristomal MASD (N = 89)

	Variable	Odds Ratio (Confidence Interval)	*P*	Multivariate Odds Ratio (Confidence Interval)	*P*
Peristomal skin irritation	Male (⇔ female)	2.597 (0.97-6.99)	.059	2.214 (0.78-6.27)	.135
	Ileostomy (⇔ colostomy)	3.107 (1.20-8.01)	.020	3.782 (1.34-10.64)	.012
	Chemotherapy	2.161 (0.89-5.22)	.087	2.702 (1.02-7.18)	.046

Abbreviation: MASD, moisture-associated skin damage.

TABLE 7.
Multivariate Analysis: Demographic and Select Clinical Variables Associated With Independence When Changing the Pouching System (N = 89)

	Variable	Odds Ratio (Confidence Interval)	*P*	Multivariate Odds Ratio (Confidence Interval)	*P*
Independent within 8 wk after surgery	≥65 y old	4.304 (1.64-11.28)	.003	7.193 (2.21-23.41)	.001
	Diabetes	5.893 (1.64-21.21)	.007	11.842 (2.56-54.77)	.002

function. These factors may exert a negative influence on overall health and the ability to self-manage an ostomy.[22-24]

LIMITATIONS

Several limitations should be considered when interpreting findings. First, participants were recruited from a single facility. A multicenter study is needed to determine the external validity of our findings. Second, subjectivity is possible when evaluating patients in routine care and one's failure to document all pertinent details associated with the retrospective data analysis.

CONCLUSIONS

Patients undergoing ileostomy and those requiring chemotherapy are more likely to experience peristomal MASD. Older patients (>65 years) and those with diabetes mellitus are less likely to achieve independence when changing their pouching system. These findings influenced our management of persons undergoing ostomy surgery for management of colorectal cancer in our clinic. We recommend additional research using a larger and more diverse sample to confirm our findings.

ACKNOWLEDGMENTS

The authors thank Dr Toshiko Ibe, professor at St Luke's International University, for her valuable advice. They also thank Ms Yoshiko Ando and Ms Estuko Mamada for assisting with data collection.

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