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Early Preoperative Ostomy Education to Reduce Peristomal Skin Complications and Ostomy Pouch Leaks

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Early Preoperative Ostomy Education to Reduce Peristomal Skin Complications and Ostomy Pouch Leaks

A dissertation submitted in partial satisfaction of the

requirements for the degree

Doctor of Nursing Practice

by

Genele Grace Novilla Romero

2021

ABSTRACT OF THE DISSERTATION

Early preoperative ostomy education to reduce peristomal skin complications and ostomy pouch leaks

by

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Doctor of Nursing Practice

University of California, Los Angeles

Professor Barbara Bates-Jensen PhD, RN, FAAN

Background: There are approximately 100,000 persons who undergo ostomy surgery each year due to colorectal cancer, inflammatory bowel disease, diverticulitis, or trauma. Absent or inadequate preoperative ostomy education leads to poor development of self-care skills resulting in increased hospital length of stay, emergency department (ED) visits, additional outpatient clinic visits, peristomal skin complications (PSCs), and ostomy pouch leaks, **Objective**: To compare usual preoperative care of verbal descriptions of ostomy surgery and care instructions to use of an early preoperative ostomy education (EPOE) session using brochures, visual aids, hands-on simulation, and online resources on reduction of PSCs, ostomy pouch leaks, hospital length of stay, number of ED visits, and clinic visits. **Methods:** A comparative, cross-sectional,

quasi-experimental study compared PSCs, ostomy pouch leaks, hospital length of stay, number of ED visits, and clinic visits for 20 previously-treated (usual care) and 5 prospectively treated (intervention) adult ostomy surgery patients. All participants were treated in an outpatient colorectal surgery clinic and identified using electronic medical records (EMRs). Sociodemographic, healthcare and disease state data were collected for each subject (e.g. hospital length of stay, ED visit and clinic visit frequency, number of PSCs and ostomy-pouch leaks). Patients in the intervention group received a 30-minute EPOE session using brochures, visual aids, information resource sheets and hands on simulation of ostomy pouch application with positive feedback. The EPOE sessions were held during the preoperative clinic visit two weeks prior to surgery. Intervention patients were followed until the 10 to 14 day postoperative clinic visit. The validated Ostomy Skin Tool was used to determine PSC severity. For the control group (usual care) PSC severity was determined using the narrative description documented in the medical record while direct observation was used for patients in the intervention group. These patients also described their quality of life and self-efficacy using the City of Hope Quality of Life (CoH-QoL) Ostomy Questionnaire and the Stoma Self-Efficacy tool (stoma care self-efficacy subscale). These validated tools were administered during the 10 to14 day postoperative clinic visit. **Results:** Hospital length of stay, number of ED visits /clinic visits, frequency of PSCs and ostomy pouch leaks were obtained from 25 patients; 20 usual care patients and 5 intervention patients. Fifty-two percent (n=13) of the total sample of patients were female (usual care n=10; intervention n=3) and forty-eight percent (n=12) of the total sample were male (usual care n=10; intervention n=2), with a mean age of 56.7 (Standard Deviation (SD) =12.7) years. The sample was ethnically and racially diverse with the majority of patients persons of color (12% (n=3) Asian, 12% (n=3) Black, 48% (n=12) Hispanic, 8% (n=2) Native

American and 20% (n=5) White). Ileostomy (56%, n=14) was more commonly performed than colostomy (44%, n=11). Intervention patients had reduced hospital length of stay (6.8, SD 2.6 days versus 7.75, SD 2.36 days), fewer clinic visits (1.2, SD 0.4 versus 1.35, SD 0.5) and fewer unscheduled clinic visits (0.2, SD 0.45 versus 0.35, SD 0.49) compared to usual care patients. At the postoperative clinic visit intervention patients presented with fewer ostomy complications compared to usual care patients (60%, n=3 versus 35%, n=7). Measurements using the Ostomy Skin Tool, intervention patients had less severe peristomal skin damage as compared to controls (1.2, SD 0.5 versus 1.4, SD 0.4). Intervention patients had a CoH-QoL Ostomy Questionnaire average score of 7.6 (SD 1.9) with domain scores from 7.0 (SD 1.9) for psychological QoL to 8.0 (SD 1.9) for spiritual QoL with higher scores indicating better QoL. The Stoma Self-Efficacy tool stoma care subscale scores for intervention patients were 56.8 (SD 9.7). These scores **indicate** higher confidence and self-efficacy among patients who received EPOE. **Conclusion:** Introducing an EPOE session compared to verbal preoperative instructions (usual care) may reduce hospital length of stay, clinic visits, PSCs, and ostomy pouch leaks. Although, these findings are not statistically significant due to small patient numbers, outcomes from hospital length of stay, additional outpatient clinic visits, and PSCs showed a decrease in scores compared to the usual care group which may help decrease the economic burden of additional costs related to ostomy complications.

The dissertation of Genele Grace N. Romero is approved.

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2021

This dissertation is dedicated to the ostomates and ostomy care community. Their fortitude and endurance during these times have encouraged me to continue on with this project.

To my mom, Leah, dad, Hermogenes Jr., amazing sister, Mary Anne, brother-in-law Bryan, my family and friends for their continued support, patience and words of encouragement during this chapter in my life.

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Last, but not least, I would like to acknowledge the efforts of all my fellow classmates for their support and encouragement which allowed me to complete this journey.

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CHAPTER ONE: INTRODUCTION

Ostomy surgery of the bowel, or bowel diversion, is a surgical operation that diverts the normal flow of intestinal contents out of the body. The creation of an ostomy brings out a part of the intestine through the abdominal wall and waste exits into a prosthetic known as an ostomy bag or pouch. Depending upon the nature of the surgery this procedure may be permanent or temporary (NIDDK, 2014). In the United States (U.S.) approximately 100,000 persons undergo ostomy surgery each year due to chronic conditions such as rectal and colon cancer, inflammatory bowel disease (IBD) (e.g. ulcerative colitis, Crohn's disease), cases of perforated diverticulitis, or trauma. The most common ostomy complications are ostomy pouch leakage and peristomal skin complications (PSCs). In one-third of ostomy patients experience these complications within 90 days of surgery (Tyler, et al, 2014). The highest incidence of PSCs are post-operative ostomy complications, occurring within the first five years after surgery (Meisner et al. 2012). The incidence of PSCs can exceed 45% which can lead to prolonged physical and emotional adjustments due to a patient lack of preparation to deal with this major change in body image (Butler, 2009; Stelton, 2019).

Patients undergo ostomy surgery for multiple medical conditions and diagnoses. The most common cause is cancer of the colon and rectum, the third most common cancer diagnosed in adults in the U.S. (ASCO, 2019). The American Cancer Society reported 104,610 new cases of colon cancer and 43,340 new cases of rectal cancer in 2020 (citation). Colorectal cancer patients often require a colostomy to divert or remove part of the diseased intestine (ASCO, 2019). Patients with IBD or pre-cancerous colon polyps also likely to have ostomy placement. Nearly, three million, 1.3%, of U.S. adults report IBD, such as Crohn's disease or ulcerative

colitis (CDC, 2019). Surgical repair of gastrointestinal damage caused by IBD may include ileostomy or colostomy (CDC, 2019).

Ostomy surgery is costly due to longer hospitalizations, increased readmission rates, and high patient morbidity (Sheetz, et al. 2014). The length of stay for patients with ostomy complications, such as PSCs, are on average four days longer compared to those without ostomy complications (11 versus 6.8 days), (Taneja et al., 2019). According to the Healthcare Cost and Utilization Project (HCUP, 2010), Ileostomy, and other enterostomy procedures, is the 2nd leading cause of procedural readmission rates with a 29% readmission rate. A temporary or permanent colostomy is the 13th leading procedural cause of readmission with a 19% readmission rate. Complications from ostomy surgery contribute to increased financial burden to healthcare institutions.

The human toll of ostomy surgery is significant. Mortality estimates approach 11% and morbidity rates as high as 43.9% (Sheetz, et al. 2014). Morbidity from ostomy surgeries include surgical site infections, and stoma or PSCs. Ostomy complications cause ostomy pouch leakage leading to pain, PSCs, poor ostomy adjustment, increased use of ostomy pouches and expenses, increased post-surgical costs and decreased quality of life (QoL) (Sheetz, et al. 2014). Peristomal skin complications are most often caused by ostomy output, feces and small bowel effluent, coming into contact with the surrounding skin for long periods of time, most commonly among patients with ileostomies (Stelton, 2019). An improper ostomy pouching system can also lead to chronic leakage, resulting in moisture-associated skin damage (MASD) (Steinhagen et al. 2017). The skin breakdown from MASD can interfere with ostomy pouch adherence that can create further difficulties for patients and negatively impact patient adjustment. Ostomy pouch leakage,

PSCs, and odor can also lead to social embarrassment and isolation, missed work days, reduced productivity and decreased QoL. (Maydick-Youngberg, 2017; Mitchel et al. 2007).

Hendren and colleagues (2015) report 84% of ostomy patients experience technical management difficulties due to inadequate preparatory information. Preoperative education includes the correct selection of ostomy pouches, how and when to change pouches to prevent leakage, and basic peristomal skin management (Forsmo et al. 2016). The ability to be responsive to postoperative ostomy education stems from the patient knowing about his or her ostomy care before surgery. Some investigators report preoperative educational products provided to patients before surgery increase knowledge and patient engagement with post-operative education (Poland et al., 2017). These studies have shown the importance placed on early education sessions given during the preoperative phase for patients to better understand ostomy care management after ostomy surgery.

Problem Statement

Patients with an ostomy require adequate education and psychosocial support to adapt successfully with their own ostomy self-care. The absence of adequate preoperative ostomy education can lead to improper development of self-care skills which can lead to increased health care needs and costs. The degree of education prior to ostomy surgery focuses on surgery benefits, risks, and complications; however, an emphasis should also be placed on goals and expectations of ostomy care and how to prevent possible PSCs and ostomy leakage. Gaps in literature related to evidence-based practices and the challenges in skin care focus on institutional practices and the frequent use of Wound, Ostomy, Continence Nurses (WOCNs). The focus of this study is determining the usefulness of an EPOE session as a standard of

practice to identify early causes of ostomy complications among trained medical providers other than WOCNs.

Aim and Objectives

The aim of this project is to determine whether EPOE can improve postoperative ostomy outcomes with decreased hospital length of stay, fewer ED visits, fewer clinic visits, decreased PSCs and ostomy pouch leaks. The objectives are to (a) provide education one to two weeks prior to surgery using visual-aides, ostomy pouch application demonstration, brochures, information sheets, and positive reinforcement, (b) collect PSCs and ostomy pouch leak data, and hospital length of stay, ED visits and additional outpatient clinic visits from the electronic medical records (EMRs), (c) and describe QoL and ostomy self-efficacy after ostomy surgery.

The advanced practice registered nurse (APRN) has a role in supporting and implementing quality improvement projects to improve the delivery of healthcare education services. The role of an APRN with a Doctorate of Nursing (DNP) degree helps to enhance organizational leadership, project implementation and development, and quality improvement services. Efforts to improve post-surgical ostomy outcomes have been used to support this study using three essentials of doctoral education (Zaccagnini, M & White, K., 2017). The DNP Essential I: *Scientific underpinnings for practice* highlights that nursing knowledge is based on science and theory and understanding the beliefs, ideas, and values used in our daily practice. Research has shown that providing preoperative ostomy education can lead to a decreased likelihood of ostomy complications such as PSCs and ostomy pouch leaks (Forsmo et al. 2016; Nagle et al. 2012; Stokes et al. 2017). The Essential II: *Organizational and systems leadership for quality improvement and systems thinking* highlights the principle of advanced communication among diverse organizational populations and cultures (patients and providers)

while using cost-effective methods of practice to promote patient safety and decrease health disparities. Quality improvement projects, such as improvement of preoperative ostomy education with visual aids, brochures, and references to free online resources, can change the way patients prepare for ostomy surgery. This can also transform the way ostomy education is presented to patients undergoing ostomy surgery for the first time. The use of evidence-based practice leads to Essential III: *Clinical scholarship and analytical methods for evidence-based practice* that prepares the DNP to translate, evaluate, integrate and apply a proven theory or evidence-based practice to improve patient care. (AACN, 2006).

PICOT Question

In patients requiring an ostomy after surgery (P), does the use of an EPOE session using visual-aides, ostomy pouch application demonstration, brochures, information sheets, and positive reinforcement (I), compared to preoperative verbal only ostomy education by the surgeon/resident/nurse practitioner (C), reduce the frequency of postoperative ostomy complications (PSCs, ostomy pouch leaks) requiring extra outpatient clinic and ED visits and longer hospital length of stay (O), within the post-operative 10 to 14 day period.

CHAPTER TWO: THEORETICAL FRAMEWORK

In 1977, American psychologist, Bandura, developed a self-efficacy model referring to individuals performing specific actions on their own and developing confidence in their ability to perform them (Xu et al., 2018; Danielson, 2013). The goals of a person's self-efficacy are achieved in three different aspects. First, self-efficacy can affect the behavior of an individual in performing activities. The higher the level of self-efficacy increases the chances of success in activity engagement. Second, increased self-efficacy can affect the level of effort in engaging in activities, as well as attitudes related to performance. Third, self-efficacy can affect an individual's way of thinking and how efficient they can be towards performing a task (Xu et al., 2018; Bandura, 1977). Patients with higher self-efficacy are more likely to cope with stressors and have more confidence to participate in behaviors that restore and improve health (Xu et al., 2018; Machado et al., 2016).

Currently, self-management programs for ostomy care focus on passive problem-solving. Less effort is placed in anticipating patient's problems with ostomy complications such as PSCs and ostomy pouch leaks. There is insufficient discharge preparedness for patients with uncomplicated hospital stays and a lack of formal training among nursing staff and medical care team (Wen, 2018). Bandura's Self-Efficacy Model suggests active participation in self-care is important (Bandura, 1977). For example, preparing patients on the expected outcomes and self-care strategies of ostomy care after surgery, with the use of preoperative educational tools, provides stability, can increase confidence and can lessen anxiety (Meisner et al., 2012). The psychological impact of a patient gaining control of their health by increased self-management ostomy care can also help to improve a patient's QoL after ostomy surgery. Additionally,

prehabilitation, defined as the improvement of the functional capacity of a patient before surgery, prevents postoperative complications among adult patients undergoing elective surgery (Wright et al, 2016). Prehabilitation allows patients to accept responsibility of their own self-care and education which includes weight loss, medications, smoking, self-exercise and nutrition, resulting in less pain, more independence, improved function and better QoL. Preoperative ostomy education follows Bandura's theory closely (Figure 1). For example, practicing ostomy pouch application can increase comfort in ostomy self-care and represents the concept of Performance Accomplishment. Past and present occupations or management of chronic diseases can determine the level of understanding and focus in which patients with an ostomy can practice self-efficacy. For example, a patient who is also diabetic who is self-injecting insulin may be familiar with self-care actions and may be more comfortable in managing chronic disease. Therefore, adjusting to new ostomy care management may be easier than for someone who otherwise have no experience in managing chronic disease. Vicarious learning is the mastery of a skill by way of learning through instructions by a certified WOCN or medical professional. In this study vicarious learning will occur during the ostomy pouch simulation as the patient will be able to observe the clinician working with the ostomy pouch and supplies and practice the process of pouch application. The additional resource links from the brochure provided in the preoperative ostomy education session can link patients to stories of other people with ostomies or "ostomates" to provide a sense of familiarity or understanding in living with an ostomy. Verbal encouragement can be used as positive reinforcement and positive patient engagement when directing pouch simulation during the preoperative education process. For example, in this study all clinicians are encouraged to provide positive statements as part of the EPOE session during the ostomy pouch simulation (e.g., "You did really well." or "That was great effort.").

Emotional states (e.g., anxiety and depression) are used to identify the overall health and well-being of a patient and the struggles they are experiencing that can be a barrier to ostomy self-care education.

Figure 1.

Bandura's Self Efficacy Model Applied to Early Preoperative Ostomy Education Session Intervention

Theoretical Framework of Bandura's Self Efficacy Model

Note: Bandura's Self-Efficacy Model as it relates to expected outcomes of receiving preoperative ostomy education by decreasing PSCs, ostomy pouch leaks, hospital LOS, ED visits, and additional outpatient clinic visits. Three of the four concepts in Bandura's Self-Efficacy Model are operationalized in this study. The concept of Performance Accomplishment is operationalized as practicing ostomy care during the ostomy simulation. The Vicarious Learning concept is operationalized as learning by the example of the clinician application of the ostomy

pouch during the education session. Verbal Encouragement is operationalized in this study as the positive reinforcement statement provided by the clinician during the ostomy simulation. Emotional States is addressed for the physiological needs in living with an ostomy with information on diet and resources on living with an ostomy provided to patients.

CHAPTER THREE: REVIEW OF LITERATURE

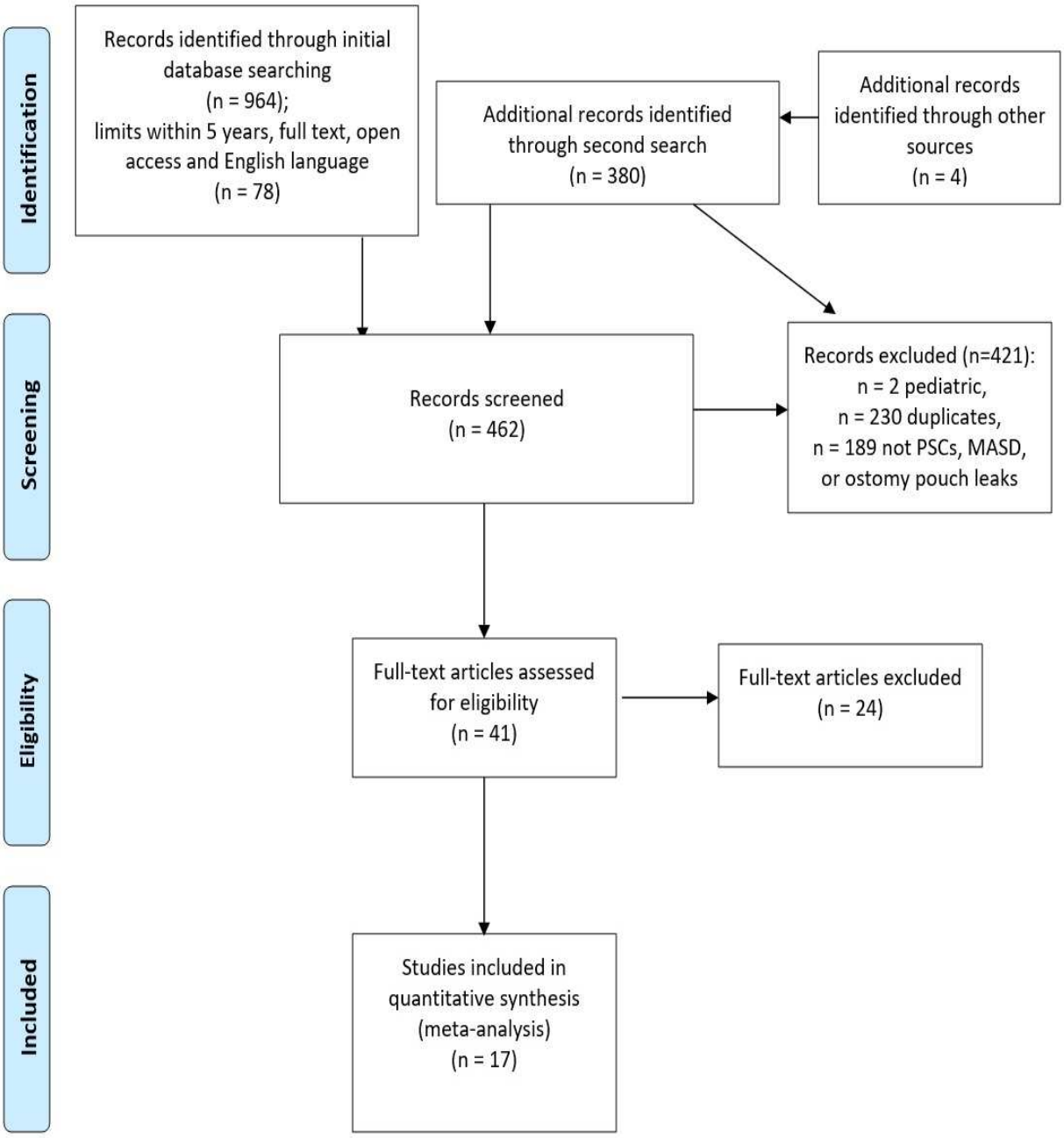
The literature search was completed using PubMed, Elsevier/Science Direct databases and Journal Wound Ostomy Continence Nursing (JWOCN) and American Society of Colorectal Surgery (ASCS) journals. Initially the search terms includede: preoperative ostomy education, ostomy teaching tools, QoL, preoperative ostomy care, patient ostomy education. These parameters resulted in 236 articles from PubMed, 670 articles from Science Direct, 157 articles from the JWOCN journal and one article from ASCS (Figure 2). The addition of additional parameters including, limiting studies to the past five years, full-text or open access research articles in the English language reduced the article number to 16 on PubMed, 18 on Science Direct, 43 in the JWOCN journal and a single article from ASCS. The second search used the terms "ostomy complications" with parameters of full-text articles in English within the last 5 years, resulted in 110 articles on the JWOCN journal site, one journal article from ASCS, 176 articles on Science Direct, and 1,080 publications on PubMed. To further narrow the publications on PubMed, the terms "colostomy/ileostomy complications" were added to the PubMed search resulting in 93 articles (987 removed). A total of 462 articles were obtained and reviewed.

Articles specific to emergency ostomy procedures and pediatric patients were removed (n=2). Ostomy complications were further limited to peristomal MASD, PSCs, and ostomy pouch leakage resulting in the exclusion of 189 articles. The review of 41 abstracts that met the inclusion and exclusion criteria resulted in the selection of 17 articles as the foundation of this project. Four of the studies were pre/post intervention clinical trials (Forsmo et al. 2016; Nagle et al. 2012; Stokes et al. 2017; Xu et al. 2018), two were retrospective studies (Sheetz et al. 2014; Taneja et al. 2019), three were systematic reviews (Meisner et al. 2012; Vonk-Klaassen et al.

2015; Wright et al. 2016), four were clinical reviews (Gray et al. 2013; Maydick-Youngberg et al. 2017; Steinhagen et al. 2017; Stelton, 2019), and one was a randomized control trial (Wen et al. 2018). Two qualitative studies were included (Erwin-Toth et al. 2012; Poland et al. 2017) as well as an article presenting clinic practice guidelines (Hendren et al. 2015). Reference review resulted in the inclusion of four additional studies published between of the years of 1996-2012 (Bekkers et al. 1996; Bandura, 1997; Meisner et al. 2012) due to their fundamental support to the development of the educational intervention.

Figure 2.

PRISMA Diagram Showing Literature Search Strategy.



Note: Diagram showing how supporting literature was selected. A systematic review of English articles using PubMed, Elsevier/Science Direct databases, Journal Wound Ostomy Continence Nursing (JWOCN) and additional studies by the American Society of Colorectal Surgery

(ASCS) journals. Primary search terms related to preoperative ostomy education were screened as well as secondary search terms relating to ostomy complications. Articles excluded were those relating to emergency ostomy surgeries and ostomy care or complications in the pediatric population.

Literature Review

Eight key studies provided support for the use of preoperative ostomy education (Forsmo et al. 2016; Gray et al. 2013; Meisner, et al., 2012; Nagle et al. 2012; Poland et al. 2017; Steinhagen et al. 2017; Stelton, 2019; Stokes et al. 2017; Taneja et al. 2019) and two studies (Erwin-Toth et al. 2012; Xu et al. 2018) used instruments to evaluate PSCs and QoL. In retrospective, comparison cohort study by Stokes *et al.* 124 persons undergoing ostomy surgery received a two-hour ostomy education class that consisted of postoperative expectations in managing a new ostomy (change in diet, signs of dehydration, and an overview of needed ostomy supplies), and a hands-on portion in practical skills for stoma care (Stokes, et al, 2017). The patients in the control group (n=94) were selected from a one-year period prior to the start of the preoperative education intervention. Patients who participated in the preoperative ostomy education class had fewer PSCs (8.1%, n=10 versus 16%, n-15) and ostomy pouch leaks (8.9%, n=11 versus 20.2%, n=19) compared to patients in the control group.

Forsmo et al. (2016) carried out a single-center study comparing hospital length of stay for adult patients who received an ostomy education session in conjunction with an early recovery after surgery (ERAS) program (n=61) to patients who received standard ostomy education (n=61). Patients who received the ostomy education session with the ERAS program showed a decrease in hospital stay from nine days to six days ($p<0.001$). A study conducted by Poland et al. (2017) has shown that patients who undergo ostomy surgery benefit from preoperative ostomy education to enhance recovery. In this study, preoperative materials included a detailed education booklet on both colostomy and ileostomy care that included information on diet, energy conservation, self-care, work and leisure, and a 15-minute DVD video on surgery preparation and stoma self-management. Questionnaires on effectiveness of the

preoperative education were administered to 97 patients, 19 caregivers, and 22 staff nurses recruited for the study. Participant feedback included patient statements that the preoperative education countered their need to know more about the medical procedure, expected bodily changes, recovery timescales and concerns for addressing individual needs.

Patients with higher self-efficacy can show improved ostomy self-care with increased QoL. A retrospective quasi-experimental study by Xu et al. (2018) explored the benefits of a self-efficacy intervention on the QoL of patients with permanent ostomies. Forty-eight patients were arbitrarily divided into two groups. The control group (n=28) received standard ostomy education and the intervention group (n=20) received a three-month Stoma Self-Efficacy intervention. Self-efficacy was measured with the Stoma Self-Efficacy tool, developed by Bekker et al. (1996) (Appendix A), at ten days, one and three months after the intervention. Item scores on Stoma Self-Efficacy tool range from 0 to 5 with higher scores indicating increased confidence and self-efficacy (Xu et al., 2018). At day 10 no difference in self-efficacy scores existed between groups, however significant differences in self-efficacy scores were detected between groups at one month (80.25, standard deviation (SD) 10.73, and 75.25, SD 6.16, respectively, $p = 0.05$); and at three months (91.15, SD 10.71, and 62.43, SD 12.63, respectively, $p < .001$) (Xu et al., 2018).

Recognizing PSCs can be challenging due to reliance on clinician experience in recognizing PSCs and underreporting of PSCs from patients. Erwin-Toth et al. (2012) conducted a survey among 743 adults with an ostomy living in North America using the Ostomy Skin Tool (OST), a tool to self-report PSCs. The OST is used in clinical practice by clinicians to measure the severity of three different domains of PSCs: skin discoloration, erosion or ulceration, and tissue overgrowth (Appendix B). The OST was used in study by Erwin-Toth et al. for patients to

self-report PSCs at their first postoperative clinic visit which was used as a baseline measure. At the six weeks postoperative clinic visit both patients and the WOCN used the OST. Per patient evaluation 29% (n=743) reported PSCs, while WOCN reported PSCs in 61% of patients. Thus, patients did not recognize normal peristomal skin compared to abnormal peristomal skin or PSCs. Meisner et al. (2012) used the OST among global ostomy patients (n=3017) to evaluate the cost and prevalence of PSCs. The estimated total average cost for a 7-week treatment, in which extra care was provided with the use of additional ostomy supplies and appliances, was found to be $312.28 among those with PSCs (n=1742) and $244.28 in those without PSCs (n=1172) (Meisner, et al., 2012). Based on these findings, the investigators concluded PSCs are more expensive, common and difficult to manage. Meisner and colleagues (2012) found the causative factor for PSCs to be from peristomal leakage caused by increased ostomy output and peristomal skin irritation. This problem would benefit from a more focused approach in methods minimizing risk of PSCs and detecting ostomy complications at an earlier stage.

Synthesis of Literature Review

The studies reviewed indicate that preoperative ostomy education and consultation with a WOCN, or ostomy specialist, can increase patient knowledge on ostomy care, preventing PSCs, ostomy leakage, decrease hospital stay and lower costs for treating ostomy complications (Forsmo et al. 2016; Meisner, et al., 2012; Nagle et al. 2012; Stokes et al. 2017; Xu et al., 2018). Evidence strongly suggests that PSCs and ostomy pouch leaks are the most common ostomy complications. Of the seven studies, three clinical reviews by Gray et al (2013), Steinhagen et al. (2017) and Stelton (2019) show patients with inexperience in the ostomy pouching system and its application can lead to patient frustration. These PSCs were commonly caused by frequent

pouch changes and ostomy pouch leakage. The three reviews showed positive patient outcomes were limited by poor access to an ostomy nurse and limited ostomy care supplies, however, with ostomy care education many PSCs are preventable.

The foundational studies of this project show that preoperative ostomy educational sessions that focus on a patient-centered approach, by establishing ostomy care expectations, minimize the psychosocial impact associated with caring for a new ostomy and postoperative ostomy complications (Forsmo et al., 2016; Nagle et al., 2012; Stokes et al., 2017). The limitations associated with these studies were: 1) small sample sizes; 2) unreported ostomy complications recorded in the EMR; and 3) use of a single health care site. Additionally, different modalities were used to provide preoperative ostomy education including PowerPoint presentations of pre- and postoperative visits regarding perioperative expectations (diet, signs of dehydration), hands-on simulation of ostomy changes and examples of stoma appliances. Even with the varying methods used to provide preoperative ostomy education the investigators showed that after some form of preoperative ostomy education there was a decrease in postoperative ostomy complications such as PSCs and ostomy pouch leaks and in some cases, shorter hospital length of stay.

Two studies focused on QoL using the Stoma Self-Efficacy tool (Erwin-Toth et al., 2012) or a validated Chinese version of the Stoma Self-Efficacy tool (Xu et al., 2018). Both studies showed lower QoL scores with increased ostomy complications. The significance of the Erwin-Toth et al. (2012) and Xu et al. (2018) studies is the finding that improved QoL can be achieved by improving patient confidence and self-efficacy as well as developing a positive working relationship between the patient and the clinician.

The financial impact of ostomy complications from PSCs and ostomy pouch leaks impacts the patient as well as the medical institution. A systematic review by Meisner et al. (2012) focused on costs associated with a seven-week treatment of PSCs. In this review the OST was used to determine the presence and severity of PSCs. A retrospective study by Taneja et al. (2019) focused on costs associated with a seventeen-week treatment course of PSCs using review of EMRs documentation. Both studies examined the economic burden of PSCs and showed increased costs associated with PSCs due, in part, to increased hospital length of stay (Meisner, et al., 2012; Taneja et al., 2019). Tyler et al. (2014) performed a retrospective study of adult patients who underwent colorectal surgery. This study demonstrated that post-operatively 38% of patients who undergo ostomy surgery presented to the ED within the first 90 days with readmission costs as high as $16,000. Further, Tyler and colleagues showed that 30-day readmission rates among patients with an ileostomy or colostomy were higher than patients who underwent colorectal surgery with no ostomy (Tyler et al. 2014). A limitation of the Taneja et al. (2019) study was defining ostomy complications based on EMRs review rather than clinical observations. Both the Meisner et al (2012) and Taneja et al. (2019) studies included small sample sizes with each study examining different surgical techniques.

Conclusions from the literature demonstrate marked benefit among patients receiving preoperative ostomy education with the use of tangible educational tools, such as brochures, booklets, ostomy pouch application demonstration, and/or information sheets compared to regular verbal instruction or instructions introduced only postoperatively.

CHAPTER FOUR: METHODS

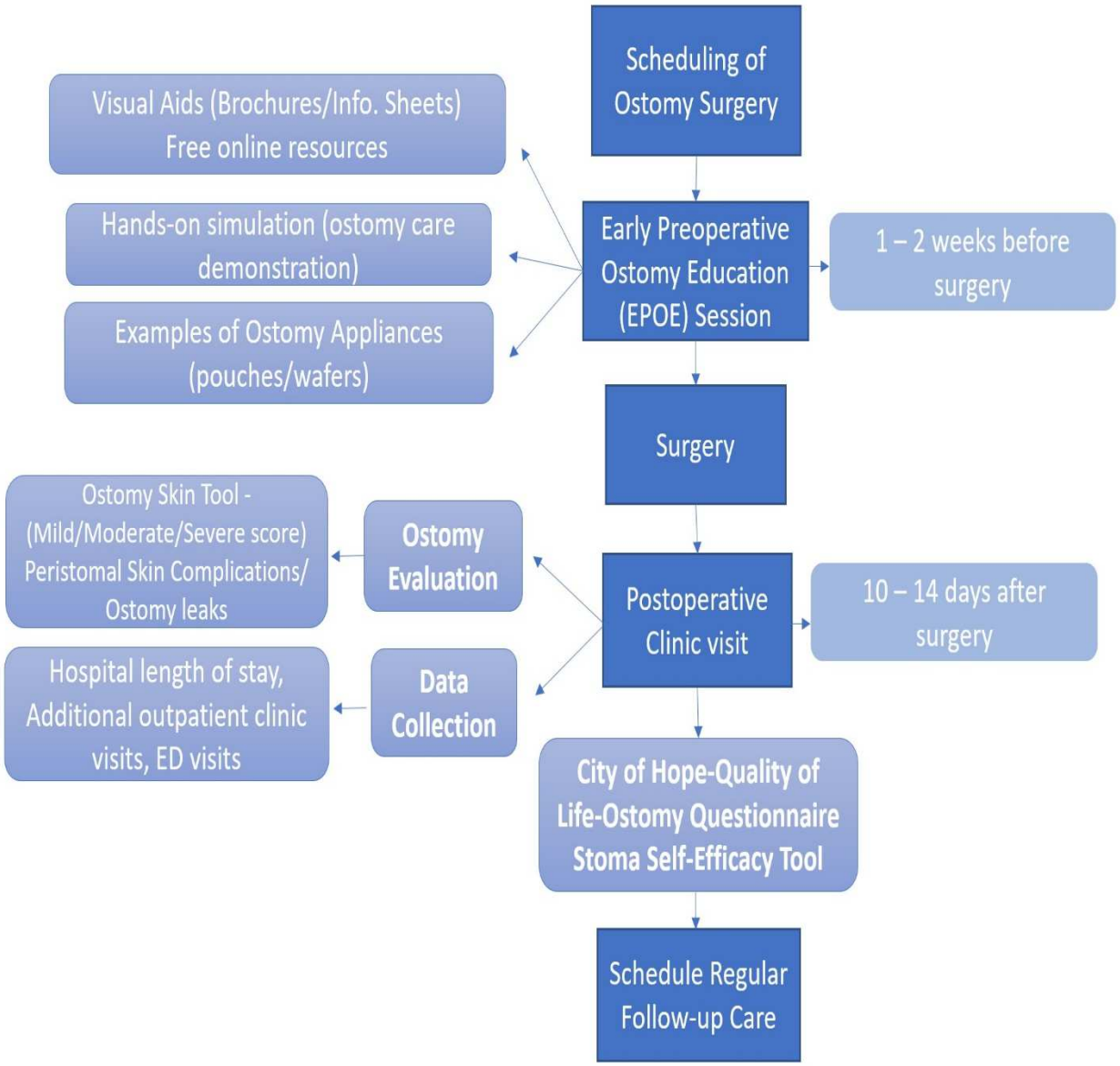
Study Design

This project is a comparative, cross-sectional, quasi-experimental, quality improvement design among adult patients undergoing ostomy surgery at a single outpatient colorectal surgery clinic in Los Angeles Medical County. This quality improvement project did not meet the definition of human subject research by the Institutional Review Board (IRB) at Harbor UCLA Medical Center and the UCLA Office of Human Subject Protection, therefore neither certification of exemption or IRB approval was required. Hospital length of stay, number of ED visits, number of clinic visits, frequency of PSCs and ostomy pouch leaks were compared between groups. Usual care patients, undergoing ostomy surgery, were given a preoperative verbal description of the procedure and care instructions. Ostomy patients in the intervention group received the EPOE session. Any clinician assigned to the colorectal clinic was taught use of the EPOE materials at least 30 minutes before the start of the clinic visit. The EPOE session was implemented one to two weeks before ostomy surgery, and during the 30-minute EPOE session patients received brochures providing information on living with an ostomy, a written resource information sheet, ostomy pouch application demonstration and ostomy pouch application simulation. The components of the brochure and resource information sheet included definitions of the functions of an ostomy, peristomal skin care management, diet, and mechanical techniques on how to properly change an ostomy pouch and a list of resources. During teach back demonstrations patients received positive reinforcement statements by the clinicians.

At the 10 to 14 day postoperative clinic visit intervention patients completed a QoL questionnaire specific to persons with ostomies (Appendix C) and the Stoma Self-Efficacy tool

(Appendix A). Figure 3 shows the timeline of events of a patient undergoing ostomy surgery and the EPOE session followed by the first postoperative outpatient clinic follow-up at 10 to 14 days.

Figure 3. *Timeline of Events from EPOE Session to Postoperative Outpatient Clinic Follow-up visits*



Note: Workflow diagram of a patient scheduled for elective ostomy surgery followed by the implementation of the EPOE 1 to 2 weeks before surgery and the postoperative clinic visit at 10 to 14 days.

Sample and Setting

The outpatient, colorectal surgery clinic is staffed by two nurse practitioners, a minimum of four surgical residents and two registered nurses. Clinicians present at the time of the patient's preoperative appointment were included in the project. Approximately two patients were scheduled weekly for permanent or temporary ostomy surgery. Thus, over 12 weeks of recruitment, 24 patients would be provided pre-operative education as part of this quality improvement project. Inclusion criteria were patients 18 years and older, receiving care at this clinic, and a diagnosis of colorectal cancer or other diagnosis in which elective stoma surgery is needed. Patients who were unable to read and understand English were provided a Spanish version of the educational tools and the session was conducted in Spanish with the use of a certified Spanish translator. Patients with known ostomies or those who underwent urgent surgeries involving an ostomy were excluded from the project.

Medical Record Review

The medical record review was conducted retrospectively for usual care patients who met the inclusion criteria and treated in the clinic between January to December 2020. Medical record retrieval was carried out through a secured (password protected) portal. The EMRs were reviewed using the investigator developed abstraction tool (Appendix D). The investigator-developed abstraction tool was also used for EMR data collection for intervention patients. Sociodemographic data (e.g., age, gender, race/ethnicity, past/present occupation) and medical data (e.g., diagnosis, ostomy type, chronic medical conditions such as hypertension, diabetes, heart and kidney disease or arthritis) were collected. Project outcome data (e.g., hospital length

of stay, number of ED visits, number of clinic visits, and frequency of PSCs and ostomy pouch leakage) were also collected from EMRs.

Intervention

To implement the EPOE sessions, all clinicians were trained in a 30-minute session prior to the start of the preoperative clinic. Training included use of the education brochures and resource information sheets, how to conduct the ostomy pouch application demonstration, and the importance of providing positive reinforcement for the patient's pouch application return demonstration. The educational materials for the preoperative ostomy education session were obtained from free resources on ostomy care and management from validated ostomy care sites such as Hollister.com, Convatec.com, WOCN.org, and Ostomy.org. Clinicians were also trained in use of the OST for assessing PSCs.

The EPOE session was an additional 30 minutes during a preoperative outpatient clinic visit at which time the nature of the patient's surgery, benefits, risks, and complications of surgery were discussed by the nurse practitioner or clinician as the usual standard of practice. After discussion of the surgery, the clinician provided EPOE didactic information that outlined expectations in postoperative ostomy management, including an overview of ostomy pouches, dietary changes, prevention of dehydration, and basic peristomal skin care using the brochure and resource information sheet. The clinician demonstrated ostomy pouch application and then the patient was guided in a hands-on simulation to practice ostomy care and pouch application skills. During the ostomy pouch simulation experience the clinician was encouraged to provide a minimum of one positive reinforcement statement to the patient (e.g., "You're doing great." or "Very good."). The ostomy preoperative education brochures and the resource information sheet

provided to patients included basic ostomy self-care information and links to resources on ostomy care. (Appendix E).

Measurement of PSC Severity

The first postoperative clinic visit was conducted within 10 to 14 days after the patient's ostomy surgery. Additional clinic visits occur due to PSCs or ostomy pouch leakage. At all clinic visits, an assessment of the peristomal skin was conducted by the surgical resident or nurse practitioner to determine the presence and severity of PSCs and any ostomy pouch leakage. PSCs were classified using the OST, a standardized tool to help clinicians monitor and evaluate PSCs more precisely (Meisner et al. 2017). The OST is based on clinical observation of the peristomal skin with scores for three domains: discoloration (D), erosion or ulceration (E) and any tissue overgrowth (T). The range of scoring is 0-15, where 0 represents normal skin and scores leading up to 15 vary depending on severity of the skin condition around the ostomy site. Mild would be classified as Discoloration, Erosion, Tissue overgrowth (DET) scores less than 4, Moderate as DET scores greater than 4 but less than 7, and Severe as DET scores greater than 7 (Appendix B)**.**

Quality of Life and Self-Efficacy measures

At the 10 to 14 day postoperative clinic visit following assessment of the peristomal site, patients were assessed for QoL and self-efficacy. The City of Hope (CoH)-QoL Ostomy Questionnaire and the Stoma Self-Efficacy tool were administered to the patient by the nurse practitioner during the discharge portion of the clinic visit.

The CoH-QoL-Ostomy Questionnaire contained 47 open-ended (n=4) and forced-choice questions (n=43) that collect sociodemographic characteristics, ostomy care experience, diet, clothing, work, health insurance, psychosocial support and sexual activity (Grant et al., 2012) (Appendix C). Forty three of the 47 items explore the patient's experience with an ostomy: physical (11 questions), psychological (13 questions), social (12 questions) and spiritual well-being (7 questions) (Grant et al., 2012). Each question is answered using a Likert scale from 0-10 with zero indicating worst outcome or negative QoL and ten indicating best outcome or positive QoL. The total score is calculated by adding the sum of all 10-point items and dividing by the total number of items. In addition, there also several questions in which the scoring is reversed and reverse coding is needed prior to data entry and interpretation. Items to reverse code are questions 1-12, 15, 18-19, 22-30, 32-34, and 37. (Appendix C).

The Stoma Self-Efficacy tool developed by Bekkers et al. (1996) includes 28 questions. Each item is scored using a Likert scale from 1 to 5, with one indicating not confident and five indicating extremely confident. The questionnaire is equally divided into two subcategories: the stoma self-efficacy scale (14 items), measuring the capability of patients to care for their ostomy, and the social self-efficacy scale (14 items), evaluating social functioning with an ostomy. The scores are then summed, ranging 28 to 140, and higher scores suggest greater self-confidence. During this study, only the 14 items on the stoma self-efficacy subscale were used for a focus on stoma self-care. Therefore, total scores range from 14 to 70 for the stoma self-efficacy subscale scores.

Analysis

Descriptive statistics were used to describe demographic and medical data from usual care and intervention patients. T-tests and chi-square statistics were used to compare groups on

demographic and medical characteristics and hospital length of stay, number of ED visits, number of clinic visits, and number of PSCs and ostomy pouch leakage.

To explore QoL and self-efficacy for intervention patients, total scores and subscale scores were analyzed using descriptive statistics. SPSS version 26 was used for all analyses (IBM Statistical Package for Social Sciences, version 26).

CHAPTER FIVE: RESULTS

Hospital length of stay, number of ED visits, number of clinic visits and frequency of PSCs and ostomy pouch leaks were obtained from 25 patients; 20 usual care and 5 intervention patients. Fifty-two percent (n=13) of the total sample of patients were female (usual care n=10; intervention n=3) with a mean age of 56.7 (SD 12.7) years. The sample was ethnically and racially diverse with the majority of patients persons of color: 12% (n=3) Asian, 12% (n=3) Black, 48% (n=12) Hispanic, 8% (n=2) Native American and 20% (n=5) White. Table 1 presents the demographic and medical characteristics for usual care and intervention patients. There were no significant differences between groups on any of the demographic characteristics although a greater proportion of intervention patients were female (65%, n=3 versus 50%, n=10), Hispanic (60%, n=3, versus 45%, n=9) and Spanish language speakers (60%, n=3, versus 45%, n=9).

All patients had some form of respiratory disease such as chronic obstructive pulmonary disease, bronchitis or asthma, about half had a diagnosis of hypertension (46%, n=11) and 33% (n=8) had diabetes. The majority of patients (67%; n=16) underwent ostomy surgery with a diagnosis of colon or rectal cancer. Ileostomy (56%, n=14) was more commonly performed over colostomy (44%, n=11). A significantly higher proportion of intervention patients had a medical history of musculoskeletal disease (40%, n=2 versus 0; p =0.05) but there were no other significant differences in medical history, diagnosis or ostomy type between usual care and intervention patients.

Table 1: *Demographic and Medical characteristics of usual care and intervention patients*

Characteristics	Total patients	Usual care patients (n=20)	Intervention patients **(n=5)**
		Mean (SD); Range	Mean (SD); Range
Age in years	56.76 (12.72); 26-82	57.9 (11.6); 26-82	52.25 (17.2); 26-82
Females	52 (13)	50 (10)	65 (3)
Males	48 (12)	50 (10)	35 (2)
Race/ethnicity			
Asian	12.5(3)	15 (3)	0
Black	12.5 (3)	12.5 (3)	0
Hispanic	48 (12)	45 (9)	60 (3)
Native American	8.3 (2)	10 (2)	0
White	20(5)	15 (3)	40 (2)
Primary language			
English	44 (11)	45 (9)	40 (2)
Spanish	48 (12)	45 (9)	60 (3)
Other	8.3 (2)	10 (2)	-
Body Mass Index	28.3 (7.00); 16.7-46.6	27.9 (6.12)	29.88 (10.64)
Medical History			
Hypertension	44(11)	45 (9)	40 (2)
Diabetes	32(8)	35 (7)	20 (1)
Cardiovascular Disease	20 (5)	25 (5)	0
Respiratory Disease	100 (24)	100 (20)	100 (4)
Chronic Kidney Disease	4.2 (1)	5 (1)	0
Musculoskeletal Disease*	8(2)	0	40 (2)
Medical diagnosis			
Colon Cancer	20.8 (5)	15(3)	40 (2)
Rectal Cancer	44 (11)	50 (10)	20 (1)
Diverticulitis	4.2(1)	5(1)	0
Inflammatory Bowel disease	16.7 (4)	15 (3)	20 (1)
Trauma	12 (2)	10 (2)	20 (1)
Diversion	4.2 (1)	5 (1)	0
Ostomy type			
Colostomy	44 (11)	40 (8)	60 (3)
Ileostomy	56 (14)	60 (12)	40 (2)

* Indicates significance at the p=.05 level.

There was no significant difference in hospital length of stay, ED visits, and clinic visits between usual care and intervention patients (Table 2). While not significant, intervention patients experienced fewer clinic visits (1.2, SD 0.4 versus 1.35, SD 0.5) and fewer unscheduled clinic visits (0.2, SD 0.45 versus 0.35, SD 0.49) compared to usual care patients.

Table 2: *Hospital length of stay, Emergency department and clinic visits among usual care and intervention patients*

Outcomes	Usual care patients (n=20)	Intervention patients (n=5)
	Mean (SD); % (n)	Mean (SD); % (n)
Hospital Length of Stay in Days	7.75 (2.36)	6.8 (2.59)
Frequency of Emergency Department Visits	0.15 (0.37)	0.20 (0.45)
Patients with Unscheduled Postoperative Clinic Visits	0.35 (0.49)	0.20 (0.45)
Total Outpatient Clinic visits up to 10 to 14 days postoperatively	1.4 (0.50)	1.2 (0.45)

While not statistically significant, a higher proportion of intervention patients presented to their 10 to14 day postoperative clinic visit with no ostomy complications compared to usual care patients (60%, n=3; versus 35% (n=7). In addition, intervention patients had less severe peristomal skin damage compared to usual care patients as measured by the OST scores with higher scores indicating more severe damage (1.2, SD 0.5 versus 1.4, SD 0.4). Table 3 presents ostomy complication outcomes for usual care and intervention patients.

Table 3: *Ostomy complications and Ostomy Skin Tool severity group among usual care and intervention patients at 10 to 14 day postoperative clinic visit*

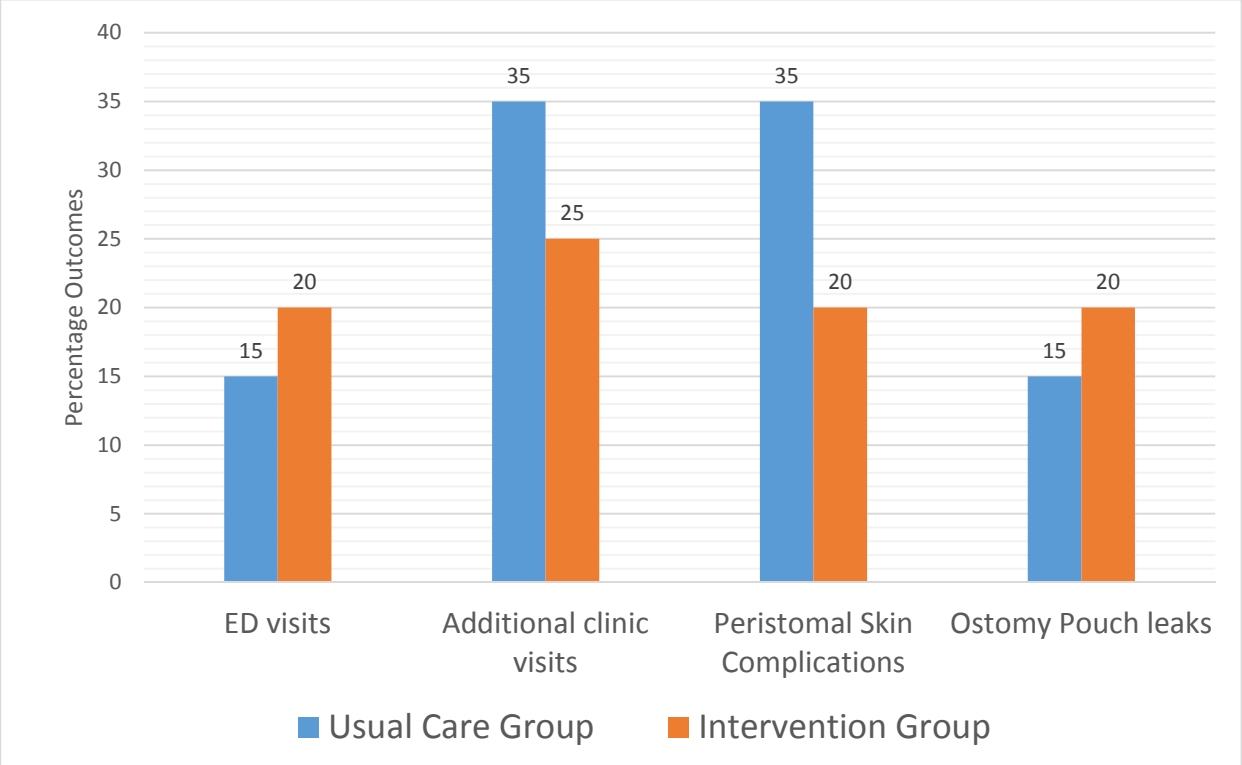
Ostomy Complication	Usual care patients (n=20)	Intervention patients (n=5)
	% (n)	% (n)
Peristomal Skin Complications (PSCs)	35 (7)	20 (1)
Ostomy Pouch Leak	15 (3)	20 (1)
Other	15 (3)	0
None present	35 (7)	60 (3)
Ostomy Skin Tool Classifications		
Mild (scores 1-3)	60 (12)	80 (4)
Moderate (scores 4-6)	40 (8)	20 (1)
Severe (scores >6)	0	0
Ostomy Skin Tool Score* --Mean (SD)	1.4 (0.5)	1.2 (0.45)

*Ostomy Skin Tool scores range from 0-15 with lower scores indicating less peristomal skin damage.

In this study, 20% of patients in the intervention group presented with ostomy pouch leaks, primarily due to not having enough ostomy supplies or their ostomy supplies were not delivered to their home in time to make the necessary ostomy pouch changes to prevent ostomy pouch leaks. Additionally, 20% of the intervention group presented to the ED over the weekend due to ostomy concerns and was not able to contact the CRS office. The main outcomes of the study were not significantly different between usual care and intervention patients however several measures did show improvement as shown in Figure 4.

Figure 4.

Outcomes of Preoperative Ostomy Education Among Usual Care and Intervention Group



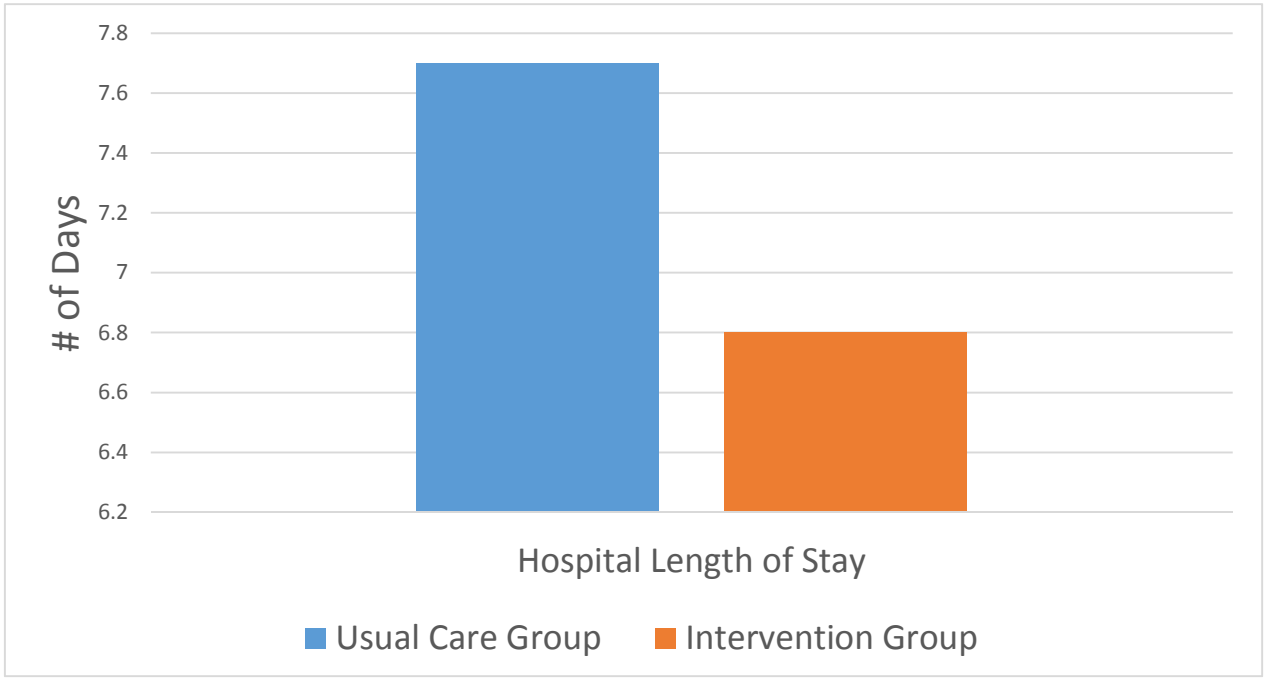
Note: Differences in percentage (%) of ED visits, additional outpatient clinic visits, PSCs, and ostomy pouch leaks by Usual Care patient group and Intervention patient Group. In this study

20% of intervention patients compared to 15% of usual care patients required an ED visit due to ostomy complications while 25% of intervention patients compared to 35% of usual care patients required an additional outpatient clinic visit. For ostomy complications, 20% of intervention patients compared to 35% of usual care patients developed PSCs and 20% of intervention patients compared to 15% of usual care patients developed ostomy pouch leaks.

While not significant, intervention patients experienced decreased hospital length of stay compared to usual care patients (6.8, SD 2.6 days versus 7.75, SD 2.36 days) as seen in Figure 5.

Figure 5.

Outcome Measures of Hospital Length of Stay Among Usual Care Group and Intervention Group.



Note: Differences in hospital length of stay in days by Usual Care Group and Intervention Group. In this study there was a decreased length of hospital stay by 1 day among intervention patients receiving early preoperative ostomy education.

Quality of Life Results

Intervention patients had a CoH-QoL Ostomy Questionnaire total average score of 7.6 (SD 1.9) with domain scores from a low of 7.0 (SD 1.9) for the psychological subcategory to a high of 8.0 (SD 1.9) for the spiritual subcategory with higher scores indicating better QoL. Examining the subcategories of the CoH-QoL-Ostomy Questionnaire scores, intervention patients scored 7.3 (SD 2.3) with a median of 8 on the physical well-being subcategory with highest score of 10.0 (SD 0) for the item "having issues with constipation or diarrhea". The lowest score on the physical subcategory was 5.0 (SD 4.1) for item "physical strength" and "issues with skin around the ostomy". A subcategory score of 7.0 (SD 1.9) with a median score of 7.9 was measured for the psychological well-being subcategory with the highest score of 9.6 (SD 0.9) for the item "ability to remember things" followed by "overall quality of life" with a score of 9.0 (SD 1.4). For the social subcategory a score of 7.9 (SD 1.9) with a median of 8.4 was obtained suggesting intervention patients did not have much difficulty in terms of social support from friends and family and continued with their daily activities. The lowest score in this category showed 4.2 (SD 3.8) from the item "how distressing illness is for family" followed by the item "financial burden from illness" with a score of 5.2 (4.6) and a median of 4. Lastly, a score of 8.0 (SD 1.9) with a median of 8 was obtained for the spiritual subcategory. The highest score in this category was 10.0 (SD 0) for the item "sense of being alive" followed by 9.0 (2.2) with a median of 10, for item "hopeful for future", which suggests intervention patients were still optimistic of the future in spite of issues with their ostomy. Individual scores for each subcategory and subcategory total scores for the CoH-QoL Ostomy Questionnaire are summarized in Table 4.

Table 4. *City of Hope-Quality of Life-Ostomy Questionnaire scores from intervention patients 10 to 14 days postoperatively.*

CoH-QoL-Ostomy Questionnaire Tool	Intervention patient (n=5)
	Mean (SD) [Median]
Categories	
Physical - total	7.3 (2.3) [8]
Physical strength	5.0 (4.1) [5]
Fatigue	6.4 (3.5) [8]
Skin surrounding ostomy	5.0 (4.5) [5]
Sleep disorders	8.2 (4.0) [10]
Aches or pains	5.0 (3.7) [6]
Gas	9.6 (0.9) [10]
Odor	9.4 (1.3) [10]
Constipation	10 (0) [10]
Diarrhea	10 (0) [10]
Leaking from the pouch	6.4 (3.8) [6]
Overall physical well-being	5.4 (4.3) [4]
Psychological - total	7.0 (1.9) [7.9]
Difficulty with ostomy adjustment	4.4 (3.6) [4]
Feeling of usefulness	7.6 (2.5) [8]
Satisfaction/enjoyment in life	7.8 (3.0) [10]
Embarrassment	4.0 (3.5) [2]
Overall QoL	9.0 (1.4) [10]
Ability to remember things	9.6 (0.9) [10]
Difficulty looking at ostomy	6.4 (2.5) [5]
Difficulty caring for ostomy	3.8 (3.0) [2]
Feeling control over life	7.0 (2.6) [8]
Satisfaction with appearance	7.0 (2.0) [8]
Anxiety	6.6 (4.7) [10]
Depression	9.6 (0.9) [10]
Fearful disease will come back	8.6 (2.2) [10]
Social - total	7.9 (1.9) [8.4]
Difficulty meeting new people	8.8 (2.1) [10]
Financial burden for illness	5.2 (4.6) [4]
How distressing illness is for family	4.2 (3.8) [4]
Ability to travel	5.6 (4.3) [5]
Interference with personal relationships	9.0 (2.2) [10]
Isolation	9.0 (2.2) [10]
Support from friends/family	10 (0) [10]
Interference with recreational sports/activities	9.2 (1.8) [10]
Interference with social activities	7.6 (3.9) [10]
Intimacy issues	8.0 (4.5) [10]

Privacy at home for ostomy care	10 (0) [10]
Privacy when traveling	8.0 (1.9) [8]
Spiritual - total	8.0 (1.9) [8]
Uncertainty about future	6.2 (2.2) [5]
Sense of being alive	10 (0) [10]
Sense of inner peace	8.8 (2.1) [10]
Hopeful of future	9.0 (2.2) [10]
Support form spiritual activities/meditation	9.0 (2.2) [10]
Support from religious activities (church/synagogue)	7.0 (4.5) [10]
Positive changes in lifestyle	6.0 (5.5) [10]
Total	7.6 (1.9)

*Scores range from 0 (worst outcome) – 10 (best outcome).

Self-Efficacy Results

Stoma Self-Efficacy tool stoma care subscale scores for intervention patients were 56.8 (SD 9.7) with higher scores indicating greater confidence and self-efficacy (Table 5). Intervention patients scored highest for self-efficacy on the items: preventing obstruction (4.6, SD 0.5, median 5), following stoma therapist's instructions for handling the stoma (4.4, SD 0.9, median 5), following doctor's advice for taking care of the stoma and nutrition pattern (4.6, SD 0.5, median 5), taking care of the stoma when ill (4.4, SD 0.9, median 5), caring for the stoma when outdoors (4.6, SD 0.5, median 5), wearing clothes they like (4.8, SD 0.4, median 5), performing light household duties (4.8, SD 0.4, median 5) and eating and drinking the foods they enjoy (4.8, SD 0.4, median 5). Intervention patients were least confident in preventing leakages (3.0, SD 1.6, median 3). This may relate to the fact that most patients registered in the Los Angeles County find it hard to obtain proper medical insurance and experience delays in receiving ostomy supplies or have to physically come in to clinic to obtain supplies, which can be burdensome to both the patient and their family members. Of interest, intervention patients reported moderate confidence in taking care of the stoma the right way at home (3.4, SD 0.9, median 3) and applying stoma collection materials the way they were taught to do so (3.8, SD 0.8, median 4).

Table 5. *Self-Efficacy Scores from intervention patients at 10 – 14 days postoperatively*

Self-Efficacy Tool Items (Bekker, et al, 1994)	Intervention patients (n=5)
	Mean (SD) [Median]
1. Apply the stoma collection materials before leakages appear?	3.2 (1.1) [3]
2. Prevent having leakages (let alone manufacturing defects)?	3.0 (1.6) [3]
3. Take care of the stoma in the right way at home?	3.4 (0.9) [3]
4. Prevent having skin problems?	3.2 (1.3) [3]
5. Prevent having stoma bleeding and damage?	3.2 (1.3) [3]
6. Apply stoma collection materials in the way you are learned to do?	3.8 (0.8) [4]
7. Prevent having obstruction?	4.6 (0.5) [5]
8. Follow the stoma therapist's instructions for handling the stoma?	4.4 (0.9) [5]
9. Follow doctor's advice for taking care of your stoma and nutrition pattern?	4.6 (0.5) [5]
10. Take care of the stoma in the right way outdoors?	4.6 (0.5) [5]
11. Take care of the stoma when you are ill?	4.4 (0.9) [5]
12. Wear most of the clothes you like?	4.8 (0.4) [5]
13. Carry out light duties in and around the house (for instance washing up and gardening)?	4.8 (0.4) [5]
14. Eat and drink most of the things you like?	4.8 (0.4) [5]
Total Self-Efficacy Score	56.8 (9.7)

*Scores range from 1 (not confident) – 5 (extremely confident) with total scores from 14 – 70.

CHAPTER SIX: DISCUSSION

Our findings suggest use of an EPOE session may decrease the incidence of PSCs, ostomy pouch leaks, hospital length of stay, and number of clinic visits among adult patients undergoing surgery with a resulting ostomy. The goal of the project was to provide EPOE to adults having ostomy surgery to manage ostomy expectations and improve outcomes (decrease PSCs, ostomy pouch leaks, hospital length of stay, ED visits, and clinic visits). Patients who received EPOE did not differ in demographic or medical characteristics. Intervention patients experienced a decrease in hospital length of stay (6.8 versus 7.75 days), fewer clinic visits (1.2 versus 1.35) and fewer unscheduled clinic visits (0.2 versus 0.35) compared to usual care patients. Our findings are similar to Forsmo et al's. (2016) single-center study that found adult patients who received an ostomy education session with an early recovery after surgery (ERAS) program had a hospital length of stay of six days (decreased from nine days). We also showed intervention patients with hospital length of stay lower than usual care patients.

While not significant we also showed a higher proportion of intervention patients with no ostomy complications compared to usual care patients (60% versus 35%) and less severe peristomal skin damage compared to usual care patients (20% vs. 35%). Our findings support Stokes et al. (2017) study that evaluated the percentage of ostomy complications following a preoperative ostomy education class and found that 8.9% (11/124) of participants reported ostomy pouch leaks compared to 20.2% (19/94) of participants who did not receive preoperative ostomy education. Stokes and colleagues' (2017) preoperative ostomy education class was over two hours and included a power-point presentation on instructions for perioperative expectations, diet, symptoms of dehydration, examples of various ostomy pouch and hands-on ostomy care

instructions. In contrast, our study used a brief 30-minute EPOE session with the use of free educational materials taken from the United Ostomy Associations of America website and other free websites. Our topics were similar to those used by Stokes et al (2017) and included a guide to ostomy care, peristomal skin care, basic colostomy care, diet, lifestyle tips and an ostomy pouch application simulation.

Ostomy pouch leaks and number of ED visits were not statistically significant, with one intervention patient having an ostomy pouch leak due to not having ostomy supplies delivered to her home on time and one intervention patient's ED visit due to not being able call the Colorectal clinic to ask questions over the weekend compared to usual care patients with three ostomy pouch leaks and three usual care patients with ED visits.

Patients who receive EPOE may also achieve higher self-efficacy with ostomy care and enhanced QoL in adapting to life changes after an ostomy. Our findings suggest intervention patients were moderately confident in ostomy self-care and overall QoL in the 10 to 14 day postoperative period. Others have shown both self-efficacy and QoL improve during later postoperative periods such as one and three months (Xu et al., 2018). Xu and colleagues (2018) showed self-efficacy scores on the Stoma Self-Efficacy tool increased for patients who received preoperative education and these scores kept increasing from 10 days postoperative to one month and three months postoperative. As our follow up period was only 10 to 14 days it is unknown if intervention patients' self-efficacy and QoL would continue to improve.

Limitations

The small number of patients receiving pre-operative education may limit the validity and generalizability of our findings. In addition, findings may not be generalizable to the general

population because the clinic's patient population is disproportionately comprised of lower-income and under-represented minority groups. Nonetheless, the importance of preparing and educating this population is essential to obtain valued outcomes and improved health equity. In addition, elective cases, including ostomy procedures, were postponed during the COVID-19 pandemic (Dr. Christian De Virgilio, Chair of Dept of Surgery, email communication, March 13, 2020). For example, fewer than half of the expected surgical procedures were scheduled between January 2021 and April 2021 (Dr. Christian De Virgilio, Chair of Dept of Surgery, email communication, January 22, 2021). Additionally, we were only able to follow patients until the 10 to 14 day postoperative clinic visit, it may be that further longer follow up time periods would reveal other significant differences between usual care and intervention patients as well as continued improvements in self-efficacy and QoL. We were unable to assess self-efficacy and QoL in usual care patients and thus, unable to compare the two groups on self-efficacy and QoL.

Implications for practice

In current practice, patients receive verbal description of ostomy surgery and ostomy care instructions, post-operative inpatient teaching or instruction during outpatient clinic follow-up visits. Implementing this brief 30-minute preoperative ostomy education session 1 to 2 weeks preoperatively using free easily accessible materials may improve patient outcomes of lower hospital length of stay, fewer clinic visits, PSCs and ostomy pouch leaks. Tyler et al (2014) showed that 38% of patients who undergo ostomy surgery present back in the ED within the first 90 days postoperatively, and readmission costs can reach up to $16,000. Thus, use of EPOE can potentially lower hospital costs related to ostomy complications and ED readmission rates in

addition to lower costs associated with shorter hospital length of stay, fewer and less severe PSCs and fewer clinic visits.

Implications for Research

According to the Wound Ostomy Continence Nurses Society, there is evidence that patients who receive some form of preoperative ostomy education experience shorter hospital length of stay, fewer postoperative complications and improved overall recovery (Mahoney, 2016). In the review of research done for this project, the last 10 years have only begun to really focus on the importance of consistent preoperative education. Multiple studies show the importance of preoperative educational sessions for ostomy patients (Forsmo et al., 2016; Nagle et al., 2012; Stokes et al., 2017). However, few studies actually focus on the results of patients receiving preoperative education specific to ostomy education. Even with a small number of intervention patients, this project demonstrated the results of an EPOE session conducted 1 to 2 weeks preoperatively for 30 minutes using readily available free materials in decreasing hospital length of stay, clinic visits, and PSCs and ostomy pouch leaks. This project provides beginning data to support a study with a longer follow up time period to evaluate outcomes. Additional research to examine study outcomes at one, three, six, and 12 months would be beneficial. Research examining the use of the OST as a routine part of assessment for patients with ostomies would support continued use of the tool. Follow up research on patient and family determination of usefulness of the ostomy care brochures and information sheet on resources could assist in determining the appropriateness of the resources used in the EPOE session. Further, determining patient access and use of the on-line resources would assist in determining if patients have adequate access to these materials. Finally, implementation of the EPOE in additional clinic

settings would help in examining the generalizability of the intervention for other patient populations.

Sustainability

The vision and mission at Harbor-UCLA is to provide patients with exceptional patient-centered care through education and innovation regardless of socio-economic status. Educational tools provided for our ostomy patients closely aligns with this philosophy and thus there is external organizational support for continued use of the EPOE session. The resources used for the EPOE session are free for provider use and can also be accessed online at no cost and at the patient's convenience. The EPOE sessions were brief, 30 minutes and this may make implementation sustainable. Project champions would need to be identified among the clinic leadership and team support developed among surgical residents and nursing staff and clinic management to further sustain the project. However, all the resources used in the project are free and easily available. Sustaining this project can also help to decrease hospital length of stay and additional emergency room visits or clinic visits due to ostomy complications.

CONCLUSION

Ostomy complications are primarily preventable untoward outcomes that can be reduced by preoperative ostomy education that can improve self-efficacy and QoL. Providing early preoperative ostomy education can lead to positive value-based outcomes even in the early postoperative period. Even with a small number of intervention patients, this project demonstrated positive results of an EPOE session conducted one to two weeks preoperatively for 30 minutes using readily available free materials in decreasing hospital length of stay, clinic visits, and PSCs and ostomy pouch leaks. In 1977, the UOAA adopted a Bill of Rights outlining a patient's expectation while undergoing ostomy surgery (see Box 6-1). The elements include pre-op counseling, informed instruction, and providing information and community resources to keep patients well informed of receiving adequate ostomy care. The EPOE session meets the obligation to provide pre-operative counseling, education, individual instruction and essential resources for adapting to life after ostomy surgery.

Box 6-1 Ostomate Bill of Rights

The ostomate shall:
Be given pre-op counseling
Have an appropriately positioned stoma site
Have a well-constructed stoma
Have a skilled postoperative nursing care
Have emotional support
Have individual instruction
Be informed on the availability of supplies
Be provided with information on community resources
Have posthospital follow-up and lifelong supervision
Benefit from team efforts of health care professionals
Be provided with information and counsel from the ostomy association and its members

* Adopted by the UOAA House of Delegates at the UOA Annual Conference in 1977

The stigma of ostomy care has been detrimental for patients needing ostomy surgery, often times patients refuse surgery for fear of the unknown in living with an ostomy and this can greatly affect the underserved population who currently lack ostomy care resources. These resources should be accessible to the patient and provide information on basic ostomy skin care and address the physical and emotional needs of that patient. Patients have stated their inability to differentiate normal peristomal skin from PSCs is due to lack of education, and providing the EPOE provides the knowledge and awareness patients need to lead a successful life after ostomy surgery.

APPENDICES

Appendix A Stoma Self-Efficacy Tool (Bekker, et al, 1996)

Item	1 Not Confident	2 Slightly Confident	3 Fairly Confident	4 Highly Confident	5 Extremely confident
Stoma Care Self Efficacy					
1. Apply the stoma collection materials before leakages appear?	O	O	O	O	O
2. Prevent having leakages (let alone manufacturing defects)?	O	O	O	O	O
3. Take care of the stoma in the right way at home?	O	O	O	O	O
4. Prevent having skin problems?	O	O	O	O	O
5. Prevent having stoma bleeding and damage?	O	O	O	O	O
6. Apply the stoma collection materials in the way you are learned to do?	O	O	O	O	O
7. Prevent having obstruction?	O	O	O	O	O
8. Follow the stoma therapist's instructions for handling the stoma?	O	O	O	O	O
9. Follow the doctor's advice for taking care of your stoma and nutrition pattern?	O	O	O	O	O
10. Take care of the stoma in the right way outdoors?	O	O	O	O	O
11. Take care of the stoma when you are ill?	O	O	O	O	O
12. Wear most of the clothes you like?	O	O	O	O	O

13. Carry out light duties in and around the house (for instance washing up and gardening)?	O	O	O	O	O
14. Eat and drink most of the things you like?	O	O	O	O	O

Appendix B Ostomy Skin Tool

Using the Ostomy Skin Tool

This instruction sheet describes how to use the Ostomy Skin Tool to evaluate the condition of peristomal skin.

How to use this tool

1. Examine the peristomal skin (not the mucosa) and evaluate the skin based on the descriptions in the three domains.
   Maximum points in each domain:
   - 3 points for the size of the affected area
   - 2 points for the severity.
2. Assess the size of the area affected and score based on the key (at bottom). Assess the severity in each domain using the definitions and the photographs as a guide.
   - If the area score is 0, then the severity score within that domain will automatically be 0 as well.

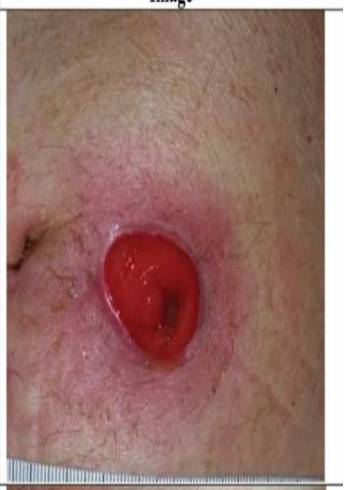
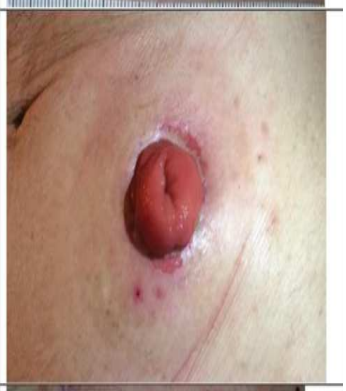
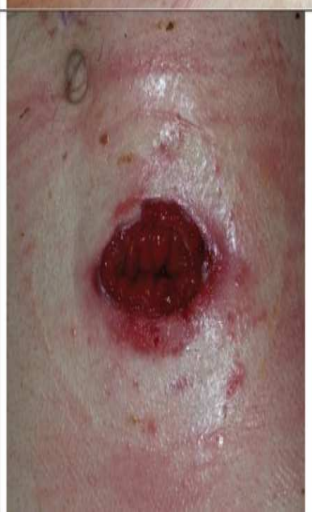
   Domain 1: Discoloration
   Estimate the size of the area affected by discoloration (score 0-3). If the patient has no discoloration at all, the skin is normal and the total score will be 0.
   - If the patient has discoloration, assess the severity (score 1 or 2).

   Domain 2: Erosion
   Estimate the size of the area affected by erosion (score 0-3). If the patient scores 0, move on to domain 3.
   - If the patient has erosion, assess the severity (score 1 or 2).

   Domain 3: Tissue overgrowth
   Estimate the size of the area affected by tissue overgrowth (score 0-3). If the patient scores 0, the total score can now be calculated.
   - If the patient has tissue overgrowth, assess the severity (score 1 or 2).
3. Calculating the total score
   - Calculate the total score by adding all of the scores from each domain together.
   - Please go through the descriptions for each score in the scoring system every time you assess a patient.

Area* affected	Score
Unaffected	0
<25%	1
25-50%	2
>50%	3

*Area is defined as the peristomal skin area that is covered by the skin adhesive (e.g., <25% affected area implies that less than 25% of the adhesive area is affected).

Category	DET Score	Image
Mild (1-3)	Discoloration=3 No Erosion or Tissue overgrowth Total score =3	
Moderate (4-6)	Discoloration =3 Erosion=2 No tissue overgrowth Total score =5	
Severe (7-15)	Discoloration = 3 Erosion=3 Tissue overgrowth =2 Total score =8	

Appendix C City of Hope Quality of Life Ostomy Questionnaire

Directions: We are interested in knowing how the experience of having an ostomy affects your quality of life. Please answer all of the following questions based on **your life at this time**.

Please circle the number form 0 – 10 that best describes your experiences. For example:

How difficult is it for you to **climb stairs**?

Not at all difficult 0 1 2 3 4 5 6 7 8 9 10 extremely difficult

Circling (2) means you have some but not a lot of difficulty climbing stairs.

Related to your ostomy, to what extent are the following a problem for you?

1. Physical strength

no problem 0 1 2 3 4 5 6 7 8 9 10 **severe problem**

2. Fatigue

no problem 0 1 2 3 4 5 6 7 8 9 10 **severe problem**

3. Skin surrounding the ostomy

no problem 0 1 2 3 4 5 6 7 8 9 10 **severe problem**

4. Sleep disorders

no problem 0 1 2 3 4 5 6 7 8 9 10 **severe problem**

5. Aches or pains

no problem 0 1 2 3 4 5 6 7 8 9 10 **severe problem**

6. Gas

no problem 0 1 2 3 4 5 6 7 8 9 10 **severe problem**

7. Odor

no problem 0 1 2 3 4 5 6 7 8 9 10 **severe problem**

8. Constipation

no problem 0 1 2 3 4 5 6 7 8 9 10 **severe problem**

9. Diarrhea

no problem 0 1 2 3 4 5 6 7 8 9 10 **severe problem**

10. Leaking from the pouch (or around the appliance)

no problem 0 1 2 3 4 5 6 7 8 9 10 **severe problem**

11. **Overall physical well-being**

no problem	0	1	2	3	4	5	6	7	8	9	10	**severe problem**

12. **How difficult has it been for you to adjust to your ostomy?**

not at all	0	1	2	3	4	5	6	7	8	9	10	**a great deal**

13. **How useful do you feel?**

not at all	0	1	2	3	4	5	6	7	8	9	10	**a great deal**

14. How much satisfaction or enjoyment in life do you feel?

none at all	0	1	2	3	4	5	6	7	8	9	10	**a great deal**

15. How much are you embarrassed by your ostomy?

not at all	0	1	2	3	4	5	6	7	8	9	10	**extremely embarrassed**

16. How good is your overall quality of life?

extremely poor	0	1	2	3	4	5	6	7	8	9	10	**excellent**

17. How is your ability to remember things?

extremely poor	0	1	2	3	4	5	6	7	8	9	10	**excellent**

18. How difficult is it to look at your ostomy?

not at all	0	1	2	3	4	5	6	7	8	9	10	**extremely difficult**

19. How difficult is it for you to care for your ostomy?

not at all	0	1	2	3	4	5	6	7	8	9	10	**extremely difficult**

20. Do you feel like you are in control of things in your life?

not at all	0	1	2	3	4	5	6	7	8	9	10	**completely**

21. How satisfied are you with your appearance?

not at all	0	1	2	3	4	5	6	7	8	9	10	**extremely satisfied**

22. How much anxiety do you have?

none at all	0	1	2	3	4	5	6	7	8	9	10	**severe**

23. How much depression do you have?

none at all	0	1	2	3	4	5	6	7	8	9	10	**severe**

24. Are you fearful that your disease will come back?

not at all	0	1	2	3	4	5	6	7	8	9	10	**extremely fearful**

25. Do you have difficulty meeting new people?

not at all	0	1	2	3	4	5	6	7	8	9	10	**extremely difficult**

26. How much financial burden resulted from your illness or treatment?

none at all	0	1	2	3	4	5	6	7	8	9	10	**extreme**

27. How distressing has your illness been for your family?

not at all	0	1	2	3	4	5	6	7	8	9	10	**extremely distressing**

28. How much does your ostomy interfere with your ability to travel?

not at all	0	1	2	3	4	5	6	7	8	9	10	**completely**

29. Has your ostomy interfered with your personal relationships?

not at all	0	1	2	3	4	5	6	7	8	9	10	**completely**

30. How much isolation is caused by your ostomy?

none	0	1	2	3	4	5	6	7	8	9	10	**a great deal**

31. Is support from friends and family sufficient to meet your needs?

not at all	0	1	2	3	4	5	6	7	8	9	10	**extremely**

32. Has your ostomy interfered with your recreational/sports activities?

not at all	0	1	2	3	4	5	6	7	8	9	10	**a great deal**

33. Has your ostomy interfered with your social activities?

not at all	0	1	2	3	4	5	6	7	8	9	10	**a great deal**

34. Has your ostomy interfered with your ability to be intimate?

not at all	0	1	2	3	4	5	6	7	8	9	10	**a great deal**

35. Do you have enough privacy at home for doing your ostomy care?

not at all 0 1 2 3 4 5 6 7 8 9 10 **a great deal**

36. Do you have enough privacy when traveling for conducting your ostomy care?

not at all 0 1 2 3 4 5 6 7 8 9 10 **a great deal**

37. How much uncertainty do you feel about your future?

none at all 0 1 2 3 4 5 6 7 8 9 10 **extreme**

38. Do you sense a reason for being alive?

not at all 0 1 2 3 4 5 6 7 8 9 10 **a great deal**

39. Do you have a sense of inner peace?

not at all 0 1 2 3 4 5 6 7 8 9 10 **a great deal**

40. How hopeful do you feel?

not at all 0 1 2 3 4 5 6 7 8 9 10 **extremely**

41. Is support you receive from personal spiritual activities such as prayer or mediation sufficient to meet your needs?

not at all 0 1 2 3 4 5 6 7 8 9 10 **completely**

42. Is support you receive from **religious activities** such as going to church or synagogue sufficient to meet your needs?

not at all 0 1 2 3 4 5 6 7 8 9 10 **completely**

43. Has having an ostomy made positive changes in your life style?

not at all 0 1 2 3 4 5 6 7 8 9 10 **a great deal**

Many people have shared stories about their lives with an ostomy. Please share with us the greatest challenge you have encountered in having an ostomy.

Appendix D Colorectal Surgery Preoperative Ostomy Education – Extraction Tool

Name		DOB	MRN
ID #		Gender: 1 – M	2 - F
CRS Attending:			
CRS Chief Resident:			
Medical History			
1 – HTN	2 – DM	3 – CV	4 - Respiratory
5 – CKD	6 – Musculoskeletal		
Smoker: 1 – Y	2- N		
Ht:	Wt:	BMI:	

Race / Ethnicity					
1 – White / Caucasian	2 – Black / African American	3 – Hispanic / Latino	4 – Asian	5 – Pacific Islander / Hawaiian	6 – Native American
Language:					

Primary Diagnosis						
1 – Colon Cancer	2 – Rectal Cancer	3 – Diverticulitis	4 – IBD / Crohn's disease / UC	5 – Diversion – Paraplegia	6 – Chronic incontinence	7 - Trauma

Preoperative clinic date:		
Preoperative ostomy education: (NP / Surgical Resident)		
1 – Y	2 - N	
Hands on simulation:	1 – Y	2 - N
Brochures/Information sheets provided:	1 – Y	2 - N
Questions/Concerns:		

Surgery:	Date:
Ostomy Type	
1 – Colostomy	2 – Ileostomy
Postoperative complications:	
1 – PSCs	2 – ostomy leakage
Ostomy education provided? (Nurse/NP/Resident)	

1 – Y	2 - N

Discharge Date:	Length of Stay:
Other Postoperative complications:	
ED Readmissions:	

Postoperative clinic date:		
Ostomy Complications:		
1 – PSCs	2 – ostomy leakage	
Ostomy Skin Tool: PSCs Assessment		
DET sccore		
1 – Mild (1-3)	2 – Moderate (4-6)	3 – Severe (7-15)

Postoperative clinic date:		
Ostomy Complications:		
1 – PSCs	2 – ostomy leakage	
Ostomy Skin Tool: PSCs Assessment		
DET sccore		
1 – Mild (1-3)	2 – Moderate (4-6)	3 – Severe (7-15)

Postoperative clinic date:		
Ostomy Complications:		
1 – PSCs	2 – ostomy leakage	
Ostomy Skin Tool: PSCs Assessment		
DET sccore		
1 – Mild (1-3)	2 – Moderate (4-6)	3 – Severe (7-15)

Other Ostomy Complications:

CoH-QoL-OQ score:
Self-Efficacy score:

Appendix E Educational materials in English and Spanish

Preoperative Ostomy Brochure and Information Sheet

(English)

General Care Guidelines

- Empty your pouch when it is 1/3 to 1/2 full of stool or gas
- Change your skin barrier on a routine basis. You will get more comfortable with this after you learn what works best for you
- Wear time is based on personal preference, stoma characteristics, and skin barrier formulation
- If you use soap, make sure it does not contain creams, lotions, or oils that may leave a residue. This can interfere with your skin barrier adhesion
- Make sure the peristomal skin is clean and dry before applying your skin barrier
- Verify that no skin is showing between the skin barrier opening and the stoma to help prevent leakage and skin irritation
- If you wear a two-piece pouching system, try placing the skin barrier on your body in a diamond shape for a smoother fit
- After you apply your skin barrier, apply gentle pressure for about a minute for best adhesion
- You can shower or bathe with your skin barrier and pouch in place, or you can remove them before bathing — water will not harm or flow into your stoma
- Removing a pouch from a two-piece system before showering may affect the skin barrier adhesion — it's best to leave the pouch on or remove both the pouch and skin barrier
- Be sure to assess your peristomal skin on a regular basis to ensure your skin is healthy and to help address any issues in a timely manner
- If you discover red, broken or moist skin around the stoma, or your pouching system is not staying in place, be sure to see your healthcare professional or ostomy care nurse

(Spanish)

Pautas para el cuidado de la colostomía

- Vacíe la bolsa cuando se haya llenado de materia fecal o gas en un tercio o la mitad de su capacidad.
- Cambie la barrera de protección cutánea periódicamente. El proceso le resultará más práctico a medida que conozca sus preferencias particulares.
- El tiempo de uso depende de las preferencias personales y las características del estoma; la duración normal es de tres o cuatro días.
- Si usa jabón, verifique que no contenga cremas ni lociones que puedan dejar residuos. Estos pueden evitar que la barrera de protección cutánea se adhiera correctamente a la piel.
- Verifique que la piel periestomal esté limpia y seca antes de aplicar la barrera de protección cutánea.
- Después de aplicar la barrera de protección cutánea, presiónela suavemente durante un minuto aproximadamente para lograr una mejor adherencia.
- Verifique que no se vea piel entre la barrera de protección cutánea y el estoma, a fin de ayudar a evitar filtraciones e irritación de la piel.
- Si usa un sistema de bolsa de dos piezas, pruebe colocar la barrera protectora de la piel en forma de diamante para un mejor ajuste.
- Puede ducharse o bañarse con la barrera de protección cutánea y la bolsa puestas o puede quitárselas antes de bañarse: el agua no entrará por el estoma ni lo dañará.
- Quitar la bolsa de un sistema de dos piezas antes de ducharse puede afectar la adhesión de la barrera protectora de la piel. Es mejor dejar la bolsa o retirar ambas, la bolsa y la barrera.
- Si nota piel enrojecida, agrietada o húmeda alrededor del estoma, o si la bolsa no permanece en su lugar, asegúrese de consultar al enfermero WOC/ET o al profesional de la salud.
- Asegúrese de revisar su piel periestomal periódicamente para confirmar que esté sana y para abordar cualquier problema oportunamente.

New Ostomy Patient Guide

• Colostomy • Ileostomy • Urostomy • Continent Diversion

A publication of

UOAA United Ostomy Associations of America, Inc.

The Phoenix

Find A Local Support Group

www.ostomy.org or call 800-826-0826

Peristomal Skin Care

Tips and techniques for adhering a pouch over red and moist skin

By Joan Junkin, MSN, APRN-CNS, CWOCN

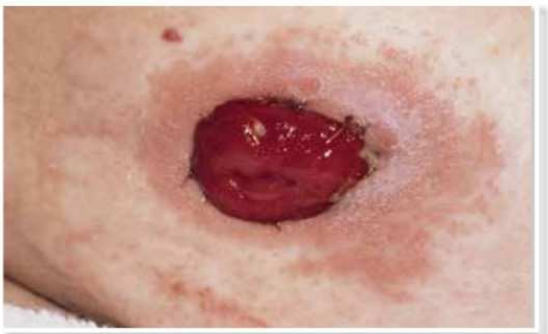


Photo courtesy of Hollister Incorporated.

Crusts are good for more than keeping bread fresh! Making a "crust" around your stoma can provide a better seal, especially if your skin is red and a bit moist. The crust involves a special powder and liquid skin barrier. It is simple to do and a skill that is handy to have in case you ever have a rash, sore or red area near your stoma that makes it hard to get a pouch wafer to stick very well.

First Step

Consider consulting your ostomy nurse if you are not confident about stoma care yet. It is possible that the skin contours near the stoma have changed and you may need a different type of wafer. If you are experienced and know what changes to watch for and what to do about it, please read on.

However, even if you are experienced and you notice that your solutions are not working, please contact your ostomy nurse for a second opinion. Many nurses do not have a stoma, yet we have been taught what to watch for and how to deal with most situations. The best way we have learned is from people who do have a stoma! That's the favorite part of an ostomy nurse's job – to see your great problem solving techniques and then pass them on to others!

Moist Skin

When skin gets sore or red it often oozes a bit of moisture. That is what prevents the wafer from sealing well. If the wafer seal is not good, stool or urine causes more soreness and a vicious cycle can occur! In this situation, there are two techniques that can help. The first method costs more, so if your insurance will not pay for the product discussed, or you don't mind trying the second method, you might consider that instead.

The first method involves using an ostomy ring or strip over the moist area. There are many from which to choose from including Coloplast, ConvaTec, Genairex, Hollister and Marlen. These are all a putty type material, a lot like clay. You can squish it and form it to whatever you need. It helps to take a piece of it, flatten it between your fingers and place it directly over the red area. This material is able to soak up the moisture so you can keep a better seal. You may also try adding a ring of the material all the way around the stoma. Think of caulking a window so wind doesn't get in, only this time we're trying to keep something from leaking out instead!

Crusting

The second method takes a bit more time, but is also quite effective and usually costs less. It is called 'crusting.' Crusting involves lightly covering the sore or red area with a powder, moistening the powder, letting it dry, then repeating the process a couple more times. Which powder you use depends on the type of rash or sore you have. If the rash is spotty (see photo) it may be a fungus,like heat rash.

This is especially likely if the rash area is also itchy. These rashes are quite common, especially when it is hot and humid or if your skin around the stoma tends to get sweaty often.

For a spotty rash suspected to be fungus you may want to speak with your ostomy nurse or doctor, especially if this is the first time you've gotten it or it's not getting better within a week. Crusting for a spotty rash like fungus involves getting an antifungal powder – there are many non-prescription products available. It will say 'anti-fungal' on the package.

After discussing this with your ostomy nurse or doctor, gently cleanse the area by soaking it for a few minutes with warm water. It is not recommended to use soap since most soaps are alkaline and fungus actually thrives on alkaline skin.

TABLE OF EVIDENCE

Table 1. Table of Evidence

Author, Year	Purpose	Sample & Setting	Methods Design Interventions Measures	Results	Discussion, Interpretation, Limitation of Findings
Erwin-Toth P., Thompson S.J., Davis J.S. (2012). Factors impacting the quality of life of people with an ostomy in North America: results from the Dialogue Study. *J Wound Ostomy Continence Nurse*, 39(4):417–422. http://doi.org/10.1097/WON.0b013e318259c441	To evaluate the quality of life (QoL) in patients with an ostomy through frequent WOCN consultation and double-layer adhesive appliances	743 participants from North America United States 94% (x=700) Canada 6% (x=43) Mean Age: 61.4 yrs. Female 59.1% (x=439, n=743) Male 40.8% (x=303, n=743)	Open-label, multicenter descriptive design Inclusion: having a colostomy, ileostomy, urostomy for 6 months; 18 yrs. and older Exclusion: Receiving chemotherapy, pregnant, and/or breastfeeding, use of ostomy plugs, have more than 1 ostomy 2 visits -1st visit: gather demographics; WOC nurse used Stoma-QoL	Visit 1: 743 participants Visit 2: 670 participants Colostomy 52.5% (x=390, n=743) Ileostomy 47.1% (x=350, n=743) Urostomy 0.2% (x=2, n=743) Visit 1 **28%** (n = 203) “always” or “often” experienced leakage **40%** (n = 297) “sometimes,” **32%** (n = 239) stated “rarely” or “never” experienced leakage with their current pouching system.	Regular WOCNs and proper pouch (double adhesive appliance) decreased ostomy leakage, improved parastomal skin and HRQoL 70 participants dropped out - 7 (Adverse Events) - 16 (non-compliance) - 7 (had skin problems)

			Questionnaire and OST -2nd visit: gather participants own assessment of PSCs, pouching used, frequency of pouch leaks; gathered after 6-8 weeks of 1st visit Stoma-QoL questionnaire 20 questions; 4 domains: sleep, activity, family/friend's relations, social relations; graded 0-100 (worse to best) Ostomy skin tool 3 conditions: (D) discoloration, (E) erosion/ulceration, (T) tissue overgrowth Graded 0-15 (normal to severe) type/permanency of ostomy	Visit 2 **16%** "always" or "often" experienced leakage **25%** "sometimes," **59%** stated "rarely" or "never" experienced leakage with their current pouching system. Health-related QOL improved significantly between visits 1 and 2 (56.8 vs 58.9, *P* < .0001	- 16 (pouching dysfunctions) - 14 (other reasons) - 3 (unknown reasons)

Forsmo, H.M., Pfeffer, F., Rasdal A., Sintonen, H., Korner, H., & Erichsen, C. (2016). Pre- and postoperative stoma education and guidance within an early recovery after surgery (ERAS) program reduces length of hospital stay in colorectal surgery. *International Journal of Surgery*, 36, 121-126. http://doi.org/10.1016/j.ijsu.2016.10.031	To investigate an ERAS protocol combined with the ostomy education from a stoma nurse specialist to decrease LOS, re-admission, stoma complications and increase HRQoL	122 adult patients ERAS stoma education (n=61) Standard care and stoma education (n=61) Single center study	Pre- and Post- study Patients informed 1-3 weeks before surgery Use of HRQoL tool Follow-up on day 10 and 30 ERAS group: 45-60min consultation before surgery - Preoperative stoma education (impact of stoma on relationships, sexuality, ADLs, stoma changes); take-home materials (information brochure) - seen by stoma nurse specialist - included preoperative ostomy education Standard group: information from nurses with varying ostomy experience - Seen by ward nurse - did not include preoperative ostomy education	ERAS group: THS 6 (range 2-21) • readmission <30days: 13% (x=21.3, n=61) • 1 or more stoma complications: 23% (x=37.7, n=61) • PSCs = 9%; ostomy leakage 3% Standard group: THS 9 (range 5-45) • readmission <30days: 11% (x=18, n=61) • 1 or more stoma complications: 31% (x=50.8, n=61) • PSCs = 11%; ostomy leakage 5% Prolonged hospital stay was found to be from inexperience and lack of knowledge of stoma care management.	Patients with extended pre-operative counselling and stoma education were more responsive and capable of being taught directly after the operation. Limitation of this study was that we did not measure days to stoma independence and proficiency Exclusion: patients already with stoma before operation

Nagle, D., Pare, T., Keenan, E., Marcet, K., Tizio, S., & Poylin, V. (2012). Ileostomy pathway virtually eliminates readmissions for dehydration in new ostomates. Diseases of the Colon & Rectum, 55(12), 1266-1272. http://doi.org/10.1097/DCR.0b013e31827080c1	To create a pathway to decrease readmission and help patient education through patient self-management of ileostomy	203 patients - new ileostomies in study group 161 pre-pathway 42 pathway Pre-pathway: January 2007 – March 2011 Pathway: March 1, 2011 – Sept 1, 2011 103 men 100 women 28.5% permanent ileostomies (x=58, n=203) 46.3% from IBD (x=94, n=203) 42.3% from cancer (x=86, n=203) Beth Israel Deaconess Medical Center	Pre- and Post- Study Ileostomy pathway: preoperative education, standardized teaching materials (current practice), in-house patient engagement, post-discharge tracking of I/O Provided sheet and measurement tool for I/Os Nurses provided ostomy teaching postoperative day 1; Seen by WOCN during postop visit 7-10 days after discharge	**Prepathway:** • New ileostomy post-discharge readmission rate: 35.4% (x=57, n=161) • Readmission for dehydration and other complications: 15.5% (x=25, n=161) • LOS = 7.5 days **Pathway:** • New ileostomy post-discharge readmission rate: 21.4% (x=9, n=42) • Readmission for dehydration and other complications: 0% (x=0, n=42, p = 0.02) • LOS = 6.6 days Decrease in readmission rate due to patient's knowledge on ileostomy outcomes and its management	Introduction of an evidence-based, enhanced-recovery pathway for patients undergoing colectomy was not embraced by some of the faculty Dehydration after a new ileostomy creation may be largely preventable through patient education and training for self-management Average LOS in new ileostomies decreased however was not statistically significant

Meisner, S., Lehur, P. A., Moran, B., Martins, L., & Jemec, G. B. (2012). Peristomal skin complications are common, expensive, and difficult to manage: a population-based cost modeling study. *PloS one*, *7*(5), e37813. https://doi.org/10.1371/journal.pone.0037813	To estimate the cost of PSCs using OST; To determine the prevalence of PSCs and the financial burden of the institution	11 skilled stoma care nurses from 9 countries identified 6-8 week treatment period France: country of origin Data collected from the Dialogue study [DS] (largest study on stoma practice, 3000 participants in 18 countries. Mean age: 63.2 Time since surgery (years): 5.9 Prices: Euros based on French unit cost in 2011 (converted to USD for study interpretation)	Systematic review Modified OST: 3 severity conditions: mild, moderate, severe Stoma care nurses identified cases irritant contact dermatitis, allergic dermatitis, mechanical trauma, disease, infection related Dialogue study [DS] - results from DS provided data on PSCs, leakage, ostomy appliance performance, QoL using Stoma QOL Questionnaire - OST also used as measurement tool for PSCs	Type of stoma Colostomy = 67% (n=2015) Ileostomy = 31% (n=954) Urostomy = 2% (n=46) PSCs Yes = 60% (n=1742) No = 40% (n=1175) **Cost of managing PSC by cause and severity** *Irritant contact dermatitis* • Mild: 20.86; Mod: 24.89; Severe: 152.19 *Allergic reaction* • Mild: 46.92; Mod: 68.02; Severe: 106.23 *Mechanical trauma* • Mild: 18.63; Mod: 23.30; Severe: 113.93 *Disease related* • Mild: 40.45; Mod: 87.91; Severe: 195.82 *Infection* • Mild: 35.39; Mod: 49.24; Severe: 167.69	The total average cost (7-week treatment): 263€ [$312.28] (n = 1742) with PSCs; 215€ [$255.28] (n = 1172) without PSC Limitations: All treatment estimates are based on expert experiences applied to average PSC cases and not on real-life observations.

Taneja, C., Netsch, D., Rolstad, B.S., Inglese, G., Lamerato, L., & Oster, G. (2019). Journal of wound, ostomy, continence nursing. Clinical and Economic Burden of Peristomal Skin Complications in Patients With Recent Ostomies, 46(2), 143-149. http://doi.org/10.1097/WON.0000000000000509	To examine the incidence and economic burden of PSCs after ostomy surgery	Single center study 249 persons aged 18 years or older who underwent colostomy, ileostomy, cutaneous ureteroileostomy, or other external urinary diversion between January 1, 2012, and December 31, 2014	Retrospective cohort study on EHR PSC within 90 days of surgery Levels of healthcare utilization tallied over a 120-day period following surgery Costs of inpatient and outpatient over 120 days from ostomy surgery	61 patients (36.3%, n=168) had evidence of PSCs within 90 days No significant LOS than did those without PSCs (11.0 days for readmissions with evidence of PSCs vs 6.8 days for those without; *P* = .111) Total healthcare costs over 120 days PSCs $58,329 (median = $49,361) Without PSCs $50,928 (median = $36,818)	No studies other than the present one and our earlier investigation have reported rates of healthcare utilization and costs among patients who experience PSCs in the United States. Limitations: small sample study; variability of complications (e.g., surgical technique, effluent characteristics, stoma characteristics)
Stokes, A. L., Tice, S., Follet, S., Paskey, D., Abraham, L., et al. (2017). Institution of a preoperative stoma education group class	To compare stomal and peristomal complications, hospital LOS, and	Retrospective cohort study 218 participants during 3-year study period	2-hour stoma education class from American College of Surgeons Ostomy	Preoperative education class • SEG: PSCs 8.1% (n=10) • CG: PSCs 16% (n=15)	Hospital length of stay and 30-day readmission rates, did not differ significantly

decreases rate of peristomal complications in new stoma patients. Journal of Wound Ostomy & Continence Nursing, 44(4), 363-367. http://doi.org/10.1097/WON.0000000000000338	readmission rates among participants attending a preoperative educational intervention	Stoma Education Group (SEG): n=123 Control Group (CG): n=94 Single center study	- Using Home Skills Kit - approximately 3 to 6 patients per class Stoma Education Group (SEG) Sept. 2012 to Aug. 2014: Control Group (CG) September 2011 to August 2012 Stomal and peristomal complications compiled from clinic, CWOCN and telephone notes. Ostomy education intervention included - diet changes - prevention of dehydration - different uses of ostomy supplies - Hands-on ostomy self-care skills	Ostomy leakage SEG: 8.9% (n=11) CG: 20.2% (n=19) Multivariable analysis: SEG had fewer reports of PSCs and decreased rates of ostomy leakage based on type of pouch used	between the 2 cohorts. Limitations: Complications may have gone unreported by patients and therefore not documented in the electronic medical record

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