A Descriptive, Interventional Study to Assess the Impact of Surgical Stomas on Individuals’ Sleep Perceptions and Response to Sleep Hygiene Intervention

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Abstract
Multiple factors affect the sleep quality of individuals with surgically created stomas. Using Rogers’ Diffusion of Innovation as the theoretical framework, a study was conducted to: 1) assess subjective sleep quality perceptions and objective sleep measurement in adults with stomas, 2) determine if there is a correlation between subjective and objective measurement of sleep in this group, and 3) implement a stoma-specific sleep hygiene intervention to improve these sleep quality perceptions. Subjective assessment focused on sleep subset questions from the Stoma Quality of Life Index (SQOLI) and the Pittsburgh Sleep Quality Index (PSQI). Respondents’ (n = 26) subjective sleep scores were 7.23 mean global score on seven questions (PSQI, range: 0 [no difficulty sleeping] to 3 [severe difficulty sleeping], total 0 to 21) with a mean score of 7.32 on three questions (SQOLI, range 1 [severe difficulty sleeping] to 4 [no difficulty sleeping], total 0 to 12) on sleep subset questions; composite scores of 5 or greater (PSQI) and 3 or less (SQOLI) indicating sleep problems. Scores showed that adults with stomas have increased sleep disruption and poor sleep quality. Five respondents who met intervention enrollment criteria participated in an objective sleep assessment using actigraphy, overnight oxygenation studies, and a 4-week sleep hygiene intervention. Mean PSQI score improved by 1.20 but the difference was not statistically significant. Because the results of this study confirm that sleep problems are common in older adults with a stoma, larger sample size studies of >4 weeks’ duration are warranted. Until additional research results are available, the existence of sleep quality and overnight pouching concerns should be recognized and use of the low-cost, easy-to-use, stoma-specific sleep hygiene intervention considered.

Key Words: descriptive prospective study, stoma, older adults, sleeping, sleep hygiene intervention

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Incontinent surgical diversions that create stomas have been performed since the 1700s; an estimated 70,000 to 100,000 stoma surgeries now are performed every year.1 The number of individuals with an incontinent stoma in the United States is estimated to be 450,000 to 500,000.2 Surgical formation of a permanent incontinent stoma is used to treat traumatic injury, cancer, Crohn’s disease, ulcerative colitis, perforated diverticulitis, anatomical malfunction, birth defect, and ischemia to the small or large intestine.2 For the purposes of this project, the term stomas will refer to ileostomies, colostomies, and urostomies.

The importance of sleep for health maintenance is well-documented in the literature.3–6 Ferrie et al7 found that consistent sleep duration of 7 to 8 hours nightly was a strong indicator of optimal health outcomes and decreased mortality. Recent advances in the study of sleep indicate that lost sleep causes alterations in respiratory and hormonal function.4–8 A healthy sleep-wake cycle also is critical for regulation of immune and neuroendocrine function.5,9,10 Sleep restriction or deprivation and chronic sleep loss increase healthcare utilization because of their negative impact on overall health.4,5,8

Literature on the quality of life for individuals with stomas strongly suggests that factors associated with incontinent stomas affect sleep but studies to ascertain the relationship between incontinent stomas and sleep disruption have not been conducted.

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Health, sleep, and sleep problems. Recently, the Centers for Disease Control and Prevention\(^4\) reported “chronic sleep loss and sleep disorders are under-recognized public health problems.” Included in this report was an observation that based on epidemiologic questionnaires the mean sleep duration has decreased in adults over the past 20 years. The National Sleep Foundation\(^5\) reported adults sleep on average 6.9 hours nightly, although the average sleep time needed to maintain health in adults is estimated to be 8 to 9 hours per night.

The National Institutes of Health\(^6\) report sleepy individuals experience impairments ranging from functioning poorly at home, school, and work to potentially life-threatening automobile and industrial accidents. The Institute also reports the most common causes of problematic sleepiness are primary sleep disorders, other medical conditions that disrupt sleep, medications, and lifestyle.

Sleep is documented as becoming more fragmented as adults grow older; however, the requirements for sleep do not change as a person ages. With advancing age, the normal sleep cycle begins to break down, causing deterioration in the deeper stages of sleep.\(^5\)

Current healthcare research and clinical practice have devoted few resources to understanding the effects of stomas on individuals’ sleep. Perhaps by deepening understanding of how stomas affect sleep quality and assessing the effectiveness of a low-cost intervention, the capacity of clinical practice to help this group benefit from improved sleep could be increased.

With this in mind, a capstone project involving a descriptive study and an intervention study using a convenience sample of healthy adult subjects 18 years or older that have a stoma was conducted. The specific objectives of this project were to: 1) understand what adults with surgical stomas think about their own sleep patterns, 2) determine if self-assessment of sleep patterns correlates with objective sleep measurements, and 3) discover if an adult individual’s sleep quality outcomes are improved by implementing a sleep hygiene program as a primary intervention.

Literature Review

A literature search was conducted using SCOPUS, OVID MEDLINE, and CINHAL databases. Evidence-based medicine databases were searched as well and included Cochrane Library, Database of Abstracts of Reviews of Effects, ACP Journal Club, Cochrane Central Register of Controlled Trials, Cochrane Database of Systematic Reviews, Cochrane Methodology Register Database, Health Technology Assessment Database, and National Health Service Economic Evaluation Database for the years 1980 through 2008 using the key terms ostomy, colostomy, ileostomy, urostomy, enterostomy, quality of life, sleep, gastrointestinal motility and disorders, and incontinence. The search terms were further narrowed to include urostomy and surgery, nocturia, self-esteem, Pittsburgh Sleep Quality Index, and sleep pathology. The numbers of articles reviewed and used appear in Table 1 and are organized by search term(s).

The literature review failed to identify any randomized, controlled studies of sleep impairment or quality of life in persons with stomas. All studies used were either case control studies or convenience sample/cohorts observational studies. Levels and strength of evidence were critiqued utilizing the levels of evidence and grades of recommendation supplied by the Canadian Task Force on Preventative Health Care Levels of Evidence and Grades of Recommendations.\(^11\) Only articles that were Level 3 or higher and Grade C or better based on this scoring recommendation or grading guideline were utilized for this study.

The literature review provided strong evidence to support the use of objective and subjective measurements of sleep. Additionally, strong evidence was found to support a primary intervention for individuals with impaired sleep quality and perceptions.

Objective and subjective aspects of sleep. Sleep can be reported by objective and subjective measures. Objective characteristics include sleep latency and sleep duration, as well as frequency and duration of nighttime awakenings. These aspects can be quantified by using electroencephalogram (EEG), polysomnography (PSG), and actigraphy tools.\(^3\) Subjective sleep characteristics include ease of falling asleep, satisfaction with sleep, ease of awakening, calmness of sleep, feelings of being refreshed, and having sufficient sleep. Subjective sleep is measured on qualitative rating scales by self-reporting through validated questionnaires, such as the Pittsburgh Sleep Quality Index (PSQI).\(^12,13\)

Sleep process. A clear understanding of the sleep process places the sleep problems of individuals with stomas in the appropriate context. The key features of the sleep process reveal that sleep is complex, fragile, and easily disrupted. This has significant implications for individuals with stomas because of the impact of sleep disruption on overall health.

Extensive study of sleep has shown it to be a highly organized process that occurs in predictable stages and cycles. The cyclical changes that control sleep-wake patterns are referred to as circadian rhythms. The internal clock that
regulates circadian rhythm is controlled by a group of neurons in the hypothalamus known as the suprachiasmatic nucleus. Light and darkness are external triggers that help “set the clock” and prompt the body to wake up or go to sleep.5

There are two distinct types of sleep: nonrapid eye movement (NREM) and rapid eye movement (REM). Nonrapid eye movement sleep occurs in three increasingly deeper stages followed by a period of REM sleep. NREM sleep is observed by a slowing of brain waves and reduced physical activity. Rapid eye movement sleep (REM) is marked by intense brain activity, but an even more pronounced reduction in physical activity. The eyes move back and forth while heart rate and blood pressure rise. Intense dreaming occurs during this stage of sleep.3,5

Balance between NREM and REM is important and a complete cycle (three stages of NREM plus an associated REM stage) lasts 1.5 hours to slightly less than 2 hours. This cycle of alternating sleep is repeated four to six times nightly.3,5

**Potential effects of poor sleep.** Maggi et al14 studied sleep complaints in 2,398 community-dwelling adults 65 years and older. Nighttime awakening was the most frequently reported sleep disturbance. The most common cause of nighttime awakening for men (73.3%) and women (57.8%) was the need to use the bathroom. Findings in the literature regarding nocturia, incontinence, and associated nighttime awakening in the general population support a negative impact on health and the quality of sleep. Higher mortality and morbidities are associated with frequent awakenings as a result of these conditions.6,15

Awakening or interruption of sleep is associated with impairment of the mechanical and myoelectrical slowing of the gastrointestinal tract that occurs with the REM phase of sleep.16 Narducci et al’s17 observational case study of 14 healthy men reports a marked increase in colonic motor activity observed in individuals with awakening or with brief arousals from sleep. Awakening from sleep causes an increase in peristalsis resulting in dysfunctional motility and increased emptying of GI contents in individuals with gastrointestinal disorders.18

The question can be raised whether surgical stoma formation may potentially replicate these phenomena and contribute to frequent nighttime awakening to empty the pouch; thereby affecting the quality of sleep and sleep perceptions in individuals with stomas.

**Stomas and sleep.** Studies in individuals with stomas anecdotally report frequent sleep disruptions and fatigue,19-23 including complaints of frequent awakening to empty stool, urine, or flatulence from their pouches at night. Individuals with nocturia, incontinence, or functional GI issues had complaints of sleep impairment similar to the stoma cohort.14,17,24,25 The anxiety associated with leakage and flatulence could potentially affect sleep quality in individuals with stomas by impairing their ability to fall asleep and stay asleep.26-28 Anxiety-related problems in falling asleep and staying asleep also contribute to daytime fatigue.29 Pouch leakage and flatulence were frequently noted complaints in literature that focused on the quality of life for individuals with stomas.21,27,30-37 Although the occurrence of leakage during sleep was not specified, the prevalence of reports of leakage and flatulence in the literature allow one to presume it would not be limited to a daytime
concern and also could occur at night. Carlsson et al,10 in their descriptive study of six persons ages 38 to 68 years with ileostomies, noted that individuals with ileostomies emptied their pouch between eight and 15 times in a 24-hour period, supporting the assumption that pouch emptying is required at night.

Individuals have noted their pouches and nighttime equipment are limiting in relation to sleep comfort and sleep position.14,35,38-40 This discomfort contributes to disruptive sleep and may potentiate an increased occurrence of sleep apnea due to supine positional sleeping.

Additional findings suggest individuals with stomas may be at greater risk for sleep disruption than the general population. The first risk factor is the average age of this cohort. The average age of persons with stomas is approximately 50 years or greater.14,29,33,34 This age group is at risk for greater comorbidities associated with sleep disruption, as well as changes in circadian rhythms that contribute to fragmentation of sleep.3,5

When all these factors are considered, there is a strong likelihood that undiagnosed sleep disruption exists in persons with stomas. Poor sleep quality is a complication in this cohort that has the potential to impact long-term health outcomes.14,23,40,41

Despite extensive anecdotal evidence that sleep is problematic for persons with a stoma, the typical postoperative education for this group does not include methods to assess and support quality of sleep and sleep perceptions.

Sleep hygiene intervention and education. Precipitating and predisposing factors influence sleep patterns and affect sleep quality.42,43 Some of these factors are amenable to change through interventions that focus on sleep hygiene. Sleep hygiene is a common term for a collection of environmental conditions and lifestyle behaviors that relate to the promotion of improved sleep quality. The primary focus of sleep hygiene education is behavioral modification to improve sleep habits. It is considered a primary intervention for individuals with poor sleep quality.44-49

Sleep hygiene education and intervention focuses on fostering good sleep behaviors and includes the moderation of caffeine, nicotine, and alcohol consumption; maximizing the regularity and efficiency of sleep episodes; minimizing medication usage and daytime napping; promoting regular exercise; and creating and maintaining a positive sleep environment.5,42,43

### Study Design

Rogers’ Diffusion of Innovations50 theory was used to provide a framework for this descriptive, interventional study. This theory describes a five-stage process to transfer research findings into practice. The stages are knowledge, persuasion, decision, implementation, and confirmation; these five stages guided the project.

Knowledge. Knowledge acquired through readings related to sleep problems in the general population, persons with stomas and their impact on quality of life, and sleep hygiene as an intervention guided the planning of the project and the development of the Stoma Sleep Hygiene Handout (SSHH) tool.

Persuasion. The literature review produced a high level of confidence that: 1) individuals with stomas experience sleep problems, 2) the correlation of self-reported sleep patterns with objective measures of sleep can be measured, and 3) an
intervention based on sleep hygiene should improve sleep quality for individuals with stomas.

**Decision.** Based on the preparatory research done to complete the literature review, the decision was made to proceed with the project as structured.

**Implementation.** The project was conducted.

**Confirmation.** Results of the first phase of the study provided evidence that confirmed the decision to structure the project around the three research questions.

**Methods**

This project included a descriptive study and an intervention study using a convenience sample of healthy adult subjects 18 years or older with a stoma. IRB approval was obtained to conduct the project, which was divided into four phases: 1) subjective sleep assessment of the initial group of participants, 2) objective sleep assessment of persons demonstrating poor sleep quality and perceptions in phase I, 3) sleep hygiene intervention, and 4) pre/post intervention comparisons. Written informed consent was obtained from participants for the subjective sleep assessment (Phase I) and then again for the objective measurement and intervention assessment (Phases II and III). Participant consent forms included study information, potential risks/benefits, and an explanation of the rights of participants in human studies. Each participant retained a signed copy of the consent form. No monetary compensation or other form of payment was given for study participation.

**Phases**

**Phase I.** This portion of the study was performed to examine the cohort’s sleep quality perceptions and perceptions of their stoma’s potential interference with sleep quality. After IRB approval in July 2008, phase I of the study commenced and data were collected until October 2008. The descriptive study evaluation of self-reported (subjective) sleep in adults with surgical stomas was conducted using the PSQI and the Stoma Quality of Life Index (SQOLI). Adults with stomas were recruited from the United Ostomy Association (UOAA) Registry of Central and Southern Minnesota. The study questionnaires (including a demographic questionnaire), informed consent form, and a request to participate in the study were mailed to 63 registry members.

**Phase II.** Five participants who met inclusion and exclusion criteria for the objective sleep measure and intervention phase of this project were identified and again signed consent forms to voluntarily participate. Objective measurements in the study’s second phase included using actigraphy and one 24-hour overnight oxygenation assessment. Participants also maintained a sleep diary for seven consecutive days. The primary investigator explained all procedures and addressed all questions.

**Phase III.** The third phase of the project measured whether implementing a sleep hygiene tool (see Figure 1) improves sleep outcomes in participants with stomas. The SSHH was developed by the researcher utilizing evidenced-based literature regarding sleep hygiene methods and care associated with stomas. The SSHH tool provides a comprehensive plan to improve poor sleep quality and perceptions for adults with stomas. The intervention was conducted over 4 weeks from November 3, 2008 to December 1, 2008 and assessed using the selected participants’ initial descriptive sleep scores (rated pre-intervention phase) and comparing these scores with post-intervention self reported scores.

**Phase IV.** The fourth phase of the project involved data analysis to determine if post-intervention PSQI scores of adults who have stomas demonstrated a sufficient improvement in sleep patterns to support a practice change in post-operative stoma education. Final analysis was complete in March 2009.

**Description of participants.** Inclusion criteria for participation in Phases II, III, and IV of the study specified individuals who were 18 years of age and older and living with a stoma for more than 1 year. Additional criteria included sleep scores of 5 or greater on the PSQI and a rating on the sleep subset question (SQOLI) of 2.5 or lower in phase I of the study. Participants were excluded from the study if any of the following conditions were present: diagnosed depression, diagnosed sleep disorder, diagnosed sleep apnea, or a body mass index (BMI) >40.

**Variables and instruments.**

**Demographic data.** Information collected on the demographic questionnaire included type of stoma, length of time the individual had the stoma, age, gender, marital status, race, weight, height, prior or current sleep disorder diagnosis, current history of depression, and current use of prescribed sleep medication.

**Subjective sleep measurement.** The PSQI is a validated instrument used to measure the quality and patterns of sleep in...
adults retrospectively over 1 month’s time. It has been shown to have a reliability coefficient on Cronbach’s alpha of 0.83.6,12 The instrument differentiates “poor” from “good” sleep by measuring seven areas of self-rated sleep. According to Buysee et al.,12 adults who have an overall global score on the PSQI of 5 or greater (scoring range 0 — no difficulty to 3 — severe difficulty on seven questions, total 0 to 21) are experiencing poor subjective sleep quality.

The SQOLI is a validated instrument used to determine overall quality of life in individuals with stomas and has three primary focus questions that address sleep quality. These questions refer to feelings of fatigue, perceived sleep disturbance associated with pouch emptying, and the ability to rest or sleep comfortably despite positional limitations due to the location of the stoma or pouch. The questions are rated on a scale, with 0 being the most problematic score and 4 representing the least problematic in perception to the participant. The SQOLI has reported Cronbach’s alpha reliability score of 0.92.32 A score of 2.9 or less on the SQOLI sleep subset questions demonstrates a negative effect of stomas on sleep.32

**Objective sleep measurement.** The actigraphy minimeter is a wrist-sized portable device worn on the nondominant hand for a continuous period of 7 days to record movement. Its use is supported for characterizing sleep patterns and circadian patterns and for delineating sleep patterns.3 Actigraphy is listed as a diagnostic tool in the International Classification of Sleep Disorders (ICSD-2), a “primary diagnostic, epidemiological, and coding resource for clinicians and researchers in the field of sleep and sleep medicine,”53 used primarily when sleep patterns must be assessed over time. Morgenthaler et al. state, “Actigraphy is a valid way to assist in determining sleep and circadian rhythm patterns.”

The Wrist Ox monitor (Phillips Respironics, a division of Phillips Healthcare, Andover, MA) was used to measure overnight oxygenation levels to determine if functional apnea occurred because of positional sleep changes incurred by the location of the stoma or pouch. The small, wrist-worn monitor attaches to the index finger and measures blood oxygen saturation levels. For this study, a medical doctor, board-certified with the American Academy of Sleep Medicine, conducted clinical analysis of actigraph and overnight oxygenation study data utilizing a nationally accredited sleep studies laboratory.

**Stoma sleep hygiene intervention.** The SSHH is a tool developed by the researcher to improve sleep by using evidence-based techniques5,5 to improve stoma satisfaction and adaptation to sleep and stoma care and to modify behaviors to improve overall sleep quality. The SSHH tool technique was explained in person to each participant by reviewing the handout and addressing all questions regarding use of the tool. The SSHH intervention was conducted over 4 weeks. The researcher contacted the participants by telephone at week 2 and week 4 to assess use of the tool during the intervention. The PSQI and SQOLI were repeated at the conclusion of the intervention.

**Data analysis.** Data were analyzed using SPSS 12.0 (SPSS, Inc., Chicago, IL) software.

Of the 63 PSQI, SQOLI, and demographic questionnaires mailed, 26 responses were returned. The data were entered and the mean, median, and standard deviation calculated. Ten respondents volunteered to participate in the actigraphy, overnight oxygenation, and 4-week intervention portion of the study but five were unable to participate based on the exclusion criteria. Actigraph data and overnight oxygenation scores (N = 5) were analyzed and post SSHH intervention PSQI and SQOLI data mean, median, and standard deviation calculated. The effect of SSHH intervention was analyzed using a paired t-test to compare outcomes (N = 5) based on pre- and post- intervention PSQI and SQOLI scores and pre-post intervention comparisons were made by group and gender. Objective and subjective sleep measurement data that focused on sleep efficiency, sleep latency, and total sleep time were analyzed. Pearson’s correlation coefficient method was utilized to discern if there was a statistically significant correlation between the sleep measurement methods used.

**Results.**

**Phase I.** Eleven men and 15 women responded to the questionnaires in the first phase of the project; of these, 22 were Caucasian, one was Hispanic, and three were Native American. One individual was single, one was divorced, and 24 were married. Stoma types included colostomies (nine), ileostomies (12), and urostomies (five). Twenty-five respondents had their stoma for more than 1 year and one individual had a stoma for 1 year. The mean length of time since stoma creation was 12.96 years (SD ± 11.76). Nine respondents were receiving treatment for depression; of these, six were taking prescribed sleep medication. Additionally, six respondents were diagnosed with a known sleep disorder. These diagnoses excluded them from participating in the intervention phase.

The mean age of the sample was 74.5 years (SD ± 10.2), mean height was 64.35 (SD ± 4.07) inches, mean weight was 169.73 lb (SD ± 38.29), and mean BMI was 28.85 (SD ± 6.2). Analysis of the SQOLI responses indicate that respondents perceived their stoma may be affecting sleep comfort and the amount of sleep achieved nightly and contribute to their feelings of fatigue (see Table 2).

The mean reported sleep in minutes was 417 (SD ± 74.38). The mean minutes spent in bed were 499 (SD ± 66.27) and the mean sleep efficiency was 84.04% (SD ± 12.94). The mean global PSQI score was 7.23 (SD ± 3.745) (see Table 3).

**Phase II.** The five participants who met inclusion/exclusion criteria included two men and three women (average age 74.6 years, SD ± 10.3). All participants were Caucasian; one was single and four were married. The stoma types reported by individuals in the group included colostomy (three), ileostomy (one), and urostomy (one). The mean length of time for their stomas was 12.6 years (SD ±14.673). The participant’s average height was 63.8 inches (SD ± 2.35) and the mean BMI was 32.2 (SD ± 4.888).
Phase III/pre-intervention. The mean pre-intervention score of the group (N = 5) on the three SQOLI subset sleep questions totaled 7.40 (SD ± 2.89) — a mean score of 2.33 per question (SD ± 0.64). The mean score of the group on the PSQI was 9.40 (SD ± 3.050). The pre-intervention groups scores on the SQOLI and PSQI reflect a perception of the stoma affecting sleep and also suggest poor sleep quality and sleep perceptions. These perceptions are supported by the groups’ low sleep efficiency score, total time in bed, total sleep time, and sleep latency scores (see Table 4).

The mean overnight 24-hour oxygenation study score was 93.75%. None of the participants demonstrated significant prolonged desaturation (<88%) to suggest sleep apnea. The actigraphy results indicated a mean time in bed of 469 minutes (SD ± 42.1), actual sleep mean of 399 minutes (SD ± 109.0), mean sleep efficiency of 83.55% (SD ±10.2), and mean sleep latency of 16 minutes (SD ± 15.6) (see Table 4).

Phase III/post-intervention. The post intervention SQOLI mean score was 7.0 (SD ± 1.5) or a mean score of 2.33 per question (SD ± 0.94). The PSQI mean score was 8.20 (SD ± 2.78). The post intervention scores for sleep efficiency, sleep latency, total sleep time, and total time in bed are summarized in Table 4.

Phase IV. For male participants, the SQOLI scores worsened from a pre-intervention mean of 7.50 (SD ± 1.41) to 6.50 (SD ± 4.24). The PSQI score also worsened from a pre-intervention mean of 9.0 (SD ± 2.12) to 10.5 (SD ± 4.24). For the female participants, the SQOLI scores were unchanged with a mean of 7.33 (SD ± 2.08) pre/post intervention. The PSQI improved from a pre-intervention mean of 9.67 (SD ± 3.51) to a post-intervention mean of 6.67 (SD ± 2.08). The mean group SQOLI pre-intervention score was 7.40 (SD ± 2.898) compared to 7.00 (SD ± 1.5) post-intervention (P = 0.554). The PSQI mean pre-intervention score was 9.40 (SD ± 3.050) and 8.20 (SD ± 2.775) post-intervention (P = 0.581). No significant correlation (r = 0.359) was seen between the pre-intervention sleep efficiency score of 70.2% (20.4) and the objective sleep efficiency score of 83.5% (10.2). The subjective sleep latency score of 28 minutes (SD ± 18.9) and objective latency score of 16 minutes (SD ± 15.6) also failed to demonstrate a statistically significant correlation (r = .313).

Discussion

The reporting of poor sleep quality and the perceptions of the initial 26 respondents confirm anecdotal evidence that sleep is a problem for persons with a stoma and suggest that sleep disruption occurs in this group and at a higher rate than in healthy older adults. Buysee et al,44 in a descriptive study of healthy subjects older than 80 years (n = 44; 20 men, 24 women) found a global mean PSQI score of 4.74; whereas, the average stoma group score was 7.23. The lower PSQI global score in healthy older adults versus the higher PSQI in older adults with stomas suggests increased subjective sleep disruption in individuals with stomas.

The absence of a correlation between PSQI and actigraphy in this study was similar to that observed by Buysee et al44 who found no significant relationship between subjective and objective reporting of sleep in older adults. Comparing objective and subjective sleep findings, they concluded that the lack of correlation between the two measures is a factor of PSQI sleep habits measured retrospectively over 4 weeks versus objective measurement that assesses a particular night’s sleep. Their study also reported poor correlation of subjective sleep measures (PSQI) with laboratory sleep measures (PSG).12

Vitiello’s53 review delineating the common causes of disorderly sleep in older persons reported a strong subjective-objective sleep quality relationship for older men and a considerably weaker one for older women. This relationship suggests gender influences subjective perceptions of sleep-quality reporting. According to an epidemiologic study of sleep complaints in more than 9,000 participants 65 years and older by Foley et al,56 women are more likely to complain of insomnia versus men. In addition, in a study of 103 community-dwelling older adults, McCrae et al57 found complaining poor sleepers generally report worse subjective sleep quality, poorer health, and more depression than noncomplaining sleepers.

This trend also was observed in the gender comparison scores of persons with a stoma recorded in Phase IV. The men’s PSQI reporting worsened while women’s PSQI reporting improved after the education/intervention phase. This trend may suggest that women with stomas are more likely to report worse subjective sleep than men with stomas; therefore, their sleep perceptions may improve more readily with cognitive behavior modification (such as the stoma sleep hygiene intervention).

The improvement in the pre/post PSQI mean score by 1.20 suggests a degree of effectiveness in the use of stoma sleep hygiene and suggests some improvement over time using the stoma sleep hygiene handout. These preliminary findings are encouraging for clinical application of stoma sleep hygiene use to improve sleep perceptions and sleep quality. Stoma sleep hygiene may be more beneficial when combined with better review of stoma education, current pouching techniques, and a longer intervention/education phase using the SSSH tool. Eliminating problems with overnight pouching concerns may help reduce factors influencing overall sleep perceptions in this cohort.

Limitations

Limitations of the project include bias associated with convenience sampling. This nonprobability method often is used during preliminary research efforts to obtain a gross estimate of the results without incurring the cost or time required to select a random sample.46

Another limitation of the study was the time constraint for the intervention phase (4 weeks), which allowed for only one post-intervention measurement of sleep quality. Research46...
indicates sleep hygiene interventions continue to produce improved sleep quality until reaching a plateau. Extending the length of the intervention and monitoring its impact over a longer period of time may have revealed greater improvement in sleep quality.

An additional limitation of this study is the unknown impact on reliability of using a subsection of the SQOLI questionnaire instead of using the entire instrument. The researcher utilized data from only three sleep subset questions of the tool; therefore, the stated Cronbach’s alpha reliability score may not apply to this study.

Conclusion

Comparison of pre/post intervention quality-of-sleep scores using paired t-tests did not identify statistical significance in this small (N = 5), 4-week study of persons with a stoma and no statistical correlation was found between PSQI and actigraph sleep measures. However, the pre-intervention PSQI data (N = 26) confirm anecdotal reports that adults with stomas have increased sleep disruption and poor sleep quality when compared to community-dwelling older adults. This warrants further exploration. The improvement in the PSQI mean score by 1.20 in five people suggests a degree of effectiveness in the use of stoma sleep hygiene. Future studies should be designed to discover the endpoint in improvement using sleep hygiene for this cohort. Factors that potentiate the benefits of transitioning the SSHH into clinical practice include strong evidence in the literature regarding sleep hygiene, cost-effectiveness, and ease of use.

The implications of these findings for nursing practice are threefold: 1) nurses should a) recognize that patients with stomas are likely to experience poor quality sleep relative to the general population and b) discuss sleep and overnight toileting concerns, 2) some aspects of poor sleep quality may be improved through the use of a sleep hygiene intervention such as the SSHH, and 3) the low cost and ease of use of the SSHH make it an appropriate intervention for individuals with stomas.

Acknowledgment

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