Therapeutic Environmental Effects on Analgesic Requirements during Post Anesthesia Care Phase I

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ABSTRACT

The noisy and brightly lit environment in the Post Anesthesia Care Unit (PACU) Phase I has the potential to agitate the arousing post anesthesia patient, delay recovering to an awake state, and could increase the need for analgesia medications. An experimental study was conducted in a community hospital PACU to determine the effects of a therapeutic environment (I.E. low lights and decreased noise) on analgesic requirements and satisfaction of patients recovering from surgery. Patients who had the quieter and darker environment did require less analgesic medications. Participants in the control group expressed dissatisfaction with the bright lights while the treatment group had no complaints. Noise levels, which were much more difficult to control, elicited some dissatisfaction from both groups.

INTRODUCTION

Nurses have long recognized the environment's potential to negatively impact the recovery of health. Florence Nightingale[1(p14)] warned in her original writings, *Notes on Nursing,* that "Unnecessary noise, or noise that creates an expectation in the mind, is that which hurts a patient." Nursing and medical journals have published numerous articles and research addressing concerns that excessive noise and light can impact patients' return to health (Dennis[2(pp220-222)]; Walder[3(2243-2244)]; Tembo[4(pp315-321)]).

Despite guidelines from the World Health Organization (WHO) for safe noise levels, studies demonstrate hospital noise levels frequently exceed these recommendations (Akansal[5(pp1583-1588)]; Lawson[6(pp e92-e97)]; Patel[7(pp310-316)]). The WHO [8(p102)] specifies that single maximum noise events in hospital rooms should be no greater than 40 decibels during the night and that the continuous noise level should not exceed 35 decibels in rooms where patients are treated or observed. Excessive light causing sleep disturbances impacting health and recovery have also been reported (Richardson[9(pp282-282)]; Patel[7(pp310-315)]; Fontana[10 (pp76-78)]).

There have been extensive studies of negative environmental impacts on sleep, recovery and general patient satisfaction focused primarily on the critical care populations (Brown[11(pp590-604)]; Fontana[(10 pp76-78]; Richardson[9 (pp282-282)]; Dennis[2(pp220-222;] Walder[3(2243-2244)]; Tembo[4(pp315-321)]) and during major surgery (Hodge, [12(pp92-94)] ;Lewis[13(S79)] ;Shapiro [14 (pp 1236-1238)]). Sleep and rest disturbances from noise and light from monitors, equipment and staff in critical care areas can interfere with healing and survival (Richardson[11(pp282-282)]; Honkus[15(pp84-186]). The Post Anesthesia Care Unit (PACU) is another patient care area with a similarly noisy,

well-lit environment that has the potential to impact patients' recovery by agitating arousing patients, interfering with rest post anesthesia, and potentially increasing analgesic needs to treat pain, yet few studies and articles have addressed the contribution of environmental effects of noise on the post anesthesia patient (Allaouchiche[16 (pp370-372)] ; Raymond [17 (p 194)]; Smykowski[18 (pp 227-228)]); the effects of light and the post anesthesia patient have not been reported.

STATEMENT OF PURPOSE

The purpose of this research was to determine if the environmental effects of noise and light would impact patients recovering in Post Anesthesia Care Units, Phase I, by increasing analgesic requirements and decreasing satisfaction with the perioperative experience.

RESEARCH QUESTIONS

1. Does a noise and light controlled environment affect analgesic requirements for Phase I post anesthesia laparoscopic cholecystectomy and hysterectomy patients?

2. What is patients' satisfaction or dissatisfaction with environmental noise and light levels during Phase I post anesthesia laparoscopic cholecystectomy and hysterectomy care?

SIGNIFICANCE TO NURSING

Controlling the environmental effects of excessive noise and bright lights within the Post Anesthesia Care Unit may alleviate suffering, promote rest, decrease agitation and decrease the need for analgesics which have the potential to cause nausea, sedation, disorientation and prolong recovery. Patients' recall of disturbing noises and bright light could potentially impact satisfaction with the perioperative experience and may prompt the patient to seek healthcare elsewhere.

LITERATURE REVIEW

Research related to the impact of noise and light on hospitalized patients' comfort and satisfaction has primarily focused on sleep deprivation and rest disturbance (Gardner [19] (pp 782-784); Dennis[2(pp220-222)] ; Patel[7(pp310-315)];; Brown[11(pp590-604)]; Tembo[4(pp315-321)]) in critical care nursing units. There is consistent evidence that noise levels in hospitals exceeds the recommended levels set forth by the World Health Organization and the

National Institute for Occupational Safety and Health (Elliot [20 (pp 30-34)]; Walder[3(2243-2244)]). Patient dissatisfaction with noise often relates to the types of noise in addition to the volume levels, such as staff conversations and equipment use (Allaouchiche [16 (pp370-372)]; Tembo[4(pp315-321)]; Akansal[5(pp1583-1588)]). Ma [21 (pp 554-556)] found that patients who had more psychologically unpleasant experiences in the intensive care units also reported more unpleasant physiological experiences, with noise as a factor sixty-five (65) percent of the time. Baker[22(pp 80-85)] demonstrated that heart rates increased significantly for surgical intensive care unit patients exposed to noise, particularly talking within their rooms. Scheduled "quiet time" for critical care patients has demonstrated significantly lowered noise levels with interventions perceived as positive for patients (Gardner [19 (pp 782-784)]). Interestingly, Walch [23(pp 2234-2236] demonstrated patients exposed to natural sunlight, rather than artificial lighting, during their hospital recovery may have less stress, pain, analgesic medication use and pain medication costs. The recovering post anesthesia patient is exposed to elevated noise level and light levels (Allaouchiche[19 (pp370-372)]) which have the potential to affect recovery and patient satisfaction.

CONCEPTUAL FRAMEWORK

Comfort theory provides a foundational and holistic approach to comfort management, (Wilson [24 (pp 163-172)]) a primary goal for nursing care in the post anesthesia care unit. Kolcaba [25 (pp 102-110)]) has defined comfort as the "immediate state of being strengthened through having the human needs for relief, ease and transcendence met in four contexts of experience (physical, psychospiritual,

sociocultural and environmental).” *Relief* is the state of having a severe discomfort mitigated or alleviated. *Ease* is the absence of specific discomforts. *Transcendence* is the ability to “rise above” discomforts when they cannot be eradicated or avoided. The three types of comfort are addressed within the experiences of the physical, psychospiritual, sociocultural and environmental.

Comfort is dynamic and can change quickly from negative to positive.

Comfort is more than the absence of pain and can be enhanced with positive feelings about the patient experience and nursing interactions. Comfort is an ideal theoretical framework for post anesthesia nursing. The theory states that enhanced comfort strengthens the recipient (I.E. the patient) to engage in getting well, achieving function goals, and feeling confident about the future.(Kolcaba [25 (pp 102-110)])

The assumptions of Comfort Theory are (Kolcaba [25(pp 102-110)]):

1. The patient has a holistic response to complex stimuli.

2. Comfort is a desirable holistic outcome that is essential to the discipline of nursing.

3. Patients strive to meet their basic comfort goals. This is an active endeavor and sometimes requires the help of the nurse and/or family.

4. Patients vary significantly in their personal need or desire for certain levels of comfort.

5. Prevention of discomforts, including those related to physiologic homeostasis, is easier than treating discomforts.

6. When discomfort (E.G. environmental effects, pain) cannot be prevented, patients can be assisted to partial or complete transcendence through comfort measures.

7. When nurses practice comfort care, they efficiently consider and minister in a caring way to the uniqueness and complexity of each whole patient.

8. After surgery and anesthesia, nurses are the patient's first link with normalcy. Nurses are the coaches that assure patients they are safe, protected from harm, and capable to create and participate in their treatment plan.

OPERATIONAL DEFINITIONS

Therapeutic Environment: A physical environment surrounding the patient, affecting all the senses, that enhances and promotes nursing care, recovery and health

Light levels: Light levels in luxems; measured by a luxemeter

every 10 minutes during the patient's stay in PACU and averaged for the entire patient stay

Noise levels: Noise levels in decibels measured by a sound level meter every 10 minutes during patient‘s stay in PACU and averaged for the entire patient stay

dBA: Decibels of noise levels expressed as an A-weighted setting. This is a frequency filter that correlates well with human response to noise because it attenuates low-frequency sound by an amount that corresponds to the human ear

Leq: Average noise level at 10 minute intervals

Post Anesthesia Care Unit (PACU) Phase I: The phase of recovery that provides care for the postanesthesia/surgery patient in the immediate postanesthesia period, transitioning them to Phase II, the in-patient setting or to an intensive care setting for continued care. Basic life sustaining needs are of the highest priority and constant vigilance by nursing staff is required during this phase.

Post Anesthesia Care Unit (PACU) Phase II: This phase of recovery postanesthesia focuses on preparing the postanesthesia/surgery patient, family and/or significant other for care in the home or extended care environment.

DESCRIPTION OF STUDY DESIGN, SETTING, SAMPLE, SAMPLING TECHNIQUE

Study Design

An experimental design was used with a treatment and control group drawn from the outpatient laparoscopic cholecystectomy and hysterectomy patient populations. Both groups were randomly selected as they presented for their pre-surgical assessments.

The surgical procedure patients (laparoscopic cholecystectomy; laparoscopic hysterectomy) were chosen after chart reviews of one year of analgesic administration for these two populations demonstrated very little variability in the amount of analgesics required post procedure and these were the most commonly performed procedures at the facility. The design was After-Only Experimental Design (Figure A). This design was selected since it is useful for testing effects that cannot be measured beforehand (versus pretest posttest experimental design) (I.E. post-pain).

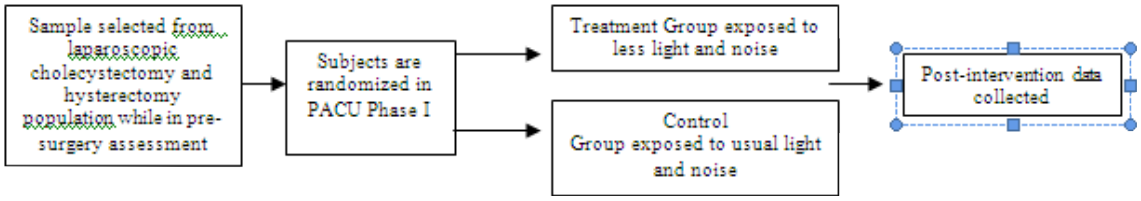

Figure A

SETTING

The setting was in the Post Anesthesia Care Units Phase I and II of a community hospital located in the southeast which primarily performs outpatient surgeries with a small population of in-patient surgical patients. The units were designed in the late 1990's and reflect the current floor plan and acoustical structures of that time. Phase I has 14 bays for patient recovery. Patients are separated by privacy curtains and a space of approximately 6 feet in Phase I and have private rooms in Phase II. Sources of varying intensities of noise within the PACU include saturation of peripheral oxygen ($SpO_{2)}$, electrocardiogram (ECG), and blood pressure monitors (alarms and monitoring emissions), telephones, staff and physician conversations, patient vocalizations (including disoriented patients, coughing and retching), patient arrivals and departures. Florescent lighting over bays is routinely as bright than the overhead lighting for the entire PACU nursing desk.

SAMPLE/SAMPLING TECHNIQUE

The treatment and control groups were selected from the outpatient laparoscopic cholecystectomy and hysterectomy patient population as they presented for their pre-surgical assessment until the sample number was met. Both groups were randomly selected.

Inclusion Criteria:

- Surgery scheduled for laparoscopic cholecystectomy or hysterectomy
- At least 18 years of age
- Consent to participate

Exclusion Criteria:

- Documented history of chronic pain
- Documented auditory impairment
- Documented blindness/visual impairment affecting perception of light
- Refusal to participate

The sample size, for 80% power, was determined to be at least 64 participants per treatment and control group. This sample size was needed for analysis by a 2-sided independent t-test with moderate effect size. A total sample size of 128 was required. The combined sample group was 132 participants. The control group had 81 participants. The treatment group had 64 participants but 13 withdrew or were excluded due to inability to conduct the post survey. The final treatment group had 51 participants.

PROTECTION OF PARTICIPANTS' RIGHTS

The study was approved by expedited review by the facility Institutional Review Board (IRB) prior to data collection. All participants received a Study Information Letter written at a 6th grade level of reading proficiency. Informed consent was obtained from participants by registered nurses (RNs) trained by the Collaborative Institutional Training Initiative (CITI) prior to any data collection.

STUDY PROCEDURES/METHODS

Patients who had consented to participate in the study were identified by a green form (consent form copy) placed on the patient's chart by the pre-surgery assessment center staff. This alerted PACU staff the patients were participants in the study.

Physicians and all relevant staff were instructed of the goals of the study, the need to control noise (I.E. attempt to maintain noise levels below 40 decibels) and light (I.E. turn off overhead lights in individual patient bays) on days the treatment groups were present in PACU, and how to identify study participants. Phase I PACU staff were trained to operate and record luxems and decibel values from the respective monitoring devices and instructed regarding the appropriate patient sites and times for monitoring for noise and light levels (no more than 3 inches from patient's ear for noise levels and level with patient's eyes and turned towards the ceiling for light levels; collected on arrival and every ten minutes until discharge). The monitoring devices were calibrated weekly by the primary investigator per manufacturer instructions for calibration. Noise and light levels, along with patient demographics, were documented on individual NOISE and LIGHT level data collection forms. PACU RNs also documented the analgesics administered while in PACU Phase I. Blue forms were used for treatment participants; yellow forms were used for the control participants. Entire work days were randomly designated as "QUIET DAYS" by the PACU staff and signs were posted to alert staff and physicians that participants would receive the treatment lighting and noise control on those days.

During PACU Phase II, after participants were alert and comfortable, participants were surveyed by RNs using the Patient Satisfaction Tool to describe their satisfaction with the noise and light levels during their recovery in PACU Phase I. Some participants were contacted post discharge by the RNs if they were unable to answer the survey questions during recovery in Phase II. If participants recalled either noise or light, they were asked to describe the noise (a small amount, moderately noisy, somewhat too noisy, far too noisy), and how bothersome it was (very, somewhat, mildly, not at all) and to identify the source of the noise (staff conversation, equipment, other patients, monitors, other) and asked to describe the light (too dark, almost too dark, just right, almost too bright, too bright) and to identify the area (light over your head, overall room lighting, other).

INSTRUMENTS

Measurements of noise and light were collected on arrival and every 10 minutes until departure, then noise and light levels were averaged.

Sound levels were measured in dBA using an A-weighted setting. An A-weighted setting is a frequency filter that correlates well with human response to noise because it attenuates low-frequency sound by an amount that corresponds to the human ear. Since the decibels were measured every 10 minutes and averaged, they are expressed as Leq. The Sper digital model 840029 [26(p18)] sound meter was utilized to collect decibels of noise and was placed within 3-6 inches of the patient's ear.

Light was measured in luxems utilizing the Sper-model 8400069 light meter[26(p14)] . The meter was placed within 3 inches of the patient's eye and turned to the ceiling.

Both instruments have been established as reliable and validated in previous studies (Dennis[2(pp220-222)], Olson [27(pp74-78)]); validity of accuracy was established by calibration by the primary investigator.

Reliability of analgesic recording and converting was established by review by two trained data collectors' review of electronic charting and conversion (all analgesics were converted to fentanyl, the most commonly used post-anesthesia analgesic). Conversion for all opioids to fentanyl equivalence was done using the Global RPh tool, Opioid Analgesic Convertor [28], a conversion tool recommended by pain management experts. Equivalence was confirmed by comparison to an equianalgesic dose chart (Pasero [29 (pp444-446)]).

The survey includes 4 questions measured using a Likert type scale addressing comfort level overall while in PACU Phase I, addressing the effects of noise on comfort and effects of light on comfort. Reliability of the patient satisfaction survey was assessed using Cronbach's alpha with an acceptable level of at least .70. Content (Face) validity of the survey was established by the research team who has broad experience in patient satisfaction.

RESULTS/FINDINGS

Of the 150 participants who consented to participate in the study, 13 withdrew or chose not to answer survey questions (all from the treatment group). Twenty-nine percent had no recall of their PACU stay. There were 132 total participants; the control group had 81 (61%) participants and the treatment group had 51 (39%) participants.

Descriptive measures were employed in the analysis of demographic data, noise and light exposures, analgesic dosing and patient survey responses. (Tables 1-4) Parametric and non-parametric correlations were used for comparing analgesic dosing between groups and for comparing the two groups related to noise and light exposure and satisfaction.

TABLE 1. Patient Demographics			
	Both Groups n=132	Treatment Group n=51	Control Group n=81
Age (mean) in years	45	44	45
Age Range	20-90	24-76	20-90
Female Gender	120 (91%)	43 (84%)	77 (95%)
Male Gender	12 (9%)	8 (16%)	4 (5%)
Laparoscopic Cholecyststectomy	68 (52%)	28 (55%)	40 (49%)
Laparoscopic Hysterectomy	64 (48%)	23 (45%)	41 (51%)

(inserted split table)

Table 2 Average Light and Noise Exposure; Analgesic Medications Administered			
	Both Groups n=132	Treatment Group n=51	Control Group n=81
Average Luxems	235	54	350
Average Decibels dBA	59	56	60
Average Analgesic (Fentanyl mcgs)	139	107	158

Table 4. Satisfaction With Noise Levels		
	Treatment Group n=41 (10 [22 %]no recall)	Control Group n=52 (29 [35%] no recall)
Not Bothersome at All	73%	54%
Small Amount of Noise	4%	7%
Moderately Noisy	4%	1%
Somewhat Too Noisy	0%	1%
Source of Bothersome Noise		
Staff Conversation	2%	5%
Equipment	4%	5%
Other Patients	10%	4%
Monitors	2%	3%

Table 3. Satisfaction With Light Levels		
	Treatment Group n=41 (10 [22 %]no recall)	Control Group n=52 (29 [35%] no recall)
Not Bothersome at All	78%	59%
Too Bright	0%	3%
Almost Too Bright	0%	3%
Source of Bothersome Light		
Overhead	0%	3%
Overall Light	0%	3%

Table 5. Treatment and Control: Average Exposure to Luxems and Decibels and Average Analgesic Administered

Treatment (1) or Control(2)		N	Minimum	Maximum	Mean		Std. Deviation	Skewness	
		Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Std. Error
Treatment	Age in years	51	24	76	44.00	1.901	13.575	.716	.333
	Avg Lux	51	17.4	100.3	54.097	3.0093	21.4907	.631	.333
	Average Decibels :	51	46.000	70.167	56.41843	.603958	4.313124	-.125	.333
	Total analgesic given (Fentanyl mcgs)	51	0	330	107.25	12.040	85.984	1.093	.333
Control	Age in years	81	20	90	45.17	1.485	13.366	.746	.267
	Avg Lux	81	39.0	591.0	350.122	13.4096	120.6866	-.557	.267
	Average Decibels :	81	46.188	88.900	60.14620	.665919	5.993270	1.245	.267

Total analgesic given (Fentanyl mcgs)	81	0	590	158.33	12.842	115.575	1.217	.267

Table 6. Differences in Treatment and Control Results

	t-test for Equality of Means						
	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
						Lower	Upper
Avg Lux	-21.540	87.904	.0005	-296.0249	13.7431	-323.3369	-268.7128
Average Decibels :	-3.855	130	.0005	-3.727773	.966920	-5.640709	-1.814838
Total analgesic given (Fentanyl mcgs)	-2.902	126.305	.004	-51.078	17.603	-85.914	-16.243
pt q1 How do you rate the level of noise in the recovery room?	-.599	90.672	.551	-.065	.109	-.281	.151
pt q2a Staff Conversation	-1.178	84.276	.242	-.053	.045	-.141	.036
pt q2b Equipment	-.519	89.184	.605	-.044	.086	-.215	.126
pt q2c Other Patients	1.088	91	.279	.094	.086	-.077	.265
pt q2d Monitors	-.423	83.455	.673	-.035	.082	-.197	.128
pt q2e Other	1.000	39.000	.323	.050	.050	-.051	.151
pt q3 How do you rate the level of light in the recovery room after surgery?	-1.948	51.000	.057	-.115	.059	-.234	.004

Comparing the treatment and control groups, both reduced lighting (p=0005; t= -21.54; mean difference -298.0249) and reduced noise exposure (p=0.005; t=-3.855;

mean difference = -3.72773) are statistically related to a decrease in the amount of analgesic required (Table 6).

Within the treatment group, the parametric Pearson Correlation Coefficient (R^2), indicates a slight positive correlation between an increase in both light (Table 7) (R^2=0.410; p=0.003) and noise (R^2= 0.375; p= 0.007) (Table 8) exposure and analgesic requirement.

Table 7. Luxems and Analgesic Requirements

Treatment (1) or Control(2)			Avg Lux	Total analgesic given (Fentanyl mcgs)
TREATMENT	Avg Lux	Pearson Correlation	1	.410**
		Sig. (2-tailed)		.003
		N	51	51
	Total analgesic given (Fentanyl mcgs)	Pearson Correlation	.410**	1
		Sig. (2-tailed)	.003	
		N	51	51
CONTROL	Avg Lux	Pearson Correlation	1	.056
		Sig. (2-tailed)		.616
		N	81	81
	Total analgesic given (Fentanyl mcgs)	Pearson Correlation	.056	1
		Sig. (2-tailed)	.616	
		N	81	81

Table 8. Decibels and Analgesic Requirements				
Treatment (1) or Control(2)			Total analgesic given (Fentanyl mcgs)	Average Decibels :
TREATMENT	Total analgesic given (Fentanyl mcgs)	Pearson Correlation	1	.375**
		Sig. (2-tailed)		.007
		N	51	51
	Average Decibels :	Pearson Correlation	.375**	1
		Sig. (2-tailed)	.007	
		N	51	51
CONTROL	Total analgesic given (Fentanyl mcgs)	Pearson Correlation	1	-.003
		Sig. (2-tailed)		.978
		N	81	81
	Average Decibels :	Pearson Correlation	-.003	1
		Sig. (2-tailed)	.978	
		N	81	81

No participants in the treatment group reported any dissatisfaction with light during the PACU stay. Four percent of the control group (usual light) found the light either too bright or almost too bright (Table 3). Four percent of the treatment group recalled some noise that was not bothersome with 4 % recalling moderate noise (Table 4). Seven percent of the control group recalled some noise that was not bothersome,

with 1 % recalling a moderate amount of noise and another 1 % recalling somewhat too much noise.

DISCUSSION

Although the implementation of a quiet time was conducted, it was not possible to consistently keep the noise levels at the decibels recommended by the WHO. Interestingly, the average noise level for the control group was 60 decibels, much less than previously reported by others studies of PACU noise (Allaouchiche[16 (pp370-372)]; Minckley [30 (pp248-249)]; Liu [31 (p300)]). The light levels were much easier to control. Even so, the treatment group was still exposed not only to a statistically lower amount of light but also a lower amount of noise than the control group.

The findings suggest that a therapeutic environment of lower light and noise levels had a significant effect on analgesic requirements during PACU Phase I. The treatment group had approximately 2 doses less of pain medication (Fentanyl 25 mcg IV) than the control group. There was a slight correlation between an increase in analgesics required and an increase in light and noise as evidenced by the treatment group.

A small amount of the control group, exposed to the usual bright light directly over the patient's during recovery from anesthesia, reported light that was uncomfortably bright. None of the treatment group was dissatisfied with the lower lights.

The noise in PACU Phase I was somewhat bothersome to a larger number of the treatment group than the control group. There was much less variation in the decibel levels of the two groups as compared to the variation in light exposure (I.E. Luxems). The noise that was bothersome was usually generated by other patients, something that was impossible to control and may have been more bothersome by the source than by the decibel level.

The nurse manager of the PACU Phase I was reluctant to decrease light levels over patients prior to the study, stating she was concerned it would impact the ability to assess the patient's condition. However, during the study there was no incidences that required increasing light to better assess patient skin color, responses, etc.. and comments about the peaceful nature of the environment with the lower lights were often heard by other staff and physicians.

LIMITATIONS of the STUDY

Several limitations were identified. The design of the PACU and the inability to control noise for the treatment group made reducing noise a challenge. It was also necessary to frequently remind staff and physicians of the observation of quiet time in the PACU. Some noise was uncontrollable, such as overhead pages, other patient noises and music announcing new births. Monitor alarms, which cannot be silenced due to The Joint Commission requirements and patient care standards, were also impossible to eliminate during quiet time.

The small size of the study and the low number of treatment participants were also limitations. Unfortunately, a number of treatment patients were unwilling to answer the survey questions or withdrew and decreased the treatment group size . The large number of female participants and the choice of a gender-specific surgical procedure versus a non-gender specific surgical procedure may have also skewed the results.

RECOMMENDATIONS FOR CLINICAL PRACTICE

The study results suggest that lower light and less noise in areas of post anesthesia recovery can impact not only a patient's need for pain medication but can also improve satisfaction with the experience. These environmental changes are easy to implement, require no additional equipment or purchases, and are nursing-directed.

The quiet, darker environment could be a standard for post anesthesia care during Phase I.

RECOMMENDATIONS FOR EDUCATION

Just as staff are educated to restrict noise and activities immediately prior to induction in the perioperative suites, staff need to be educated to be aware of environmental conditions that can impact patients during recovery. Staff conversations were cited in the study and in previous studies as one of the sources of noise that was bothersome. Light levels are easily manipulated to meet the study goals and staff should be educated about the impact of bright lights and to use nursing judgment when deciding to increase lighting around the recovering patient.

RECOMMENDATION FOR RESEARCH

The small size of the sample, especially the treatment group, and preponderance of female gender participants, supports replication of the study with a larger, more diverse group. The study does add to the literature about the environment impacts within a PACU. Including patient self-reported pain intensity ratings may add to the credibility of the pain experience.

CONCLUSION

Noise and bright lights in the PACU Phase I appear to have the potential to impact patients' pain and the need for analgesics. Also, patients' dissatisfaction with noise and bright lights supports the need to address these modifiable environmental effects. Providing a therapeutic environment in the PACU Phase I could be nurse-led patient care improvement based on evidence based practice.

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