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# Research Study

## Understanding Stress In The Operating Room: A Step Toward Improving The Work Environment

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### Abstract

Job-related stress is an important factor predicting staff satisfaction and position turnover among nursing staff, particularly in the operating room. The purpose of this study was to examine the perceived amount of stress elicited by events in the perioperative environment, the frequency of those events, and the impact of those events on the perceived stress of operating room nurses (ORNs) and operating room technologists (ORTs). The Survey on Stress in the OR instrument, which was used to query the subjects, exhibited high internal consistency of all items. The findings indicated that the ORNs and the ORTs exhibited remarkable similarities between stressful events perceived as high and low impact. The two groups agreed that the highest impact stressful event was "pressure to work more quickly." Using the results of this study, OR administrators may be able to redesign the OR environment to minimize the impact of stressful events and thereby improve job satisfaction and minimize nursing staff turnover.

Keywords: stress, operating room, surgery, nurse, technologist

### Introduction

Job-related stress can negatively impact employee well-being and job satisfaction. Job dissatisfaction is a key factor among nurses affecting turnover, negative patient safety and quality outcomes, and increasing cost of delivering high quality patient care (Hayes, Bonner, & Pryor, 2010). In the operating room, stress is an issue for both operating room nurses (ORNs) and operating room technologists (ORTs), though stress in the latter group has been studied less frequently. Stress among these groups has been linked with tension, fatigue, anxiety, depression and substance abuse (Engel, 2004; Kingdon & Halvorsen, 2006). The first step toward minimizing the effect of stress on operating room nurses and technologists is to accurately identify the causes of stress and their impact in the perioperative environment.

### Statement of Purpose

The purpose of this study was to examine the perceived amount of stress elicited by events in the perioperative environment, the frequency of those events, and the impact of those events on the perceived stress of operating room nurses (ORNs) and operating room technologists (ORTs).

### Research Questions

RQ1: What are the highest impact stressful events among registered nurses and operating room technologists in the perioperative environment?

RQ2: What are the lowest impact stressful events among registered nurses and operating room technologists in the perioperative environment?

RQ3: Do registered nurses and operating room technologists differ in their perceptions of the amount of stress induced, the frequency of occurrence, and the impact of four sources of stress including interpersonal relationships, excessive expectations, frustration on the job and crisis on the job?

### Statement of Significance to Nursing

An inverse relationship has been noted between job stress and job satisfaction among nurses (Watson & Feld, 1996). In addition, a positive correlation has been described between job stress and staff turnover (Smoot & Gonzales, 1995). These relationships among job stress, job satisfaction and job turnover are of interest since turnover among nurses has a direct impact on patient outcomes, patient safety and cost associated with maintaining a trained workforce. For example, in the healthcare system where this study was conducted the cost to replace a registered nurse in the operating room (ORN) is estimated at \$85,000 and the cost to replace a technologist (ORT) at \$48,000. Turnover of nursing staff can also negatively impact patient outcomes and patient safety due to understaffing or use of less experienced replacement staff (Bae, Mark, & Fried, 2010). Therefore, it is important for nursing leaders to identify and attempt to reduce work-related stress. The first step toward addressing this problem is to accurately identify the amount of stress elicited by unit specific events, the frequency of those events and the overall impact of the stressful events. Once these phenomena have been identified, perioperative nurse managers can then develop interventions to reduce the stressful events or the impact of the events on the nursing staff.

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### Farmer's Market Vegetable, Beef & Brown Rice

Marinate time: 6 hours or overnight Total recipe time: 50 minutes Makes 4 servings

#### Ingredients

- 1 beef top round steak, cut 1/4-inch thick (about 1 pound)
- 1 teaspoon olive oil
- 2 cups asparagus pieces (2-inch pieces)
- 1 medium yellow squash, cut lengthwise in half, then crosswise into 1/4-inch thick slices
- 3 cups hot cooked brown rice
- 1 cup diced, seeded tomatoes
- 1 cup canned garbanzo beans, rinsed, drained
- 1/4 cup fresh basil, thinly sliced
- 1/2 teaspoon salt

#### Marinade

- 1/4 cup olive oil
- 2 tablespoons fresh lemon juice
- 1 tablespoon minced garlic
- 1 tablespoon honey
- 2 teaspoons fresh thyme, chopped
- 1/4 teaspoon salt
- 1/8 teaspoon black pepper

#### Instructions

1. Combine marinade ingredients in small bowl. Place beef steak and 1/4 cup marinade in food-safe plastic bag; turn steak to coat. Close bag securely and marinate in refrigerator 6 hours or as long as overnight. Reserve remaining marinade in refrigerator for dressing.
2. Remove steak from marinade; discard marinade. Place steak on rack in broiler pan so surface of beef is 2 to 3 inches from heat. Broil 12 to 13 minutes for medium rare (145°F) doneness, turning once. Remove; keep warm.
3. Heat oil in large nonstick skillet over medium-high heat until hot. Add asparagus and squash; cook and stir 7 to 8 minutes or until tender. Toss with rice, tomatoes, beans, basil, salt and reserved marinade in large bowl.
4. Carve steak into thin slices. Serve over rice salad.

Nutrition information per serving: 514 calories; 15 g fat (3 g saturated fat; 8 g monounsaturated fat); 61 mg cholesterol; 593 mg sodium; 6 g carbohydrate; 7.3 g fiber; 36 g protein; 8.6 mg niacin; 1.1 mg vitamin B<sub>6</sub>; 1.5 mcg vitamin B<sub>12</sub>; 5.9 mg iron; 50.8 mcg selenium; 7 mg zinc.

This recipe is an excellent source of fiber, protein, niacin, vitamin B<sub>6</sub>, vitamin B<sub>12</sub>, iron, selenium and zinc.

Funded by The Beef Checkoff

### Literature Review

Previous research has demonstrated that perioperative nurses experience high stress levels in their daily work environment. There is little in the literature concerning stress levels of the operating room technologists. Kingdon and Halvorsen (2006) discovered job stress stems from several factors, such as conditions in the working environment, working relationships, role conflict and ambiguity, structure and climate of the organization, work-home interface, career development and the nature of the job. Fox (2003) noted the uniqueness of the perioperative environment, and results of that study indicated that nurses experienced high levels of workplace stress which had an influence upon both their professional and personal lives. Chen, Lin, Wang, and Hou (2009) interviewed 121 registered nurses with more than six months experience finding the level of stress has a significant negative impact on patient safety. Horowitz's Impact of Event Scale was utilized by Gillespie and Kermod (2004) to query 46 registered nurses. Results of this study indicated that nurses with the least experience demonstrated the highest negative impact of stress. Thus, it appears that OR nursing staff are exposed and vulnerable to high degrees of stress.

### Theoretical/Conceptual Framework

This study is supported by Lazarus' conceptual framework which indicates that perceptions of stress result when environmental demands exceed the individual's resources to cope with those demands (Lazarus, 1990). Expanding upon this definition, Lambert and Lambert (2001) defined role stress among nurses as a perceived mismatch between the expectations of the role and the nurse's ability to deal with it. This conceptualization of workplace stress among nurses is consistent with the findings of Jex et al. (1991) who defined workplace stressors among resident physicians as job characteristics to which they were attempting to adaptively respond. Lambert et al. (2004) after studying 310 nurses, identified low job control coupled with high demand and low support; dealing with death and dying; difficulties with colleagues, patients or relatives; inadequate resources; and organizational and management issues as major nursing role stressors. Thus, the environmental context and the individual's response to an event need to be considered when describing stress among nurses in the work place. This concept of workplace stress among nurses supports the purpose of this study to examine the perceived amount of stress elicited by events in the perioperative environment and the frequency of those events. This theory further supports combining the perceived stress evoked by an event with the frequency of the event to arrive at a composite impact score (amount x frequency) for the event.

### Study Design

This descriptive study began as a quality improvement project to reduce stress in the OR

among ORNs and ORTs. A convenience sample of 24 regular full-time registered nurses (ORNs) and 15 regular full-time ORTs from within an 18-room surgical suite were originally approached to participate in a survey on stress as a result of discussion at a journal club meeting. The 39 individuals who volunteered to take the survey were not provided with any incentives or encouragement to participate. No demographic data were collected and surveys were anonymous. The surveys were collected over 2-weeks in the month of July.

Following a review of the findings, the author decided that communicating the outcomes of this project may contribute to science and may improve patient care in other institutions. Thus the author obtained approval from the IRB to access the data for the purposes of publication. Since the surveys were anonymous, and void of demographic information, the IRB approved a waiver of informed consent and ruled the study exempt from further review.

Participants were given the 19-item pencil and paper Survey on Stress in the OR instrument. This instrument was developed for use in a prior study in a different hospital using a small sample (n=29) of perioperative nurses, all of whom were employed in the same operating room (Kingdon & Halvorsen, 2006). Each item on this instrument cites a stressful event relevant to operating room personnel, e.g. patient going into cardiac arrest; equipment that does not work. Participants rated each item by the amount of stress the event produced and the frequency of the stressful event using separate 5-point Likert scales. These two responses to each item on the instrument were multiplied to yield an Impact of the Stressful Event score (amount X frequency) for each item.

The Quality Improvement team that developed the original tool organized the 19 items into four subscales based upon the similarities of the items (Kingdon & Halvorsen, 2006). These four subscales included interpersonal relationships, excessive expectations, frustrations on the job and crisis on the job. No other psychometric characteristics of this instrument have been presented in the literature. Thus, prior to addressing the research questions in the current study, the data collected from the participants were used to compute Cronbach's alpha internal consistency estimates for the entire scale and the four subscales. Items on the entire instrument yielded a high degree of internal consistency ( $\alpha = .875$ ), with the deletion of any individual item not appreciably increasing the entire instrument's internal consistency. The four subscales demonstrated a moderate degree of internal consistency ranging from  $\alpha = .641 - .755$  with the deletion of no single item resulting in a higher degree of consistency of the items. Based on these results and the findings of the previous authors (Kingdon & Halvorsen, 2006), the entire Survey on Stress in the OR scale and the four corresponding subscales were deemed reliable, although future investigators may wish to establish concurrent and predictive validity as well as test-retest reliability of this instrument.

### Results/Findings

Table 1 presents the highest to lowest ranking of the impact scores (stress amount X event frequency) for each item on the Survey on Stress in the OR scale as rated by the ORNs (n= 24) and ORTs (n=15) in the sample. The top five items ranked as having the highest stress impact scores among the registered nurses included pressure to work more quickly, equipment that does not work, inaccessible materials or equipment necessary to do your job, feeling unprepared for procedures, and inadequate communication among staff members. Four of these high stress impact items were also in the top five

items ranked as the most stressful among ORTs. The top five items for ORTs included pressure to work more quickly, inadequate communication among staff members, feeling unprepared for procedures, receiving contradictory instructions, inaccessible materials or equipment necessary to do your job. Both the ORNs and the ORTs ranked the same five items on the Survey on Stress in the OR as having the lowest impact (stress amount X event frequency) including: patients dying in the OR, making role changes, precepting new staff members, interacting with your boss, and working with other departments.

Table 2 provides a comparison between the ORNs and ORTs amount, frequency and impact scores (stress amount x event frequency) on the Survey on Stress in the OR subscales. The two-tailed t-test (df = 37) comparisons indicate that the nurses and operating room technologists reported similar amounts, frequency and impact of the four Survey on Stress in the OR subscales (t = 0.108 - 1.319, p = .92 - .20).

### Discussion

The results of this study clearly identify the amount, frequency, and the impact of stressful events in the perioperative environment among ORNs and ORTs. The analysis to address research question 1 identified the top five items ranked as having the highest stress impact scores among the ORNs and ORTs. These findings indicate that in general ORNs and ORTs perceive the same events in the OR environment as having high stress impact. These findings also seem to indicate the sources of high stress impact are from a lack of control over the environment or inadequate communication between staff.

These findings are somewhat different than those of Lambert et al. (Lambert et al., 2004) who reported stress in the OR resulting from low job control coupled with high demand and low support; dealing with death and dying; difficulties with colleagues, patients or relatives; inadequate resources; and organizational and management issues. Chen et al (2009) discovered the most intense stressor reported by ORNs was maintaining patient safety. Differences in our findings, as compared with these previous authors, may be attributable to our procedure of combining the amount of stress and frequency of the event into a stress impact score. Using this approach, we discovered that rare high stress events (patient dying) didn't have the same impact as frequent low to moderate stress events (pressure to work more quickly). In fact, the highly stressful events identified by Lambert et al. (patient death or cardiac arrest) were ranked as low impact in the current study because they occurred infrequently among this sample. These findings indicate low to moderate stressful events which occur frequently have the greatest stress impact on ORNs and ORTs.

The analysis to address research question 2 indicated that ORNs and ORTs ranked the same five items as having the lowest stress impact scores. These items ranked low on impact because they were infrequent, didn't evoke much stress or both. This finding supports the theoretical framework of the study that both perceived amount of stress elicited by events in the perioperative environment, and the frequency of those events, are important in determining the impact of specific events on stress. As well, this is one of the first studies of perioperative stress to include ORTs. The similarities between the responses of the ORTs and the ORNs in this study validate the sources, frequency, and impact of stress experienced by the staff in this clinical area.

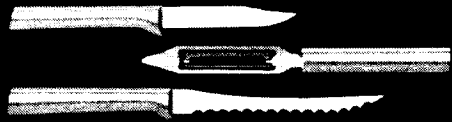
The findings of this study must be interpreted cautiously for a number of reasons. First, all of the ORTs and ORNs in this study were from the same hospital which may not represent surgical nursing staff in other hospitals or other surgical environments. Second, although the psychometric properties of the Survey on Stress in the OR scale were found to be acceptable and consistent with previous investigators, this instrument has yet to exhibit consistent validity and reliability over numerous large studies. Finally, without qualitative data on the topic, or some other method of triangulating the findings, the threat of misinterpretation or narrow validity of the Survey on Stress in the OR scale cannot be eliminated.

In response to the results of the initial quality improvement project, the administration of the institution where the project took place responded immediately in an attempt to reduce the stressors with the most impact. In this study, the highest

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Impact events proved to be pressure to work more quickly, equipment availability and maintenance, and communication issues. The action plan the institution developed focused on creating easier and less stressful procedures for patient turnover, having needed equipment and supplies available, and techniques to improve overall communication.

To address the high impact item "pressure to work more quickly", assistant nurse managers now assist with case turnovers. Since communication also proved to be a high impact stress issue, management is working with the Information Technology (IT) department to develop a computer program to alert nurses within surgical suites when changes have been made in the OR case schedule. To address the high impact item of "equipment and necessary items not being available," the staff now has a list of all necessary equipment posted on the door of each surgical suite in order to ensure all items are in each room before starting the first case of the day. The large cabinets in the OR suites are being redesigned to incorporate needed positioning items to ease the workload and decrease turnover times. A new cart in the surgical services' core area was constructed to hold items frequently needed which were usually difficult to locate. ORTs and ORNs are encouraged to stock surgical suites early in their shift and return items to their proper locations at the end of their shifts.

A "Snack and Relax" was provided for the OR staff in September in an attempt to reduce stress in the OR staff. "Snack and Relax" provides light refreshments in a quiet environment where holistic nurses provide head and neck massage, Reiki, and other holistic modalities to the OR staff. It was well received and more activities similar to this one will be scheduled.

Implementation of this action plan began in August, 2010, and will continue to evolve as changes are evaluated for quality improvement. Monthly staff meetings will focus on ways to improve efficiency, decrease stress, improve job satisfaction, and decrease staff turnover rate. The survey will be repeated in several months to ascertain the results of the stress reduction action plan to determine the impact of this action plan on amount, frequency and impact of stressful events in the OR.

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Table 1. Ranking of Survey on Stress in the OR Impact Scale by ORNs ORTs

Item	Nursing Rank	ORT Rank
Q1. Doing your least favorite procedure	12	13
Q2. Patients dying in the OR	15*	15*
Q3. Receiving contradictory instructions	7	3
Q4. Inadequate communication among staff members	5	2
Q5. Making role changes (eg. mother or homemaker to professional life)	19*	18*
Q6. Pressure to work more quickly	1	1
Q7. Having too much responsibility	9	9
Q8. Feeling unprepared for procedures	4	5
Q9. Patients going into cardiac arrest	14*	14*
Q10. Working with others who appear incompetent	6	8
Q11. Equipment that does not work	2	6
Q12. Doing emergency procedure	11	11
Q13. Precepting new staff members	17*	16*
Q14. Changes in scheduled procedures	10	7
Q15. Tardy peers	8	10
Q16. Inaccessible materials or equipment necessary to do your job	3	4
Q17. Inadequate training to do your job	13	12
Q18. Interacting with your boss	18*	17*
Q19. Working with other departments	16*	19*
Shaded items indicate top five ranked items * indicates five lowest ranked items		

Table 2. Comparison of Registered Nurses and Operating Room Technologists on Amount, Frequency and Impact of the Stressful Event Subscores

Sub-score	Position*	N	Mean	Std. Dev.	t-value	P<
Interpersonal Relationships Amount	ORN	24	21.41	5.03	-1.250	.22
	ORT	15	23.33	3.98		
Interpersonal Relationships Frequency	ORN	24	24.33	3.43	1.075	.29
	ORT	15	23.00	4.26		
Interpersonal Relationships Impact	ORN	24	524.79	161.69	-.361	.72
	ORT	15	543.67	153.53		
Excessive Expectations Amount	ORN	24	15.21	3.36	-.881	.38
	ORT	15	16.33	4.61		
Excessive Expectations Frequency	ORN	24	16.25	2.38	.762	.45
	ORT	15	15.53	3.50		
Excessive Expectations Impact	ORN	24	248.92	74.80	-.553	.58
	ORT	15	265.60	113.94		
Frustration on the Job Amount	ORN	24	13.21	3.20	-1.030	.31
	ORT	15	14.27	2.99		
Frustration on the Job Frequency	ORN	24	12.38	1.74	-.519	.61
	ORT	15	12.73	2.58		
Frustration on the Job Impact	ORN	24	165.21	54.77	-1.004	.32
	ORT	15	185.27	69.33		
Crisis on the Job Amount	ORN	24	8.33	1.66	1.319	.20
	ORT	15	7.40	2.77		
Crisis on the Job Frequency	ORN	24	3.63	.97	-.999	.32
	ORT	15	3.93	.88		
Crisis on the Job Impact	ORN	24	30.63	10.99	.108	.92
	ORT	15	30.20	13.52		

\*ORN - Registered nurses, ORT - Operating room technologists