Dimensions of Hospital Nurse Fatigue Improving Clinical Outcomes with Translational Research

July 27, 2015

Sigma Theta Tau International Nursing Research

San Juan, Puerto Rico

Diane Drake PhD RN

Linsey Barker Steege PhD

Diane Drake PhD RN
Nurse Research Scientist
Mission Hospital
Mission Viejo, California, USA
Diane.drake@stjoe.org

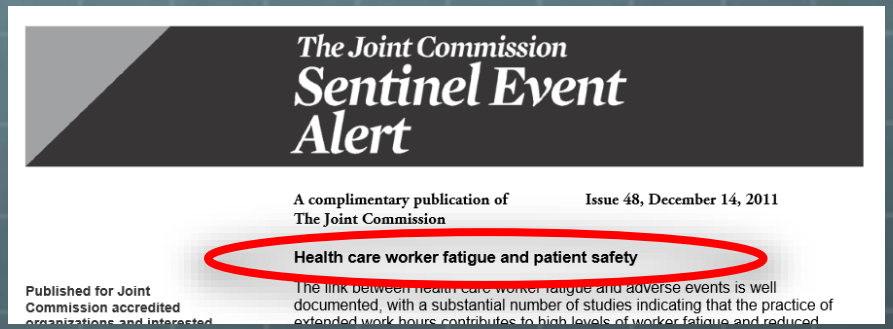
Linsey Barker Steege PhD
Assistant Professor
School of Nursing
University of Wisconsin
Madison, Wisconsin, USA

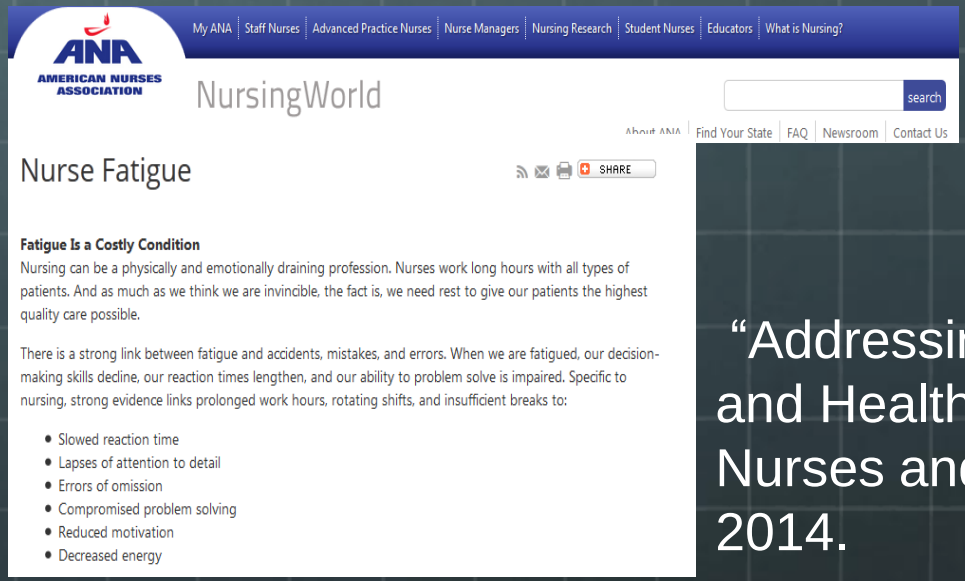
We acknowledge there are no conflicts of interest in conducting this research or concerning this presentation.

Discussion Points

- Describe the investigation of hospital nurse fatigue and importance of fatigue risk management.
- Discuss findings from a 2015 cohort analyses of the Hospital Nurse Fatigue Study.

Background





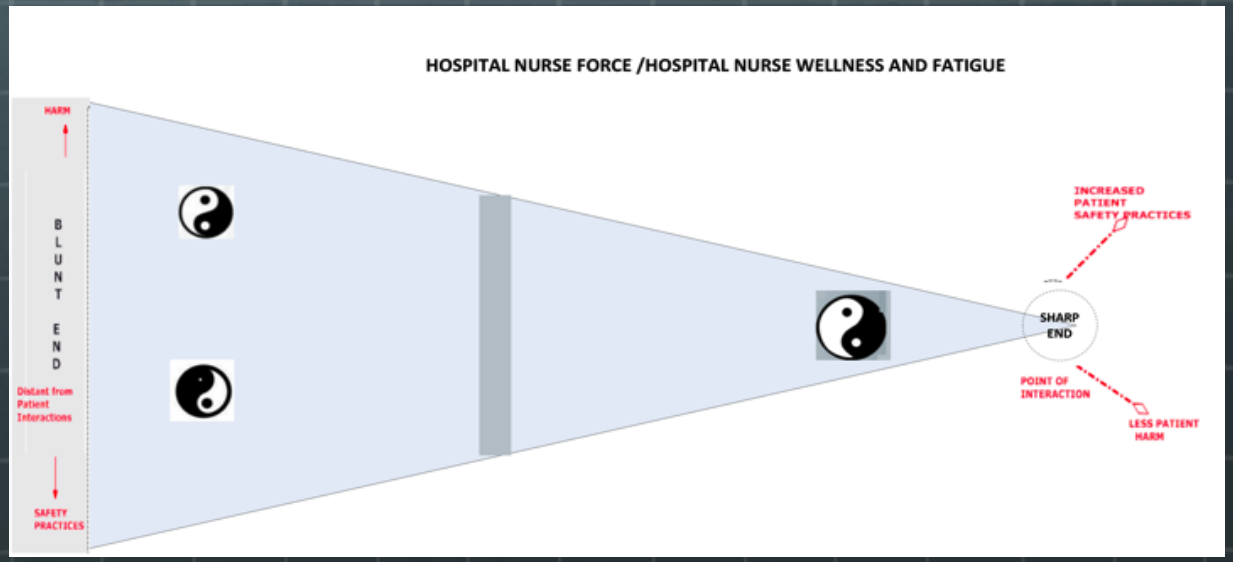
Fatigue risk management is an essential component of professional nursing practice

"Addressing Nurse Fatigue to Promote Safety and Health: Joint Responsibilities of Registered Nurses and Employers to Reduce Risks" ANA, 2014.

Aims

- Describe a strategy to profile dimensions of hospital nurse fatigue.
- Evaluate associations of nurse fatigue profiles with nurse adaptation scores.
- Evaluate associations of nurse fatigue profiles with nurse wellness and safety practice variables

Fatigue and Adaptation



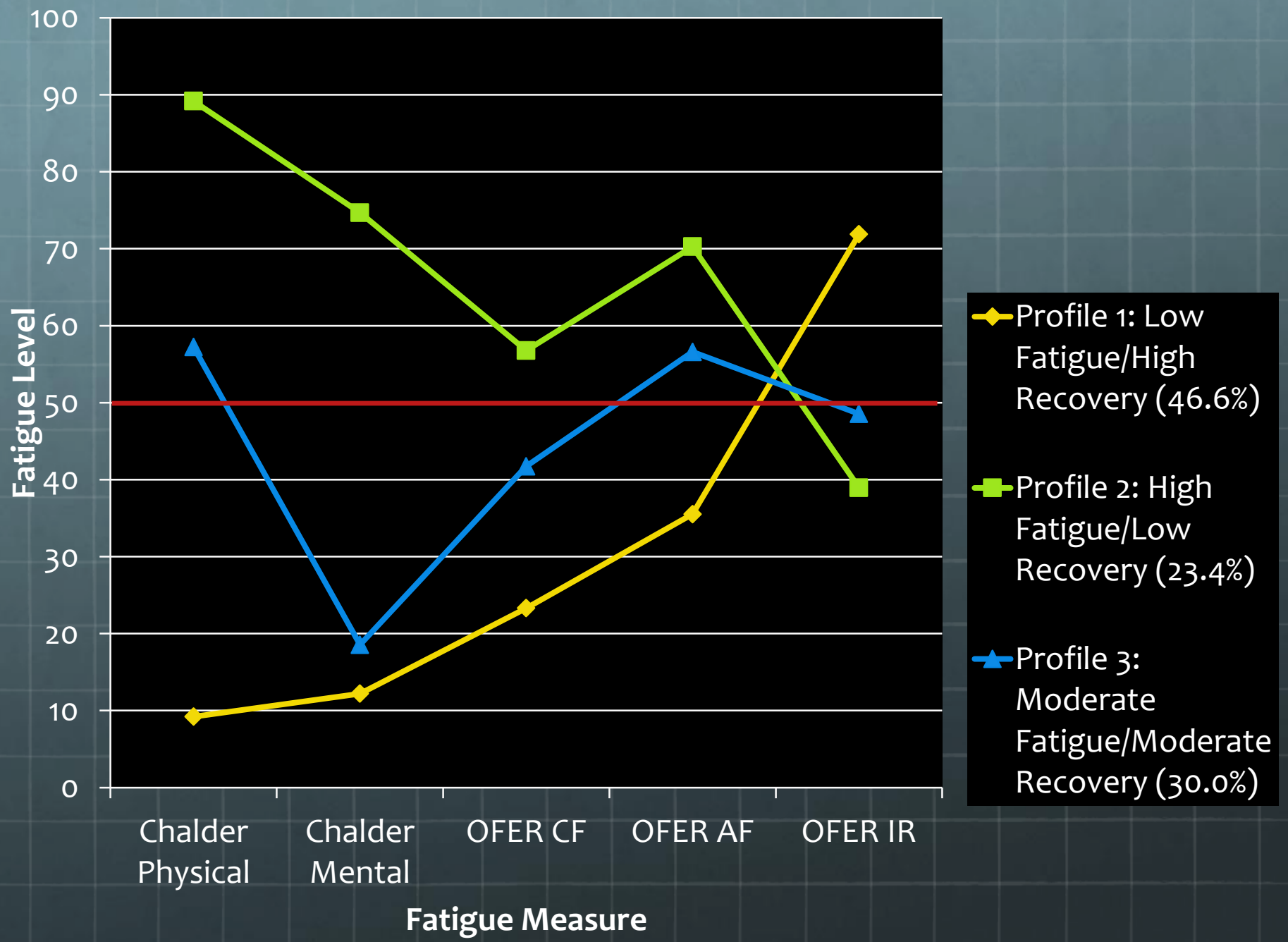
Methods

- Institutional Review Board (IRB) approved study to conduct an online survey of all Mission RNs (2012)
- An online 100-item survey measured nurse demographics, fatigue, wellness, work system parameters, performance, and patient safety practices
  - 420 RNs responded to the survey (42% response rate)
    - 94.2% female
    - age range from 23 years to 76 years; mean (SD) = 46.1 (11.41) years
    - years of experience ranged from 1-50 years, mean (SD) = 17.0 (11.35)
    - patient care only RNs (n=227)

Analysis

- Study cohort of patient care RNs (n=227)
- Used a statistical strategy of Latent Profile Analysis (LPA) of 5 fatigue scores
  - Chalder Physical Fatigue
  - Chalder Mental Fatigue
  - OFER Chronic Fatigue
  - OFER Acute Fatigue
  - OFER Intershift Recovery


100
90
80
70
60
50
40
30
20
10
0
Fatigue Level
Chalder Physical
Chalder Mental
OFER CF
OFER AF
OFER IR
Fatigue Measure
Profile 1: Low Fatigue/High Recovery (46.6%)
Profile 2: High Fatigue/Low Recovery (23.4%)
Profile 3: Moderate Fatigue/Moderate Recovery (30.0%)


100
90
80
70
60
50
40
30
20
10
0
Fatigue Level
Chalder Physical
Chalder Mental
OFER CF
OFER AF
OFER IR
Fatigue Measure
Profile 1: Low Fatigue/High Recovery (46.6%)
Profile 2: High Fatigue/Low Recovery (23.4%)
Profile 3: Moderate Fatigue/Moderate Recovery (30.0%)

Comparison of Nurse Adaptation Scores with Fatigue Profiles

Variable	Low fatigue/High recovery		Moderate fatigue/ Moderate recovery		High fatigue/ Low recovery		Test statistic	*p*-value
	n	% or $\bar{x}$(SD)	*n*	% or $\bar{x}$(SD)	*n*	% or $\bar{x}$(SD)		
Adaptation								
Compassion satisfaction (ProQOL)	89	43.49 (4.82)	58	40.54 (5.74)	43	38.19 (5.92)	$F = 15.22$	$p = 0.000$*
Burnout (ProQOL)	92	17.76 (4.18)	63	20.44 (4.33)	46	23.85 (5.51)	$F = 32.72$	$p = 0.000$*
Secondary traumatic stress (ProQOL)	83	17.69 (4.98)	59	19.69 (5.48	41	21.78 (6.31)	$F = 7.99$	$p = 0.000$*
Need for recovery scale	93	41.64 (18.33)	63	58.36 (14.52)	49	66.01 (12.86)	$F = 42.94$	$p = 0.000$*

Comparison of Nurse Adaptation Scores with Fatigue Profiles

Variable	Low fatigue/High recovery		Moderate fatigue/ Moderate recovery		High fatigue/ Low recovery		Test statistic	*p*-value
	n	% or $\bar{x}$(SD)	*n*	% or $\bar{x}$(SD)	*n*	% or $\bar{x}$(SD)		
Adaptation								
Compassion Satisfaction (ProQOL)	89	43.49 (4.82)	58	40.54 (5.74)	43	38.19 (5.92)	F = 15.22	p = 0.000*
Burnout (ProQOL)	92	17.76 (4.18)	63	20.44 (4.33)	46	23.85 (5.51)	F = 32.72	p = 0.000*
Secondary Traumatic Stress (ProQOL)	83	17.69 (4.98)	59	19.69 (5.48	41	21.78 (6.31)	F = 7.99	p = 0.000*
Need for recovery scale	93	41.64 (18.33)	63	58.36 (14.52)	49	66.01 (12.86)	F = 42.94	p = 0.000*

Comparison of Nurse Variables with Fatigue Profile

Variable	Low fatigue/High recovery		Moderate fatigue/ Moderate recovery		High fatigue/ Low recovery		Test statistic	*p*-value
	n	% or $\bar{x}$(SD)	*n*	% or $\bar{x}$(SD)	*n*	% or $\bar{x}$(SD)		
Sociodemographic								
Age	104	48.59 (11.32)	80	45.42 (11.64)	53	43.39 (10.71)	$F = 4.10$	**$p = 0.018$***
Gender							$X^2 = 0.63$	$p = 0.729$
Female	99	93.40%	64	94.12%	48	90.57%		
Male	7	6.60%	4	5.88%	5	9.43%		
Ethnicity								
White	79	80.61%	57	85.07%	43	82.69%	$X^2 = 4.26$	$p = 0.833$
Asian	12	12.24%	6	8.96%	4	7.69%		
Hispanic or Latino	5	5.10%	3	4.48%	3	5.77%		
Other	2	2.04%	1	1.49%	1	1.92%		
Marital status							$X^2 = 3.82$	$p = 0.701$
Married/partnered	69	69.70%	49	74.24%	40	78.43%		
Divorced	18	18.18%	9	13.64%	6	11.76%		
Single never married	8	8.08%	5	7.58%	5	9.80%		
Widowed	4	4.04%	3	4.55%	0	0.00%		
Dependents (yes)	80	1.77 (1.91)	60	1.88 (1.87)	45	1.97 (1.65)	$F = 0.18$	$p = 0.834$
Academic								
Associate degree in nursing	47	50.00%	32	55.17%	17	34.69%	$X^2 = 6.54$	$p = 0.191$
Currently student (yes)	13	12.26%	11	16.18%	11	20.75%	$X^2 = 2.00$	$p = 0.369$
Employment								
Years employed as a nurse	106	18.30 (11.95)	68	16.66 (1.26)	53	14.11 (10.03)	$F = 3.00$	$p = 0.643$
Average # hours/shift	102	35.50 (8.74)	66	33.78 (9.51)	49	35.12 (6.67)	$F = 0.82$	$p = 0.442$
Work commute								
miles	99	16.67 (20.55)	67	14.85 (14.67)	50	14.28 (11.28)	$F = 0.41$	$p = 0.665$
minutes	100	26.65 (23.29)	67	25.53 (20.52)	51	25.53 (19.68)	$F = 0.37$	$p = 0.693$

Comparison of Nurse Variables with Fatigue Profile

Variable	Low fatigue/High recovery		Moderate fatigue/ Moderate recovery		High fatigue/ Low recovery		Test statistic	*p*-value
	n	% or $\bar{x}$(SD)	*n*	% or $\bar{x}$(SD)	*n*	% or $\bar{x}$(SD)		
Sociodemographic								
Age	104	48.59 (11.32)	80	45.42 (11.64)	53	43.39 (10.71)	$F = 4.10$	***p* = 0.018***
Gender							χ^2 = 0.63	$p = 0.729$
Female	99	93.40%	64	94.12%	48	90.57%		
Male	7	6.60%	4	5.88%	5	9.43%		
Ethnicity								
White	79	80.61%	57	85.07%	43	82.69%	$\chi^2 = 4.26$	$p = 0.833$
Asian	12	12.24%	6	8.96%	4	7.69%		
Hispanic or Latino	5	5.10%	3	4.48%	3	5.77%		
Other	2	2.04%	1	1.49%	1	1.92%		
Marital status							$\chi^2 = 3.82$	$p = 0.701$
Married/partnered	69	69.70%	49	74.24%	40	78.43%		
Divorced	18	18.18%	9	13.64%	6	11.76%		
Single never married	8	8.08%	5	7.58%	5	9.80%		
Widowed	4	4.04%	3	4.55%	0	0.00%		
Dependents (yes)	80	1.77 (1.91)	60	1.88 (1.87)	45	1.97 (1.65)	$F = 0.18$	$p = 0.834$
Academic								
Associate degree in nursing	47	50.00%	32	55.17%	17	34.69%	$\chi^2 = 6.54$	$p = 0.191$
Currently student (yes)	13	12.26%	11	16.18%	11	20.75%	$\chi^2 = 2.00$	$p = 0.369$
Employment								
Years employed as a nurse	106	18.30 (11.95)	68	16.66 (1.26)	53	14.11 (10.03)	$F = 3.00$	$p = 0.643$
Average # hours/shift	102	35.50 (8.74)	66	33.78 (9.51)	49	35.12 (6.67)	$F = 0.82$	$p = 0.442$
Work commute								
miles	99	16.67 (20.55)	67	14.85 (14.67)	50	14.28 (11.28)	$F = 0.41$	$p = 0.665$
minutes	100	26.65 (23.29)	67	25.53 (20.52)	51	25.53 (19.68)	$F = 0.37$	$p = 0.693$

Comparison of Nurse Wellness Variables with Fatigue Profiles

Variable	Low fatigue/High recovery		Moderate fatigue/ Moderate recovery		High fatigue/ Low recovery		Test statistic	*p*-value
	n	% or $\bar{x}$(SD)	*n*	% or $\bar{x}$(SD)	*n*	% or $\bar{x}$(SD)		
Sleep								
Epworth Sleepiness Scale	84	4.83 (2.98)	58	6.84 (4.02)	42	9.40 (4.92)	$F = 20.31$	$\mathbf{p = 0.000^*}$
Total Global Pittsburgh Sleep Quality Index	91	6.06 (2.67)	60	7.82 (2.87)	47	9.93 (3.58)	$F = 26.80$	$\mathbf{p = 0.000^*}$
Physical Fitness								
BMI	94	24.86 (4.61)	63	26.03 (5.87)	50	26.93 (7.06)	$F = 2.32$	$p = 0.101$
Resting pulse	98	68.51 (8.89)	65	70.32 (9.25)	51	70.98 (10.14)	$F = 1.43$	$p = 0.243$
Exercise (yes)	10	90.56%	10	85.29%	14	73.58%	$X^2 = 8.01$	$\mathbf{p = 0.018^*}$
Depression								
Depression scale (PHQ-9)	91	4.56 (3.17)	60	6.83 (3.56)	45	9.13 (2.67)	$F = 32.06$	$\mathbf{p = 0.000^*}$
Resilience								
Brief Resilience Score	100	22.36 (4.09)	65	21.69 (3.5)	50	19.20 (5.15)	$F = 9.40$	$\mathbf{p = 0.000^*}$
Flourishing								
Flourishing scale	93	49.93 (4.99)	61	48.50 (5.38)	46	45.20 (5.88)	$F = 12.19$	$\mathbf{p = 0.000^*}$

Comparison of Nurse Wellness Variables with Fatigue Profiles

Variable	Low fatigue/High recovery		Moderate fatigue/ Moderate recovery		High fatigue/ Low recovery		Test statistic	*p*-value
	n	% or $\bar{x}$(SD)	*n*	% or $\bar{x}$(SD)	*n*	% or $\bar{x}$(SD)		
Sleep								
Epworth Sleepiness Scale	84	4.83 (2.98)	58	6.84 (4.02)	42	9.40 (4.92)	$F = 20.31$	$p = 0.000$*
Total Global Pittsburgh Sleep Quality Index	91	6.06 (2.67)	60	7.82 (2.87)	47	9.93 (3.58)	$F = 26.80$	$p = 0.000$*
Physical Fitness								
BMI	94	24.86 (4.61)	63	26.03 (5.87)	50	26.93 (7.06)	$F = 2.32$	$p = 0.101$
Resting pulse	98	68.51 (8.89)	65	70.32 (9.25)	51	70.98 (10.14)	$F = 1.43$	$p = 0.243$
Exercise (yes)	10	90.56%	10	85.29%	14	73.58%	$X^2 = 8.01$	$p = 0.018$*
Depression								
Depression scale (PHQ-9)	91	4.56 (3.17)	60	6.83 (3.56)	45	9.13 (2.67)	$F = 32.06$	$p = 0.000$*
Resilience								
Brief Resilience Score	100	22.36 (4.09)	65	21.69 (3.5)	50	19.20 (5.15)	$F = 9.40$	$p = 0.000$*
Flourishing								
Flourishing scale	93	49.93 (4.99)	61	48.50 (5.38)	46	45.20 (5.88)	$F = 12.19$	$p = 0.000$*

Comparison of Hospital Environment Scores

Variable	Low fatigue/High recovery		Moderate fatigue/ Moderate recovery		High fatigue/ Low recovery		Test statistic	*p*-value
	n	% or $\bar{x}$(SD)	*n*	% or $\bar{x}$(SD)	*n*	% or $\bar{x}$(SD)		
Job Satisfaction								
MMSS Total	89	3.87 (0.48)	60	3.73 (0.59)	45	3.47 (0.46)	$F = 3.00$	$p = 0.643$
Teamwork								
Team Vitality	97	41.46 (4.63)	67	41.01 (4.93)	50	39.68 (5.11)	$F = 2.24$	$p = 0.109$
Safety Practices								
Teamwork within unit	85	87.94 (17.93)	59	85.17 (16.16)	44	82.95 (20.72)	$F = 1.17$	$p = 0.312$
Supervisor expectations	93	88.17 (18.15)	62	81.72 (23.89)	46	78.26 (27.41)	$F = 3.36$	**$p = 0.033$***
Management support	93	82.80 (23.88)	62	74.73 (29.37)	46	73.19 (28.65)	$F = 2.69$	$p = 0.070$
Organizational learning	87	95.02 (12.99)	58	91.95 (18.00)	44	90.15 (23.28)	$F = 1.28$	$p = 0.282$
Overall perceptions	84	76.19 (24.21)	58	65.95 (26.78)	43	56.98 (30.53)	$F = 7.82$	**$p = 0.010$***
Frequency of events reported	93	63.08 (42.98)	62	58.60 (42.97)	46	47.10 (45.83)	$F = 2.07$	$p = 0.129$
Teamwork across units	93	77.15 (24.35)	62	75.81 (26.77)	46	55.98 (32.14)	$F = 10.38$	**$p = 0.001$***
Staffing	86	67.44 (28.91)	57	45.61 (34.29)	45	40.74 (27.42)	$F = 14.92$	**$p = 0.000$***
Handoffs & Transitions	93	54.30 (39.98)	62	51.61 (40.96)	46	33.15 (34.98)	$F = 4.74$	**$p = 0.010$***
Non-punitive response to errors	86	45.35 (37.54)	59	40.68 (38.69)	45	31.85 (35.50)	$F = 1.92$	$p = 0.149$

Comparison of Hospital Environment Scores

Variable	Low fatigue/High recovery		Moderate fatigue/ Moderate recovery		High fatigue/ Low recovery		Test statistic	*p*-value
	n	% or $\bar{x}$(SD)	*n*	% or $\bar{x}$(SD)	*n*	% or $\bar{x}$(SD)		
Job Satisfaction								
MMSS Total	89	3.87 (0.48)	60	3.73 (0.59)	45	3.47 (0.46)	$F = 3.00$	$p = 0.643$
Teamwork								
Team Vitality	97	41.46 (4.63)	67	41.01 (4.93)	50	39.68 (5.11)	$F = 2.24$	$p = 0.109$
Safety Practices								
Teamwork within unit	85	87.94 (17.93)	59	85.17 (16.16)	44	82.95 (20.72)	$F = 1.17$	$p = 0.312$
Supervisor expectations	93	88.17 (18.15)	62	81.72 (23.89)	46	78.26 (27.41)	$F = 3.36$	**$p = 0.033$***
Management support	93	82.80 (23.88)	62	74.73 (29.37)	46	73.19 (28.65)	$F = 2.69$	$p = 0.070$
Organizational learning	87	95.02 (12.99)	58	91.95 (18.00)	44	90.15 (23.28)	$F = 1.28$	$p = 0.282$
Overall perceptions	84	76.19 (24.21)	58	65.95 (26.78)	43	56.98 (30.53)	$F = 7.82$	**$p = 0.010$***
Frequency of events reported	93	63.08 (42.98)	62	58.60 (42.97)	46	47.10 (45.83)	$F = 2.07$	$p = 0.129$
Teamwork across units	93	77.15 (24.35)	62	75.81 (26.77)	46	55.98 (32.14)	$F = 10.38$	**$p = 0.001$***
Staffing	86	67.44 (28.91)	57	45.61 (34.29)	45	40.74 (27.42)	$F = 14.92$	**$p = 0.000$***
Handoffs & Transitions	93	54.30 (39.98)	62	51.61 (40.96)	46	33.15 (34.98)	$F = 4.74$	**$p = 0.010$***
Non-punitive response to errors	86	45.35 (37.54)	59	40.68 (38.69)	45	31.85 (35.50)	$F = 1.92$	$p = 0.149$

Hospital Nurse Fatigue

- LPA was an effective strategy to translate hospital nurse fatigue scores into three distinct profiles.
- The three fatigue profiles were significantly associated with nurse adaptation scores.

Hospital Nurse Wellness

- Nurses in the low fatigue/high recovery profile
  - Were older 48 v 43 years
  - Had less sleepiness
  - Had better sleep quality
  - Were more likely to exercise
  - Had less depression
  - Had better resilience
  - Had greater flourishing

Safety Practices

- Nurses in the low fatigue/high recovery profile
- Had better overall perceptions of safety practices
  - Agreed more with
    - supervisor safety expectations
    - staffing practices
    - teamwork
    - handoffs

Limitations

- The three nurse fatigue profiles were calculated from self-reported scores in an anonymous online survey collected over several months from a single hospital.
- Although LPA can be considered and recommended for reporting fatigue profiles during a specified time, such as a single shift or repeated measures, that was not accomplished in this study.
- Self reports of fatigue and fatigue profiles may not provide valid representation of objective (clinical) measures of nurse alertness, wellness, safety practices or prevention of adverse events.

Recommendations

- Validate fatigue scores and fatigue profiles with clinical and objective measures.
- Shorten the 100-item fatigue survey.
- Conduct a longitudinal study and test fatigue risk interventions to evaluate trends in hospital nurse fatigue and effects of fatigue risk management.


Mission
Hospital

2013 Study Team Members

- Michele Luna PhD RN (Quality Manager)
- Diane Drake PhD RN (Research Scientist)
- Linsey Barker Steege PhD (Human Factors Engineer)
- Connie Gagliardo RN MSN (Clinical Director)
- Mary Olivas RN MSN (Nurse Manager)
- Gerri Mazza RN MSN (Nurse Manager)


Mission Hospital Laguna Beach
31872
Mission Hospital Laguna Beach

2012 - 2013 Study Collaborators

- Leif Guerrero RN MSN (Occupational Health Officer)
- Teri Arruda RN DNP (Hospital Nurse and Doctoral student)
- Jane Georges PhD RN (Nurse Philosopher)
- Mary Wickman PhD RN (Dean and Nurse Researcher)
- Kaylan Pasupathy PhD (Industrial and Systems Engineer)
- Shaghayegh Parhizi (Doctoral student in Industrial Engineering)