



# Nurse Working Conditions and Healthcare Associated Infection

Pat Stone, PhD, RN  
ps2024@columbia.edu

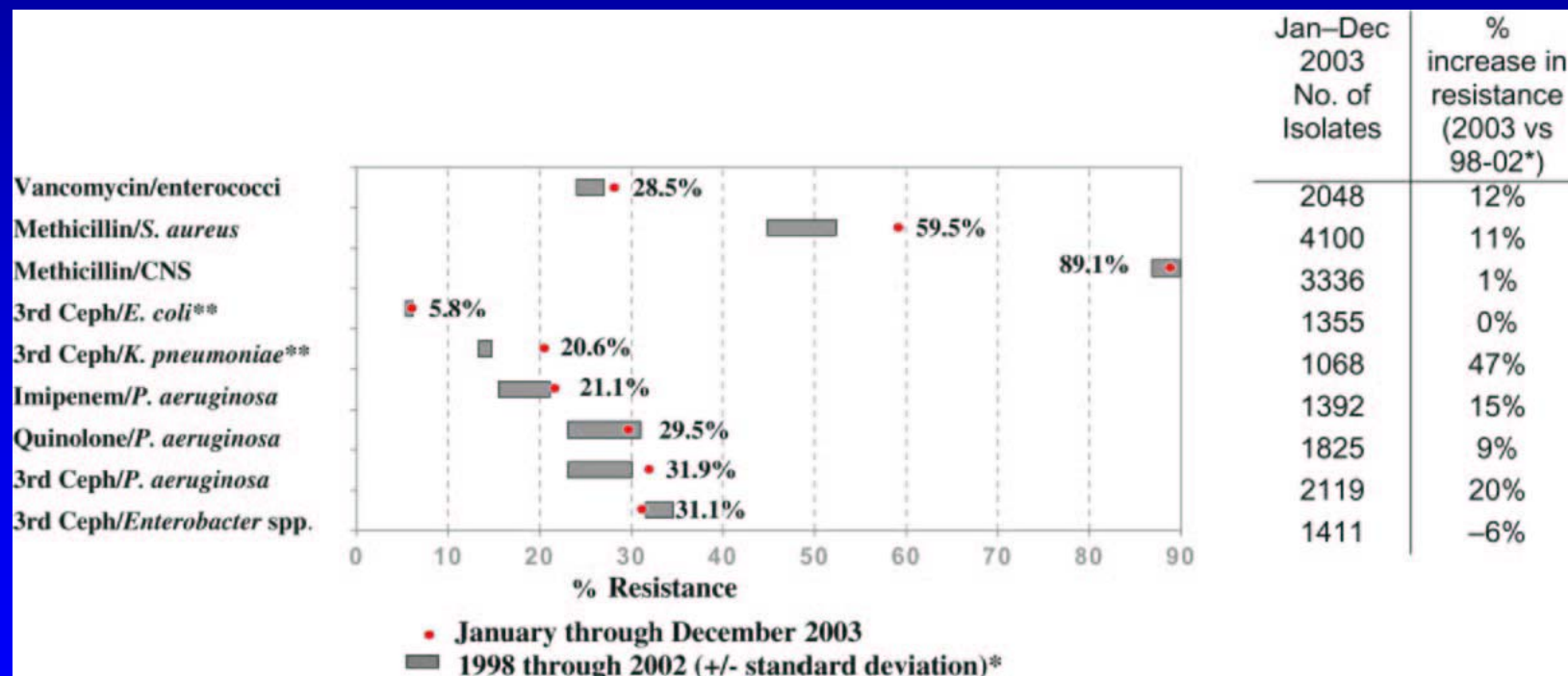
# Working Conditions and Patient Safety

- Growing concern that poor working conditions in the health care sector is contributing to decreasing patient safety (IOM, 2004).
- An acute nursing shortage that will not be as cyclic as past shortages due to
  - Aging workforce
  - Aging population and increased demand for nursing services
  - Poor working conditions resulting in difficulty recruiting and retaining qualified nursing personnel

# Nosocomial Infections: Important Patient Safety Issue

- 2 million cases annually
- 500,000 occur in ICUs
- NI have risen over the last 30 years
- Objective of Healthy People 2010 to lower NIs in ICUs by 10%
- Estimated to cost hospitals \$5.9 billion per year

# HAI's and Resistance



Data from NNIS (2004) AJIC



# Outcomes of ICU Working Conditions (ICUWC)

Investigators: Pat Stone, Andy  
Dick, Teresa Horan,  
Elaine Larson, Cathy Mooney-  
Kane, and Jack Zwanziger

Funded by AHRQ R01 HS013114 and Supported by the CDC

# Purpose

Examine the factors related to nurse working conditions and

- Patient safety outcomes
- Employee safety outcomes
- System outcomes

# Design

- Cross sectional analysis
- RNs employed in the ICU were surveyed
  - Anonymous survey identifiable to ICU where distributed
- Survey results linked with AHA data and other public use files
- Medicare files cross referenced with NNIS surveillance

# Survey Measures

- Organizational climate
  - Based on Nursing Work Index-Revised (Aiken)
    - 42 items
    - 1-4 Likert scale
    - Strongly agree to strongly disagree
- Demographic questions
  - 8 items including gender, age, education and experience
- Behavioral intention to leave
  - 1 item, "Do you intend to leave your position in the coming year?"
  - If yes, why?

# Results

- 2,330 respondents (41% response rate)
- 68 hospitals
- 109 ICUs

# Nurse Demographics

	N	Percent*
Gender		
Female	2086	89.5
Male	234	10.0
Education		
ASN/Diploma	963	41.3
BSN or higher	1341	57.6
Employment Status		
Full-time	1797	77.1
Part-time	339	14.5
Float	173	7.4

\* Percents do not equal 100 due to missing data

# Nurse Demographics

	Mean (yrs)	SD
Age	39.5	9.8
Healthcare Exp	15.7	9.3
ICU Experience	10.3	8.4
Tenure on unit	8.0	7.5

# Hospitals Characteristics

	N	Percent
<u>Region</u>		
Atlantic	872	37.5
Central	727	31.3
Pacific	514	22.1
<u>Bed size</u>		
$\leq 299$	444	19.1
300-399	541	23.3
$\geq 400$	1128	48.5

# Intention to Leave

- Positive intention:  
17% (n=391)
  - 72% (n=202) reported due to negative working conditions

# Intention to Leave Due To Negative Working Conditions

- No difference in intention related to
  - nursing demographics or
  - hospital characteristics

## Organizational Climate Factors and Intention to Leave Due to Negative Working Conditions

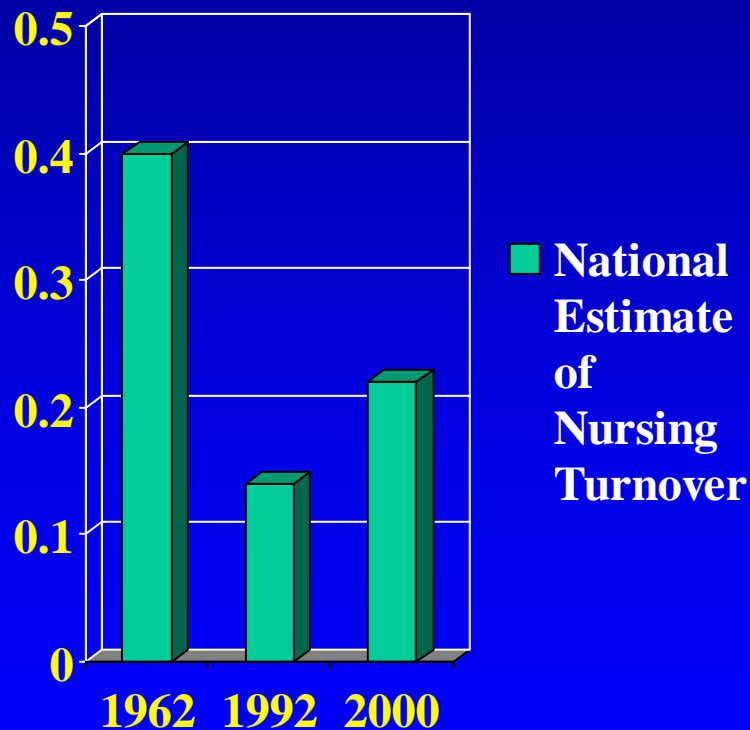
Factor	Odds Ratio	(95% CI)
Professional practice	0.54*	(.41, .64)
Supervisor	0.74*	(.55, .98)
Adequate staffing/resources	1.10	(.83, 1.5)
Nursing process	0.80	(.53, 1.2)
Collaboration	1.31	(.85, 2.3)
Nurse competence	0.63*	(.46, .85)
Scheduling	0.81	(.60, 1.1)

\*Ratios statistically significant with  $p < 0.05$

# Summary

- Behavioral intention to leave of critical care RNs across the nation is great
- Negative perceptions of organizational climate impact this phenomenon
- Perception of professional practice, positive leadership skills of supervisors, and support for RN training are independent factors which reduce intention to leave

# Historical Nature of Nursing Turnover



- ANA has estimated nursing turnover to be greater than we found
- Report of 36% ITL in 1991 (Vahey, Aiken, 2004)
- Turnover is on the rise again

# Discussion

- Turnover of 1 RN is estimated to cost \$30,000 to \$50,000
  - Critical care RN turnover is among the highest cost

# Implications

Investing in

RN training

Nurse supervisor training

Increasing RN participation in governance  
may decrease turnover, improve patient  
safety and reduce health care costs

# Working conditions: Effects on elderly patient safety

- Control Variables
  - Severity of illness
    - Longterm health status
    - Severity of illness on admission
    - Comorbidities on admission
  - Patient Demographics
  - Hospital Characteristics
  - ICU Characteristics
- Patient Outcomes
  - HAIs
    - CA-UTI
    - VAP
    - CL-BSI
  - 30-day mortality
  - Decubitus Ulcer

# Predictors of Healthcare-Associated Infection

<u>Variable</u>	<u>Coefficient</u>	<u>p value</u>
Gender	0.15	0.005
Age (75 to 79 vs. to 65-74)	0.14	0.003
Hx Cancer	-0.29	0.005
Hx GI	0.46	<0.001
Hx Cardiac Arrest	0.31	0.001
Hx CV	0.25	0.010
Hx Paralysis	0.62	0.010
Hx Transplant	0.51	0.013
ICU type (CV vs Med/Surg)	-0.35	<0.001
SES1	0.0002	0.008
SES 2	9.06	<0.0001
<b>Proportion of RN overtime</b>	<b>2.34</b>	<b>0.033</b>
<b>Mean organizational climate</b>	<b>-0.72</b>	<b>0.012</b>

# Results

- Working conditions not related to 30-day mortality or CL-BSI
- Patients admitted to ICUs with positive climate 39% less likelihood of developing CA-UTI (OR 0.61, 95% CI 0.39 to 0.94)
- ICUs with nurses working more overtime had higher rates of CA-UTI and decubitus ulcers
- ICUs with higher RN-to-patient ratio had 79% lower incidence of VAP (OR 0.21, 95% CI 0.07 to 0.58)

# Summary

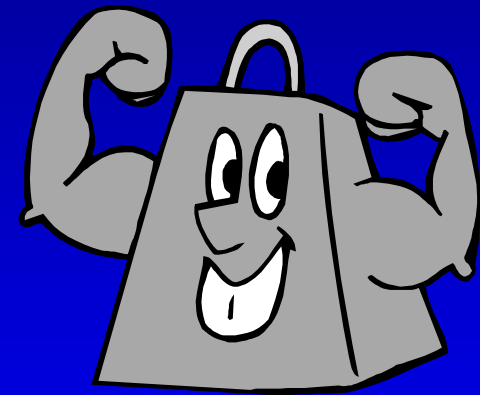
- The more positive the organizational climate, the less likely the patient will acquire a healthcare-associated infection
- The higher the proportion of overtime, the more likely the patient will acquire an infection

# Discussion

- HAIs were rare events.
- Hospitals were unique in that Infection Control Professionals routinely conducted HAI surveillance using consistent standardized definitions.
- Non-significant findings are also interesting
  - E.g., staffing ratios

# Strengths and Limitations

- Unique data set
- Large national sample
- Generalizability?
  - ICU specific
  - Over represented by large teaching hospitals
  - Hospitals may be best of the best?

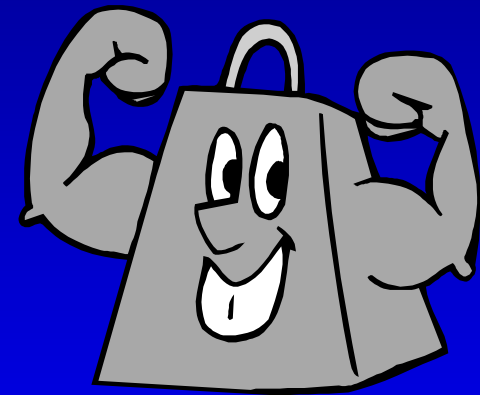


# Comparison of ICUWC Sample to National Data

- Nurses compared to NSSRNs
  - No difference in age or gender
  - Our sample more highly educated and more full-timers
- Hospitals compared to AHA dataset
  - Regional representativeness similar
  - More large teaching hospitals in our sample

# Strengths and Limitations

- Unique data set
- Large national sample
- Generalizability?
  - ICU specific
  - Over represented by large teaching hospitals



# Implications for Policy

- Organizational climate is an important predictor of nurses' intention to leave
- Organizational climate and overtime are important predictors of HAI
- Better understanding of how to improve organizational climate may help hospitals financial performance and improve patient outcomes

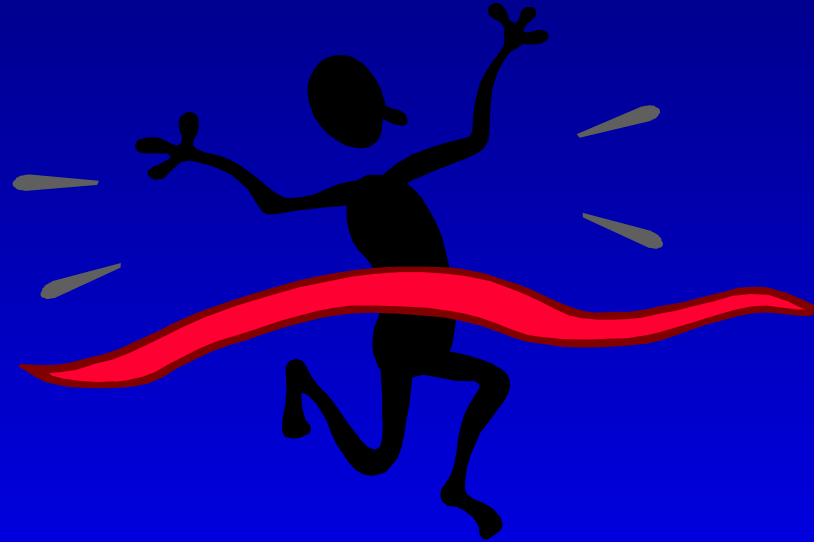
# Other Analyses From this Study

- Nurse Working Conditions, Organizational Climate and Intent to Leave in ICUs: An Instrumental Variable Approach (accepted, HSR)
- Nurse working conditions and employee safety (in development)
- Comparison of healthcare associated infections using two different mechanisms for public reporting (to be submitted, Health Affairs)

# Next Steps

- P-NICE
  - NINR
- Antimicrobial Resistance and Hospital Compliance with Evidence-based Guidelines
  - CIRAR

# Thank You!



Special thanks to all the nurses and hospitals that participated in these studies!