



Association of Hospital Nursing and Postsurgical Sepsis

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Mentor: Andrew M. Dierkes

Background of the project

- Reproduction of Andrew's thesis using 2015 data
- Leading cause of hospital death
- **Sepsis:** Infection after surgery can cause sepsis. **Sepsis** is a potentially life-threatening condition caused by the body's response to an infection. The body normally releases chemicals into the bloodstream to fight an infection. **Sepsis** occurs when the body's response to these chemicals is out of balance, triggering changes that can damage multiple organ systems.
- More than 1 million sepsis cases, \$20 billion costs each Year

Background of the project

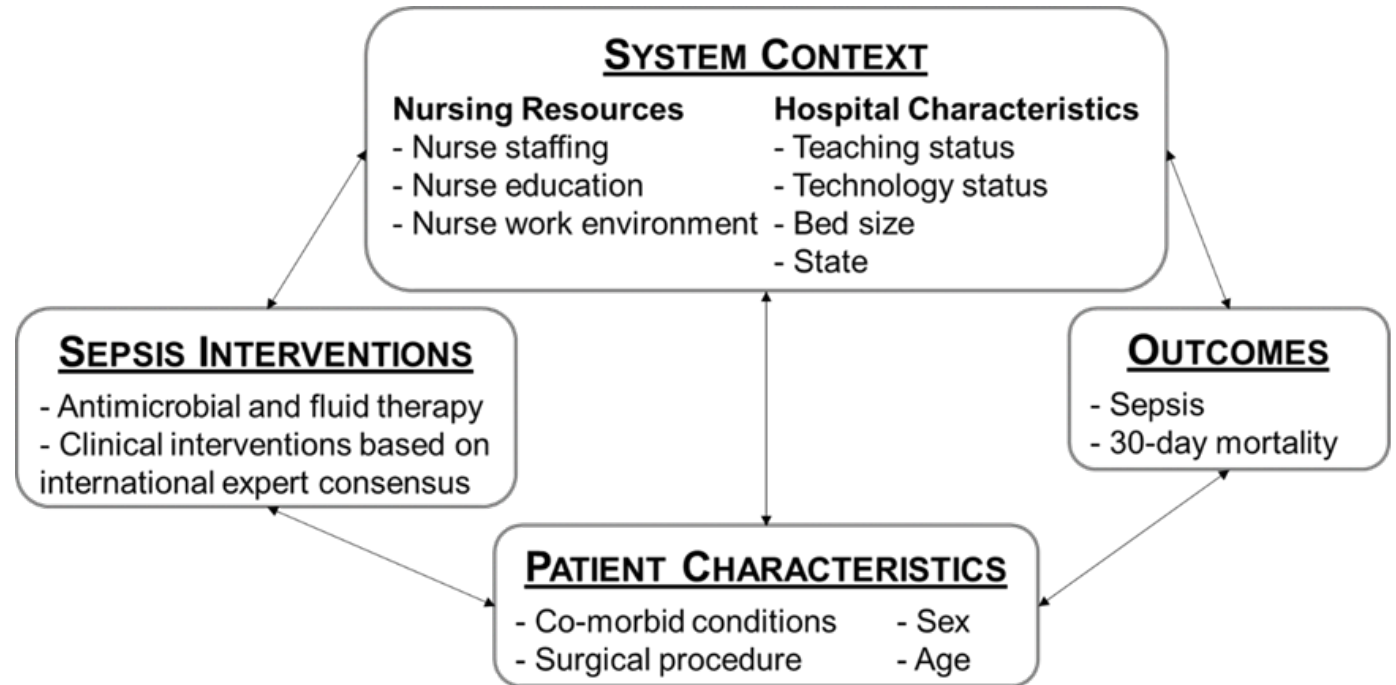
- nurses are largely absent from current sepsis policy recommendations¹
- Hospital nursing resources, have been shown to help explain facility-level variation in hospital infection and complication rates¹
- Nurses' at the forefront of Sepsis surveillance, prevention, early recognition:
 - monitor vital signs,
 - advise the care team of changes in a patient's condition,
 - implement orders to draw labs,
 - administer antibiotics, and resuscitate patients with intravenous fluids¹

1. Dierkes, Andrew Michael, "The Impact of Hospital Nursing on Postsurgical Sepsis" (2018). *Dissertations available from ProQuest*. AAI10846185. <https://repository.upenn.edu/dissertations/AAI10846185>



Aim of the study

The Procedure



Andrew M. Dierkes(20

18) The Impact of Hospital Nursing on Postsurgical Sepsis.
Powerpoint Slides

Study Design

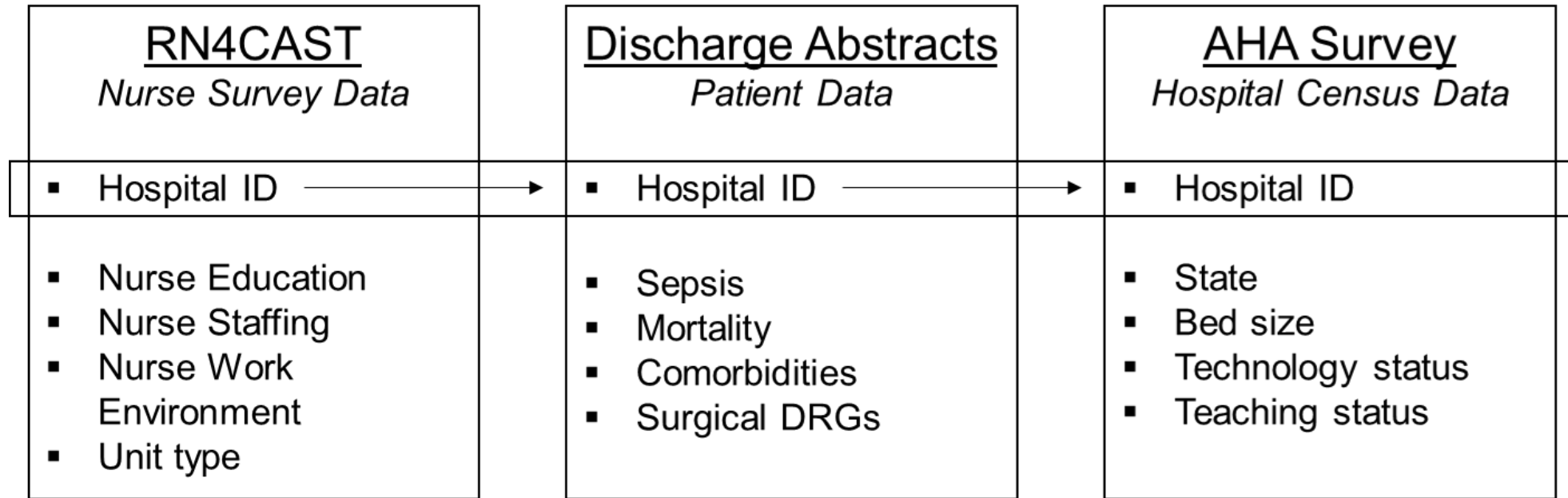
1.2014-16 Multi-state Nurse Survey dataset

1171 hospitals, 59972 nurses

2.National Hospital Discharge Survey. Surgical Patient Discharge dataset

943 hospitals, 1,829,019 patients

3.American Hospital Association Annual Survey Data

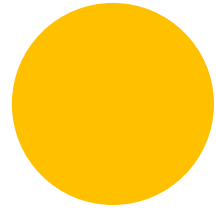
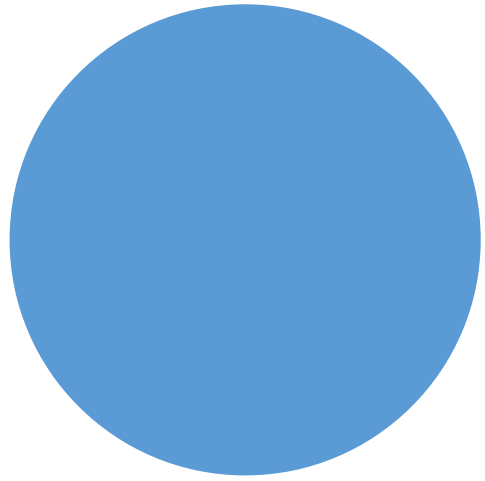


Methods

Run Logistic regressions to predict Sepsis rate and sepsis mortality rate

My Role in the Project

- 1. clean and merge raw data
- 2. Implement logistic regressions



Descriptive Analysis



Basic Demographics

636 hospitals
from 4 states

23,614
nurses

1,937,417
patients

```
. tab PSI5_sepsis
```

PSI 5.0 Sepsis as a secondary diagnosis	Freq.	Percent	Cum.
0	1,901,182	98.13	98.13
1	36,237	1.87	100.00
Total	1,937,419	100.00	

Table1: sepsis diagnose

Table 2: Sepsis Diagnose vs Death

- Death rates of sepsis in our dataset:
- $5742/36237 = 15.8\%$!!

PSI 5.0 Sepsis as a secondary diagnosis	Alive	Death	Total
0	1891942	9240	1901182
1	30495	5742	36237
Total	1922437	14982	1937419

Variables related to Nursing Condition

- 1. Nurse Staffing
- 2. Bachelor Degree
- 3. NWI: a measure of nurse working environment

Nurse staffing for each
Hospital:
Patients/Nurse

Patients/Nurse	Freq.	Percent
<4	908, 070	51.61%
4-5	6960352	39.59%
5-6	138, 025	7.84%
6-7	15,772	0. 90%
7-50	1,211	0. 07%
	1,759,430	100%

Percent of Nurse with Bachelor Degree

Percent of BS-nurse	Freq.	Percent
<10%	4,749	0.25%
10-20%	1,614	0.08%
20-30%	25,110	1.30%
30-40%	127,308	6.57%
40-50%	290,320	14.98%
50-60%	486,470	25.11%
60-70%	524,658	27.08%
70-80%	318,661	16.45%
80-90%	119,429	6.16%
90-100%	39,126	2.02%
Total	1,937,445	100%

NWI: 3 levels

NWI: 3 Categories	Freq.	Percent
0	367,900	19.40%
1	989,282	52.16%
2	539,479	28.44%
Total	1,896,661	100



Results

```
foreach resource of varlist hcat_patsrn2 pct_bsn10 NWI3 {
    logistic PSI5_sepsis `resource', cluster(chopr_hospid)
}
```

Resource	Bivariate		Fully Adjusted	
	OR	P-value	OR	P-value
Staffing	0.861	0.000	0.952	0.084
Education	1.040	0.001	.994	0.0674
Work Environment	0.981	0.505	0.947	0.023

A. The ODDS OF SEPSIS

```
logistic PSI5_sepsis hcat_patsrn2 pct_bsn10 NWI3 $pat_char $elix $base_drg
    $nurs_char $hosp_char, cluster(chopr_hospid)
```

B. The Odds of Death(from one fully adjusted model without interactions)

Resource	Bivariate		Fully Adjusted	
	OR	P-value	OR	P-value
Staffing	0.994	0.825	1.025	0.223
Education	0.098	0.362	0.945	0.00
Work Environment	0.911	0.000	0.91	0.00
Sepsis	38.56	0.000	38.91	0.000

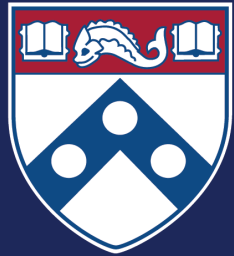
BIVARIATE		FULLY ADJUSTED		
Resources	OR	P-value	OR	P-value
Sepsis			37.25182	0.00
Staffing * Sepsis			1.11/.97/1.34/1.46 from 2-5	0.049/0.801/0.152/0.00
Sepsis			31.966	0.000
Education * Sepsis			1.01	0.545
Sepsis			35.76	0.00
Wrk.Env. * Sepsis			1.05	0.181

C...the ODDS
OF DEATH (from
three fully adjusted models,
each with one interaction

Conclusion

Administrators may improve the work environment and education

Both for sepsis and non-sepsis cases

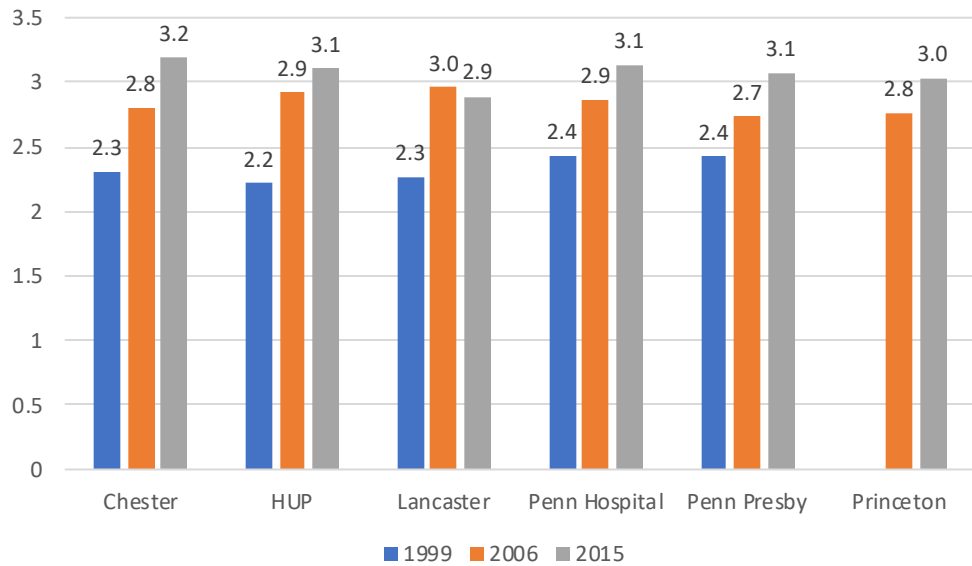


Penn Nursing

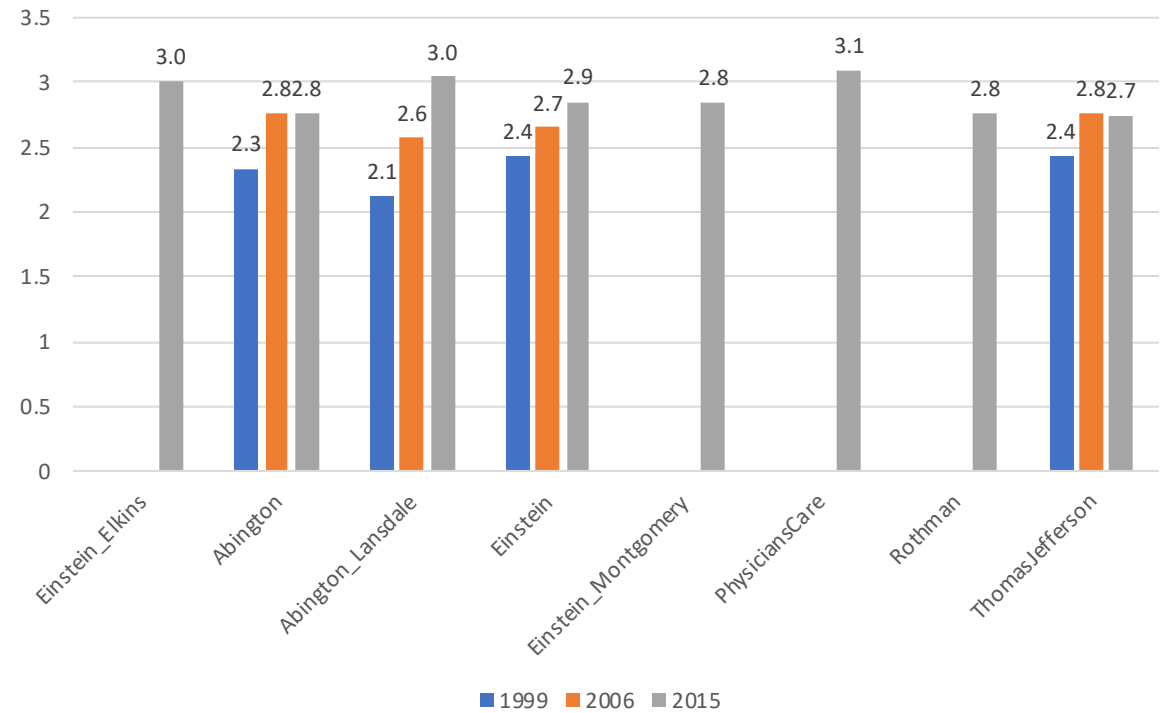
UNIVERSITY *of* PENNSYLVANIA

SCHOOL *of* NURSING

UPHS PES-NWI 1999-2016 for Penn's Hospital



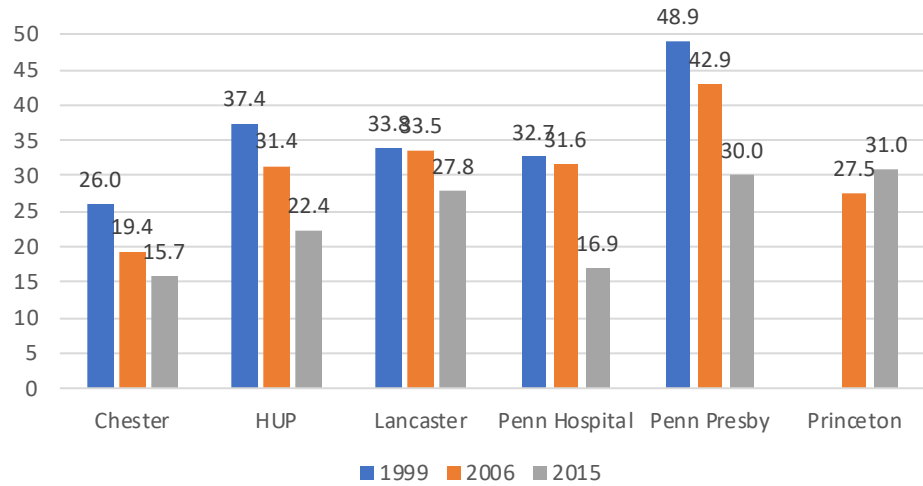
UPHS PES-NWI 1999-2016 for non-Penn's Hospital



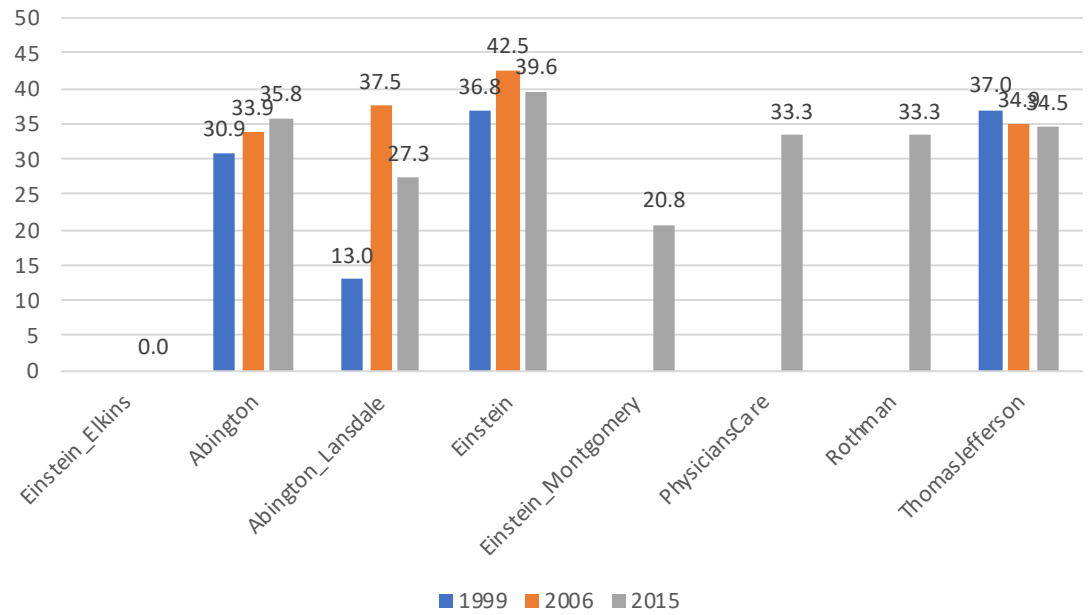
Increase for each year

NWI increase for each year.

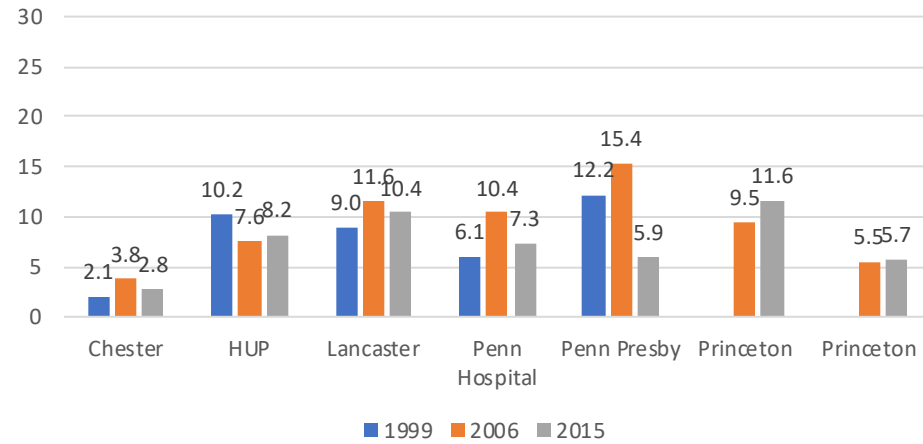
Percent Burnout for Penn's Hospital



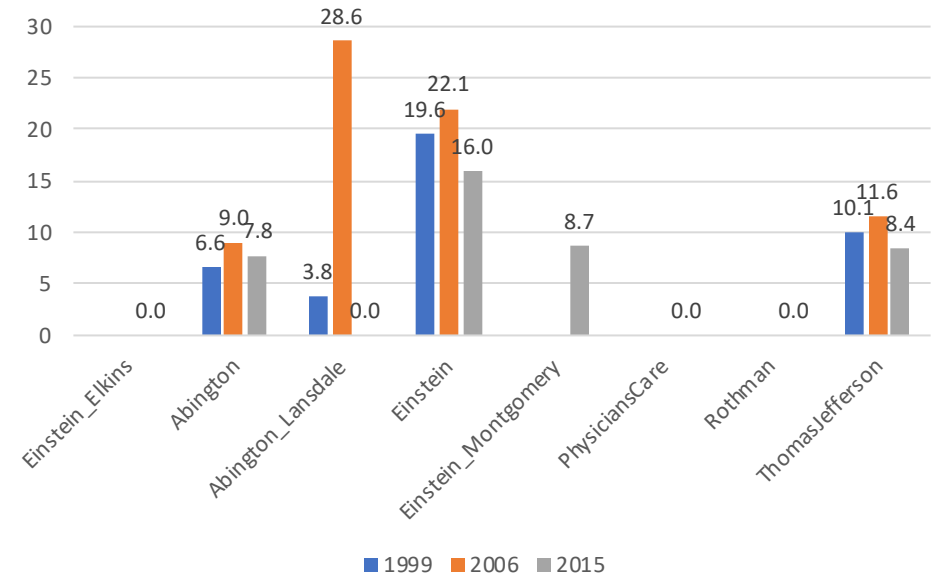
Percent Burnout for Non-Penn's Hospital



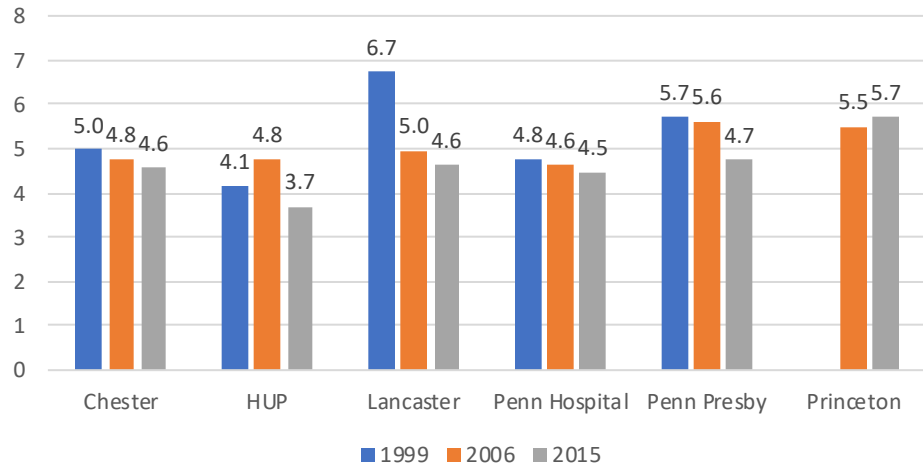
Rate quality of nursing care fair/poor for Penn's Hospital



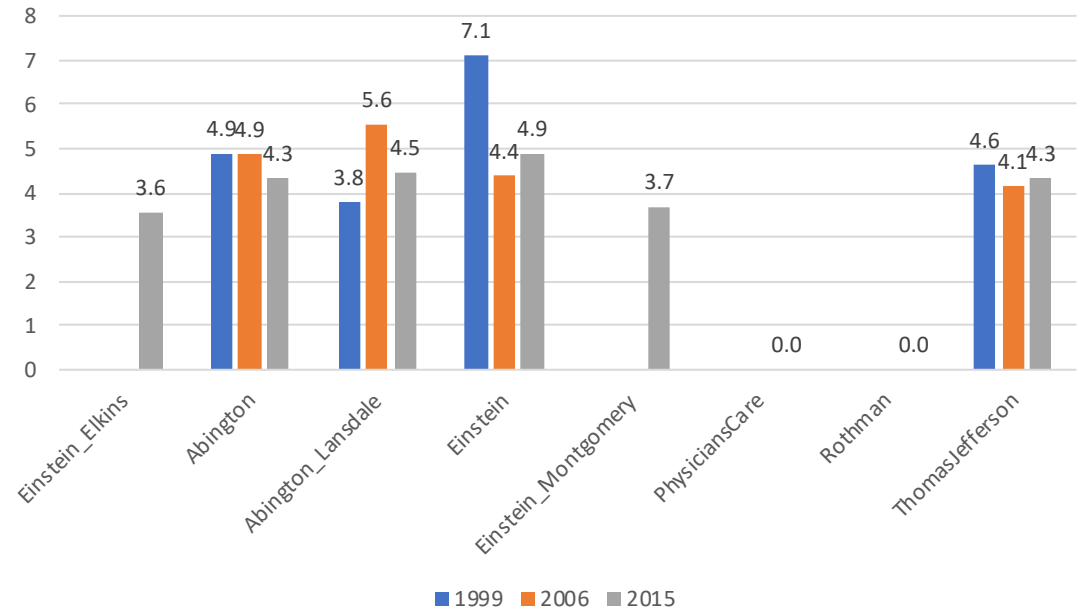
Rate quality of nursing care fair/poor for non-Penn's Hospital



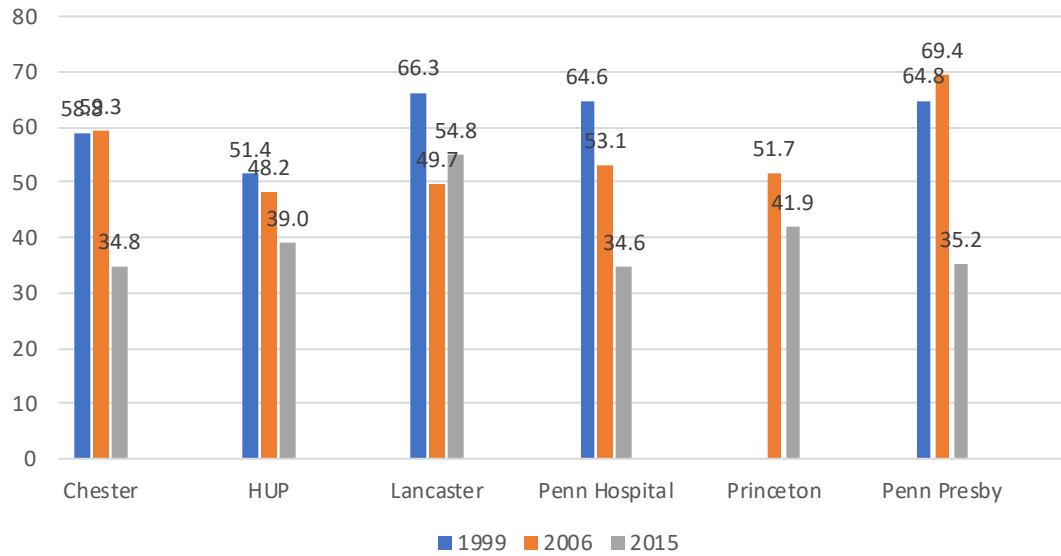
Patients per RN ratio: Penn's Hospital



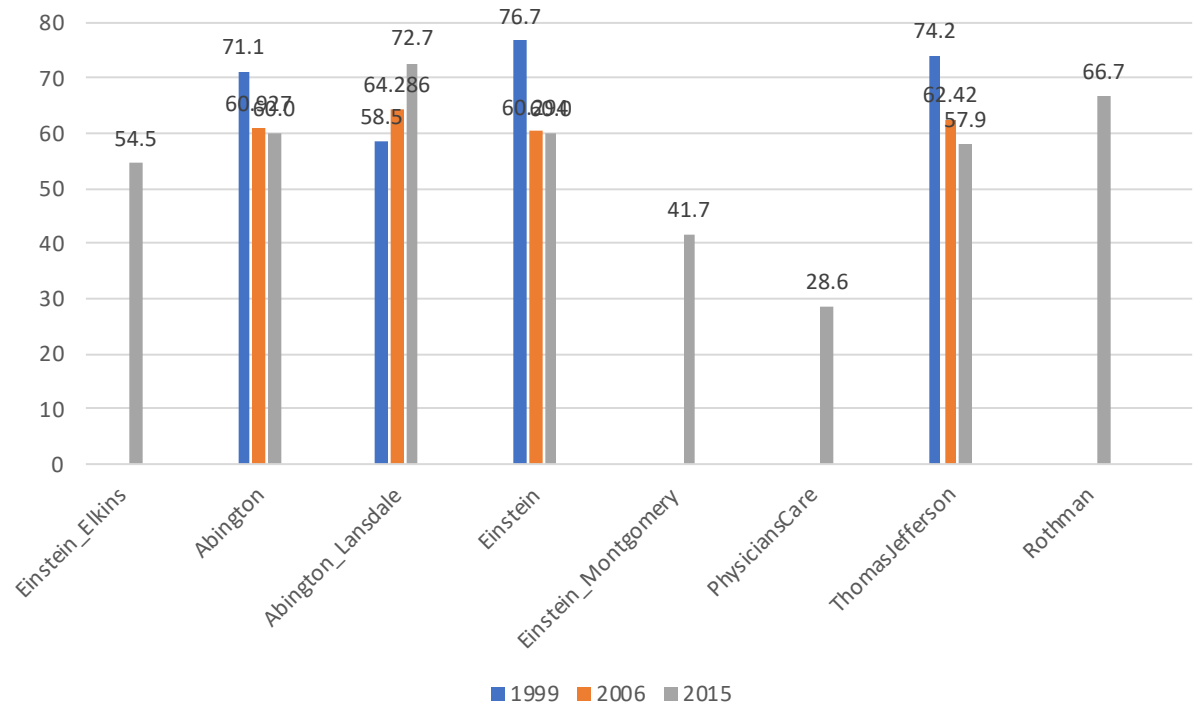
Patients per RN ratio: non-Penn's Hospital



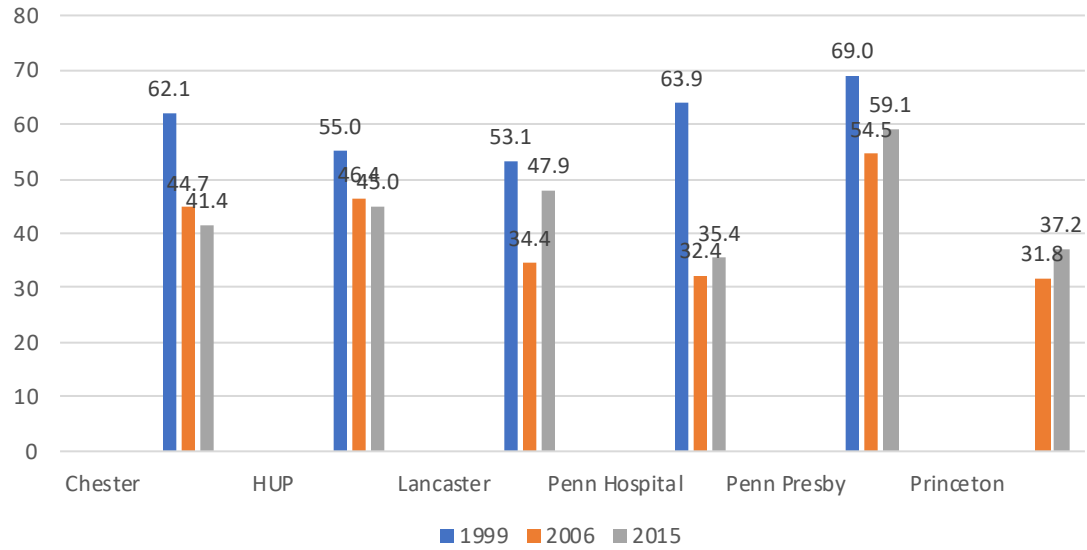
Percent Report Somewhat not Confident That Management Resolves Patient Care Prob: Penn's Hospital



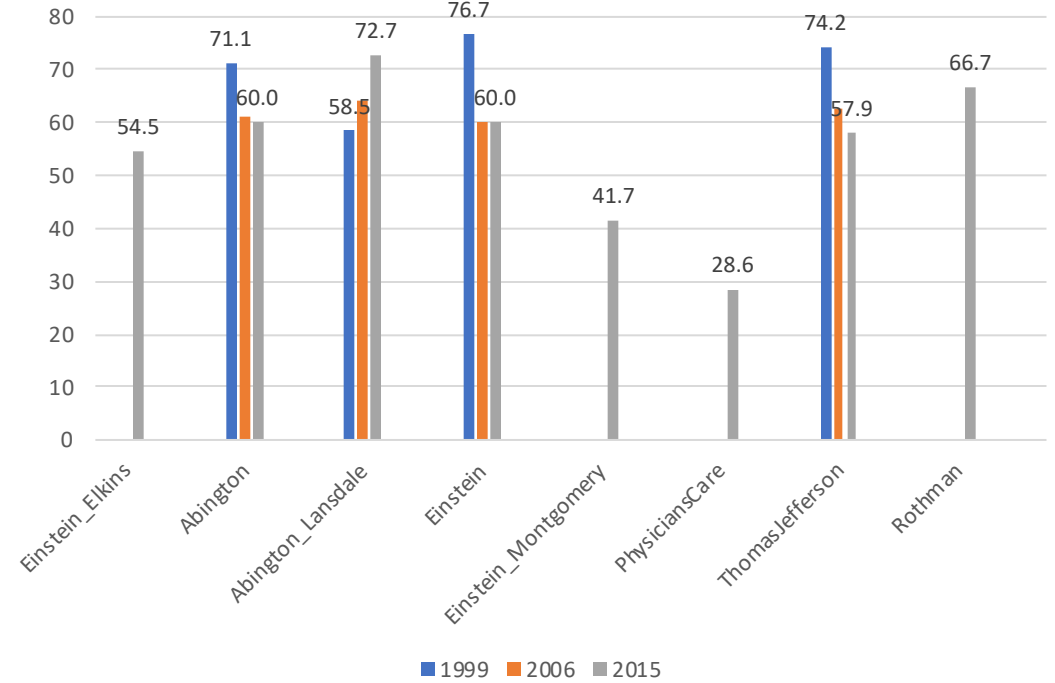
Percent Report Somewhat not Confident That Management Resolves Patient Care Prob: Non-Penn's Hospital



Percent report somewhat/not confident that patients able to manage care: For Penn's Hospital



Percent Report Somewhat not Confident That Management Resolves Patient Care Prob: Non-Penn's Hospital



Lessons Learned



Acknowledgement