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# Nurse Staffing and Quality in Rural Nursing Homes

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Rural Health Research  
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# Motivation for Study

- Rural and urban nursing homes are different
- Hospital-based and freestanding nursing homes are different
- Previous studies have mixed conclusions
- Paucity of research with rural vs. urban context



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# Study Objective

- How is the relationship between nurse staffing levels and care quality in rural nursing homes affected by hospital ownership?



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# Methods: Data

- 2011 Nursing Home Compare Data
  - Staffing and facility characteristics
  - Quality indicators
- Minimum Dataset
  - Resource Utilization Group Case Mix index for all residents admitted to a facility
- 4,825 rural nursing homes in our sample
  - 485 hospital-based (10%)
  - 4,340 freestanding (90%)



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# Outcome Measures

Individual Quality Indicators	
Long-stay	Short-stay
Pain	Pain
Pressure Sores	Pressure sores
Decline of Activities of Daily Living (ADL)	
Physician Restraints	
Catheter	
Mobility	
Urinary Tract Infections	



# Outcome Measures

Individual Quality Indicators	
Composite Quality Scores	Average of long-stay measures (reporting 3 or more measures)
	Average of short-stay measures (reporting any measure)
Health / Complaint Inspections	Total deficiencies
	Total actual harms
	Total minimal or potentially-actual harms
	Weighted total harms



# Statistical Methods

- Multivariate, ordinary least-squares models
  - Long-stay and short-stay quality measures
  - Weighted total harms
- Negative binomial-regression models
  - Health/complaint inspections



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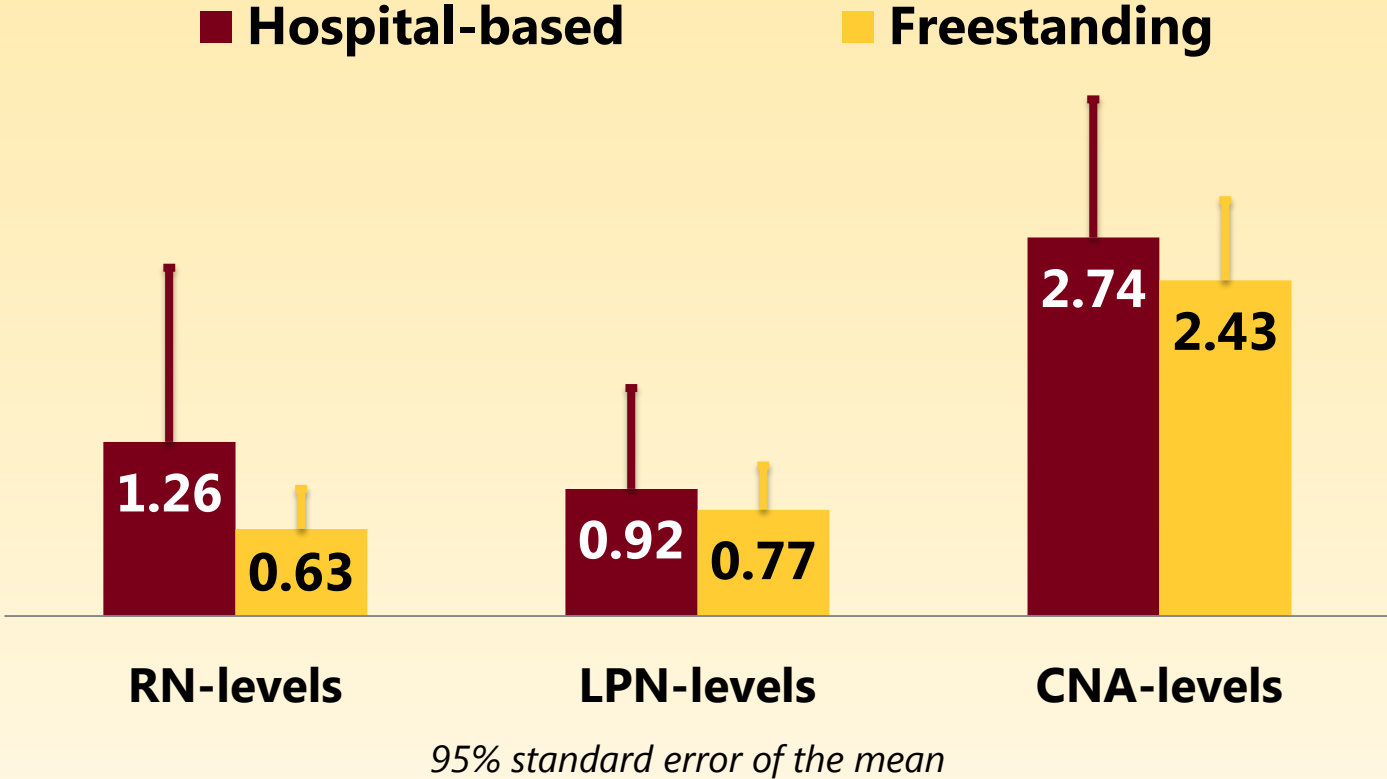
# Methods: Explanatory Variables

Primary	Nurse Staffing Levels
	Nursing Home Structure
Secondary / Other	Facility Operational Characteristics
	Facility Structure Characteristics
	State Fixed Effects

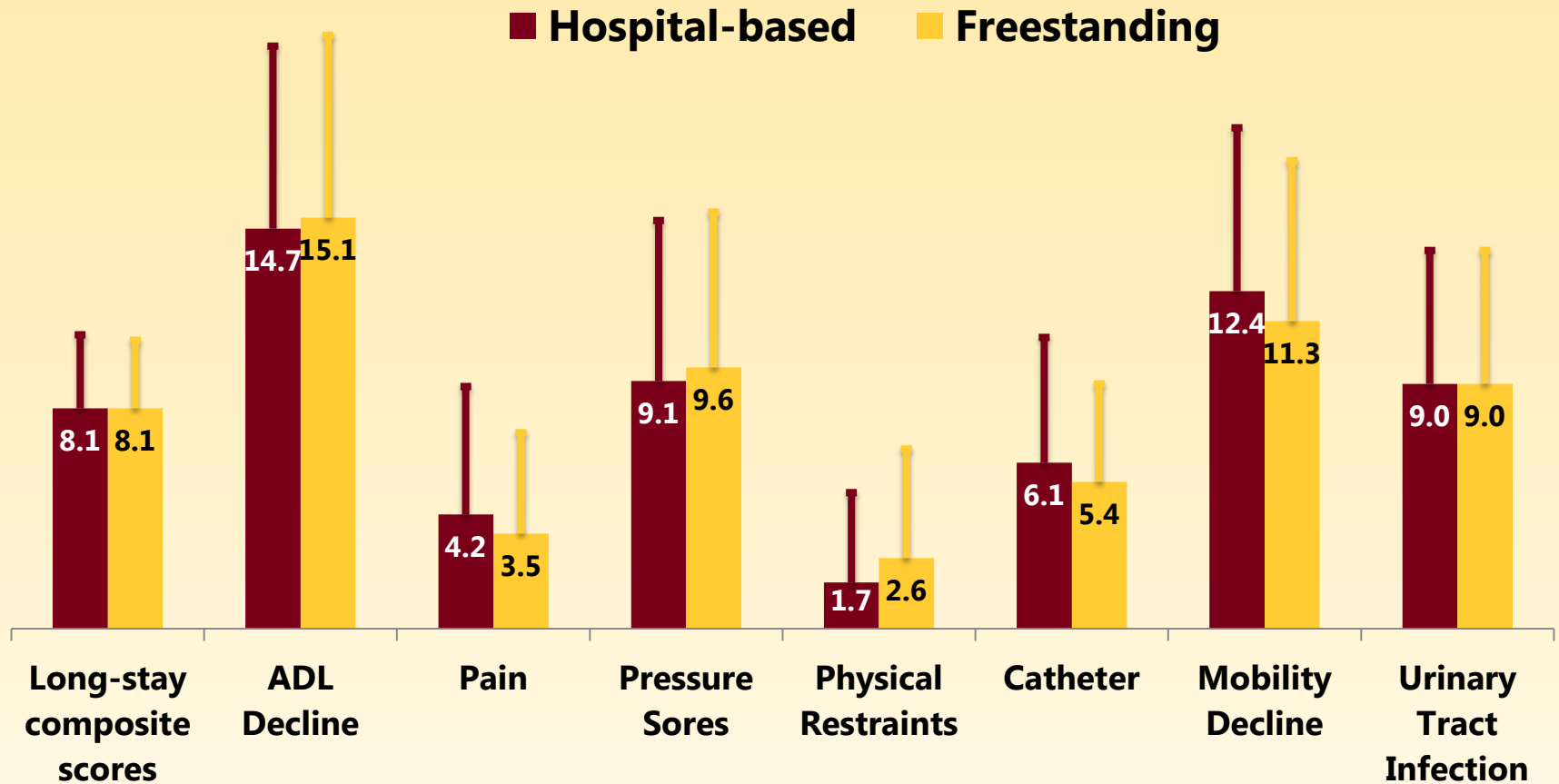




# Nurse Hours per Resident Day



# % of Long-Stay Residents with Outcome Measures



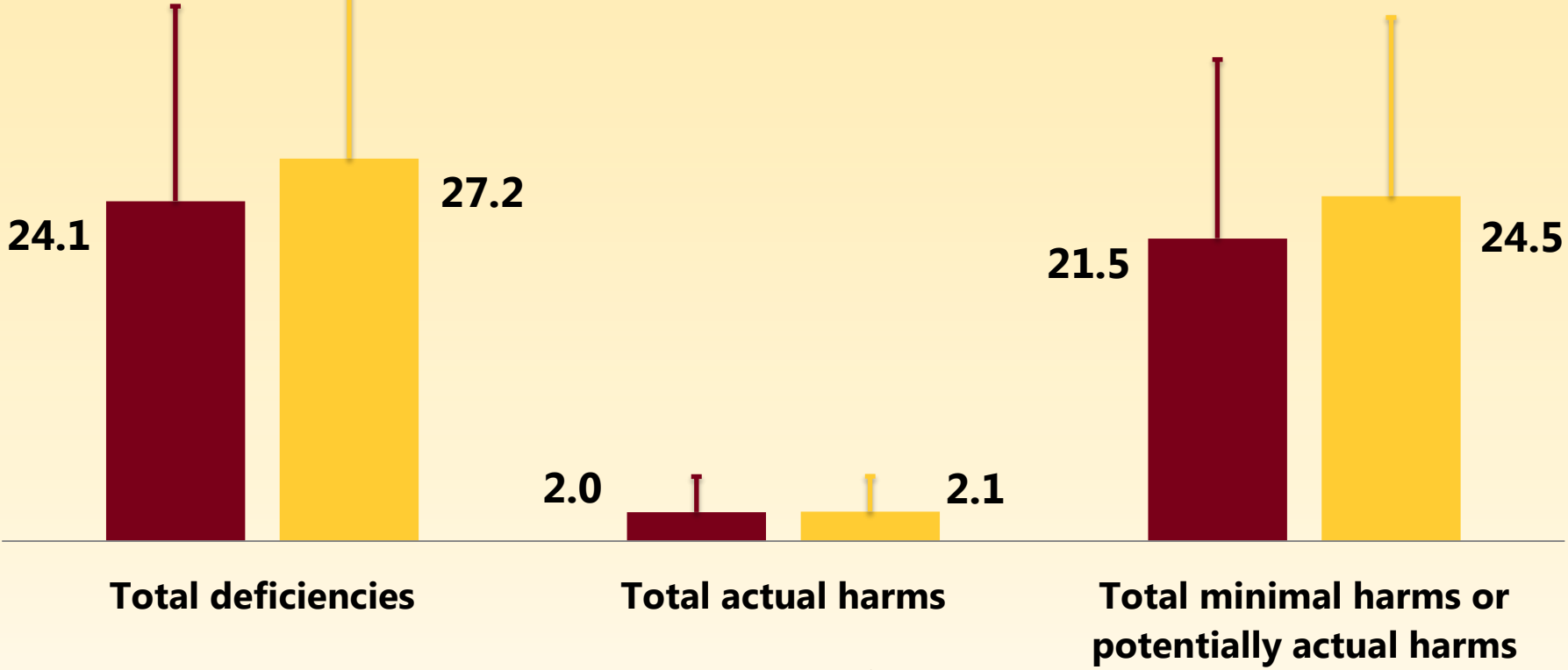
*95% standard error of the mean*



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# Health / Complaint Inspections

■ Hospital-based ■ Freestanding



*95% standard error of the mean*



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# Results: Quality Outcome Measures

(Higher is better)	Hospital-Based (vs. Freestanding)	RN-levels	LPN-levels	CNA-levels
Long-stay composite scores	<b>-0.415***</b>	-0.211	<b>-0.599***</b>	-0.1
ADL Decline	0.194	-0.072	<b>-1.053***</b>	-0.145
Pain	-0.202	<b>-0.735**</b>	<b>-0.710***</b>	
Pressure Sores	<b>-1.176**</b>	<b>-0.779*</b>	<b>-0.955**</b>	<b>-0.353*</b>
Physical Restraints	<b>0.496**</b>	0.465	0.317	
Catheter	<b>-1.208***</b>	<b>-0.714*</b>	<b>-0.665*</b>	0.024
Mobility Decline	-0.501	-0.71	<b>-0.706*</b>	-0.327
Urinary Tract Infection	-0.158	-0.171	<b>-1.354***</b>	-0.202
Short-stay composite scores	<b>-1.807***</b>	<b>-2.083***</b>	<b>-1.551***</b>	0.219
Pain	<b>-3.032**</b>	<b>-3.711***</b>	<b>-2.996***</b>	0.288
Pressure Sores	<b>-2.018***</b>	-0.559	<b>-0.970**</b>	0.153

\*p<0.05 \*\*p<0.01 \*\*\*p<0.001



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# Results: Health/Complaint Inspections

<b>(Higher is worse)</b>	Hospital-Based (vs. Freestanding)	RN-levels	LPN-levels	CNA-levels
Total deficiencies	<b>1.645*</b>	<b>-4.930***</b>	<b>-3.430***</b>	-0.408
Total actual harms	<b>0.120*</b>	<b>-0.167***</b>	<b>-0.163***</b>	0.004
Total minimal harms or potentially actual harms	<b>0.168*</b>	<b>-0.176***</b>	0.063	<b>-0.07*</b>
Weighted total harms	<b>0.135*</b>	<b>-0.397***</b>	<b>-0.247***</b>	-0.026

\*p<0.05 \*\*p<0.01 \*\*\*p<0.001



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# How Stratified Results Differ

- In *hospital-based* nursing homes:
  - One unit RN-level is correlated with 3% less ADL decline prevalence rate and 4.7% fewer deficiencies.
  - RN-levels show no associations with other outcome measures.



# How Stratified Results Differ

- In *freestanding* nursing homes:
  - RN-levels and LPN-levels are positively (worse) correlated with most quality outcomes.
  - More CNA-levels are correlated with less pressure sores.
  - One unit increase of RN-levels is associated with 4 fewer deficiencies.



# Summary

- Relationships between staffing and quality in rural nursing homes vary by hospital-affiliation and quality measures.
- Nurse staffing in rural nursing homes ***negatively*** correlates with most quality outcome measures.



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# Summary (cont.)

- Nurse staffing levels were ***negatively*** associated with deficiencies in both rural hospital-based and freestanding nursing homes.
- When nursing homes were stratified by hospital-affiliation, RN-staffing levels in rural hospital-based facilities had ***more optimal*** association with quality than in freestanding facilities.



# Limitations

- Relatively fewer hospital-based rural nursing homes than freestanding nursing homes in the sample.
- Cross-sectional study design limits the ability to draw causal conclusions on relationships between staffing and quality.
- Lack of individual resident-level data.



# Conclusions

- The relationship between nurse staffing and quality in rural nursing homes varies depending on the quality measures used.
- RN staffing did not always have a positive relationship with quality in rural nursing homes.



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