Unstable Staffing, Unsafe Care: The Link Between Overtime, Agency Nurses, and Patient Outcomes

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The Question That Drove Our Research

The Gap

Hospitals have spent billions on **overtime and agency nurses**—a number that rose rapidly throughout the pandemic—yet **little data** exists on the **return, or the risk, of this investment.**

Our Central Question

Is there a measurable, systematic relationship between these temporary staffing strategies and adverse patient events? And if so, at what point does it become dangerous?

How We Answered the Question

Design

A retrospective, longitudinal quality improvement study.

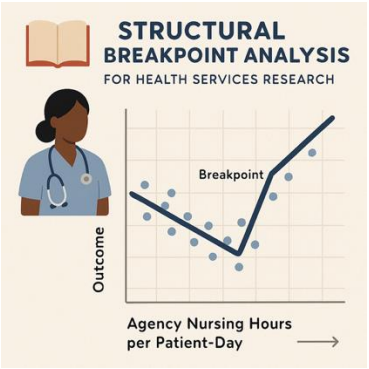
Dataset

Premier Inc. Research Database

- 70 Hospitals
- 4 years of data – 2019-2022
- Daily report on outcomes and utilization.
- Biweekly payroll-based staffing reports

Methodology

- Poisson regression for patient count outcomes adjusted for patient mix through expected counts
- Structural breakpoint analysis were used to identify safety thresholds.



Finding #1: The Potential Risk of Overtime and Agency Staffing

Table 4. Baseline Regression Model Outcomes on Primary Outcomes in Hospitals[a]

	Pressure ulcers		Postoperative hemorrhage or hematoma	
Variable	IRR (95% CI)	*P* value	IRR (95% CI)	*P* value
RN or LPN work HPPD	0.96 (0.85-1.1)	.62	0.99 (0.9-1.1)	.90
RN or LPN overtime HPPD	2.26 (0.55-9.30)	.25	1.38 (0.42-4.47)	.59
RN or LPN agency HPPD	1.80 (1.16-2.78)	.008	1.46 (1.02-2.08)	.03
NAP work HPPD	2.75 (1.51-5.01)	<.001	0.61 (0.33-1.12)	.11
Intercept	0.45 (0.3-0.67)	<.001	1.03 (0.77-1.37)	.86

Abbreviations: HPPD, hours per patient per day; IRR, incidence rate ratio; LPN, licensed practical nurse; NAP, nurse assistive personnel; RN, registered nurse.

[a] This table shows coefficient estimates obtained from our baseline regression model that control for NAP total HPPD, hospital acute beds, percentage of the hospital census with COVID-19, COVID-19 waves, and the interactions between the percentage of hospital census attributed to COVID-19 and the distinct COVID-19 waves. Covariates include number of hospital beds, percentage hospital census with COVID-19, COVID-19 waves, and the interactions between percentage of patients with COVID-19 and COVID-19 waves.

Finding #1: The Potential Risk of Overtime and Agency Staffing

Table 3. Independent and Outcome Variables Across COVID-19 Phases

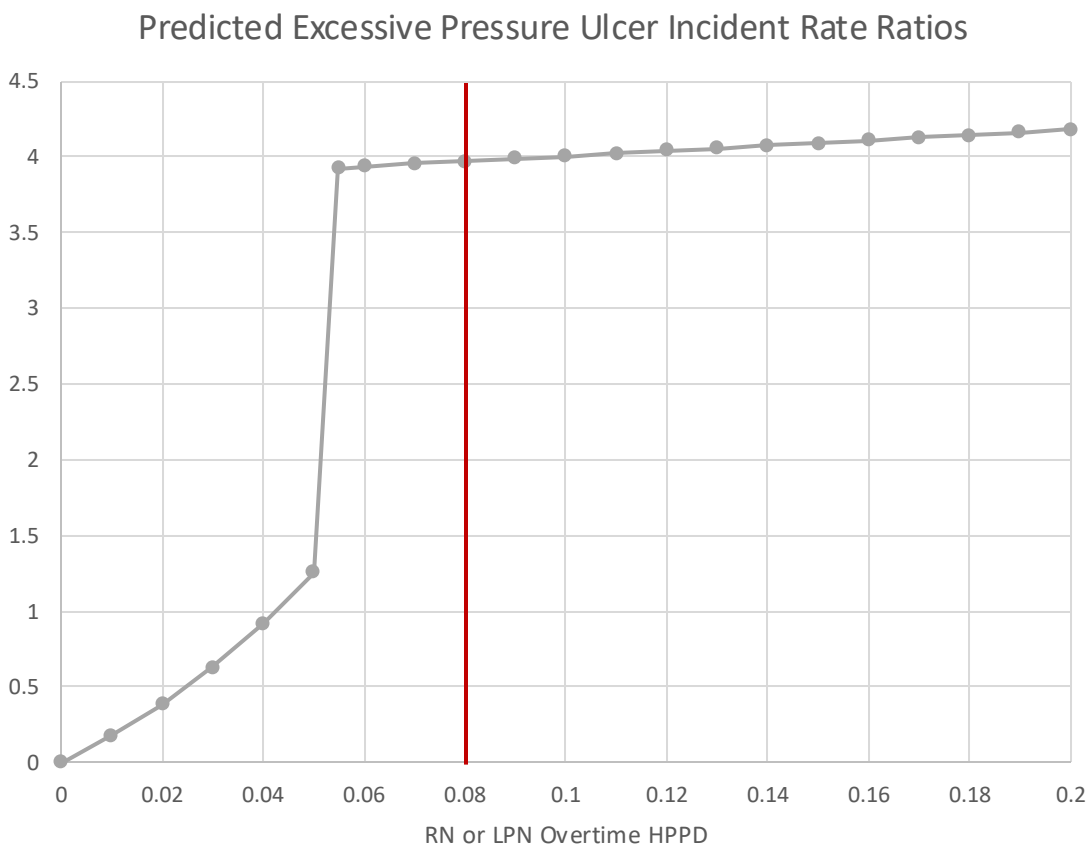
Variables	Mean (SD)			
	Pre-COVID-19 (January 1, 2019, to March 31, 2020)	Wave 1 (April 1, 2020, to September 30, 2020)	Wave 2 (October 1, 2020, to March 31, 2021)	Wave 3 (April 1, 2021, to December 31, 2022)
Independent variables				
Hours per patient day[a]				
RN or LPN total	2.50 (1.22)	2.79 (1.42)	2.04 (1.21)	1.69 (1.27)
RN or LPN overtime	0.09 (0.08)	0.09 (0.08)	0.10 (0.09)	0.08 (0.09)
RN or LPN agency	0.06 (0.22)	0.09 (0.33)	0.08 (0.22)	0.11 (0.24)
NAP total[b]	0.14 (0.22)	0.17 (0.27)	0.11 (0.17)	0.10 (0.15)
Acute beds, No.	248.47 (201.37)	246.06 (201.60)	249.99 (202.01)	258.37 (200.00)
Hospital COVID-19 census, %	0.09 (0.42)	9.41 (8.97)	19.81 (8.59)	13.29 (9.36)
Outcome variables, No. of cases/1000 discharges				
Pressure ulcer	0.86 (1.57)	0.52 (1.18)	0.90 (1.74)	1.32 (3.45)
Perioperative hemorrhage or hematoma	1.35 (2.50)	1.13 (2.19)	1.30 (2.28)	1.29 (2.18)
Iatrogenic pneumothorax	0.29 (0.63)	0.30 (0.57)	0.22 (0.54)	0.27 (0.59)
In-hospital fall with hip fracture	0.12 (0.36)	0.11 (0.31)	0.16 (0.40)	0.13 (0.38)
Postoperative physiologic and metabolic derangement	0.39 (0.90)	0.21 (0.55)	0.24 (0.60)	0.27 (0.69)
Postoperative respiratory failure	2.04 (3.84)	1.43 (2.77)	1.57 (2.66)	1.53 (2.82)
Perioperative pulmonary embolism or deep vein thrombosis	1.67 (2.78)	1.59 (2.50)	1.60 (2.86)	1.84 (3.01)
Postoperative sepsis	1.01 (2.05)	0.81 (1.81)	0.96 (1.96)	0.95 (1.93)
Postoperative wound dehiscence	0.23 (0.58)	0.25 (0.63)	0.18 (0.60)	0.23 (0.70)
Accidental puncture or laceration	0.35 (0.81)	0.35 (0.85)	0.39 (0.82)	0.55 (1.10)

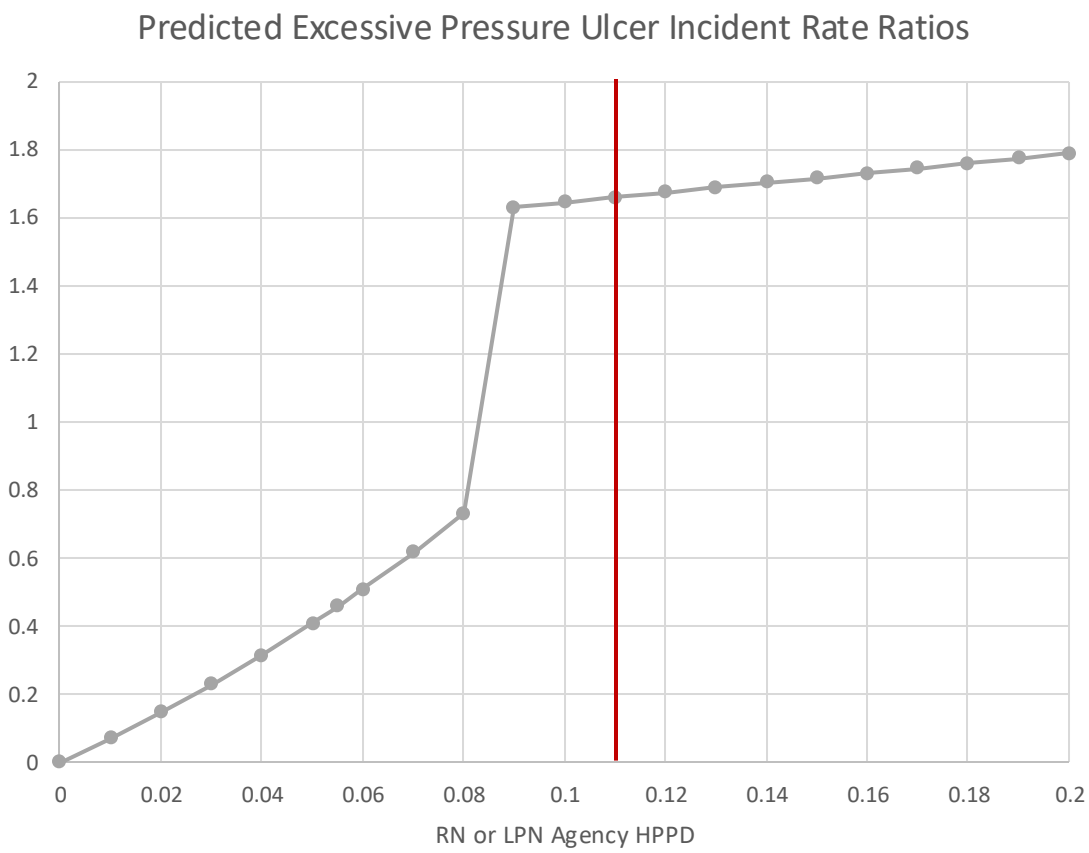
Abbreviations: LPN, licensed practical nurse; NAP, nurse assistive personnel; RN, registered nurse.

[a] These data are the summation of RN and LPN total, overtime, and agency hours per patient day.

[b] NAP total hours per patient day encompasses the sum of normal, overtime, and agency hours per patient day for NAPs.

Findings #2: The "Tipping Point"





Conclusion

- Our studies provide some evidence that chronic reliance on overtime and agency nurses is an unsafe and unsustainable strategy for staffing our nation's hospitals.
- Our recommendation:
  - The focus must pivot from recruitment to **retention**. We need to invest in creating work environments that make permanent staff want to stay.

Future Directions

- A larger scale national sample would enhance the statistical power of and generalizability our analysis.
- Can we define the "breakpoint" threshold for different hospital types (e.g., academic vs. community)?
- What specific retention strategies have the highest impact on reducing the need for temporary staff?
- How does the patient experience and perception of care change under these different staffing models?

Thank you!

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