



Clinical Staff Retention and Leadership Stability and Antibiotic Utilization in Nursing Homes

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Abstract

Background: Antibiotic utilization in skilled nursing facilities (SNFs) varies widely and the factors responsible for this variation remain poorly understood. Staff retention and leadership stability in SNFs have been associated with a number of important resident and facility outcomes but the relationship to antibiotic utilization has not been examined previously. Data collected as part of an ongoing study of an antibiotic stewardship intervention in SNFs in two states provided an opportunity to explore the relationship between these facility characteristics on baseline antibiotic utilization in SNFs participating in this study.

Methods: 12 months of pre-intervention data on antibiotic use were abstracted from pharmacy records in 9 SNFs in Wisconsin and Pennsylvania. Baseline SNF characteristics were collected. The analysis focused on four clinical nursing variables: (1) director of nursing stability (1 = tenure > 5 years); (2) RN & LPN retention (1 = retention >= median of 79.5% of staff still employed after one year); (3) CNA retention (1 = retention >= median of 77.3% of staff still employed after one year); and full-time infection preventionists [IP] (1 = works 50% of time or more). Measures of overall antibiotic utilization, including antibiotic starts (AS) and days of therapy (ADT) per 1,000 resident days, were calculated for each SNF over a 12-month pre-implementation period. A generalized linear model (GLM) repeated measures analysis explored the differences for the dichotomous variables where 1 is a Yes response.

Results: GLM analysis results shown in the table below indicate that SNFs with a full time IP had significantly fewer ADT and fewer AS with higher RN/LPN retention. Antibiotic Starts (AS) Antibiotic Days of Therapy (ADT) DON Leadership Stability ($\mu = 0.74, p=0.37$) ($\mu = 3.85, p=0.66$) RN/LPN Retention ($\mu = -1.53, p=0.04$) ($\mu = -13.62, p=0.11$) CNA Retention ($\mu = -0.55, p=0.53$) ($\mu = -11.44, p=0.20$) Full time IP ($\mu = -1.44, p=0.051$) ($\mu = -15.75, p=0.04$)

Conclusion: Our study shows that RN/LPN staff retention and having an IP, who spends 50% or more of their time on infection control activities are associated with lower rates of antibiotic use in SNFs. Future studies should examine how these attributes exert influence on provider antibiotic decision-making. Nevertheless, our results suggest that ongoing efforts to improve staff retention, if successful, will positively impact the quality of antibiotic prescribing in SNFs.

Understanding the Problem

Influence of Nursing Home Structure on Quality in Nursing Homes

- Relationship between staffing levels (e.g., RN, LPN, CNA) and clinical as well as process outcomes is mixed.^{1,2}
- Evidence suggests that
 - Lower nurse aid turnover and higher retention is associated with lower pressure ulcer incidence rates.³
 - NH administrative tenure (< 1 year vs. 15+ years) is associated with a two fold increase of having higher total number of deficiencies.⁴
 - NH Director of Nursing tenure (< 1 year vs. 15+ years) is associated with a four-fold increase in the likelihood of having severe deficiencies.⁴
 - Part-time infection control practitioner is associated with lower indwelling UTI catheter use.⁵

Nursing may play an important role in Antibiotic Stewardship

- Recently updated nursing home regulations emphasize an interdisciplinary approach to antibiotic stewardship.⁶ Though limited in number, hospital base studies suggest an important role of nursing staff in reducing UTI rates.^{7,8}

To our knowledge, no studies provide evidence of the impact of nursing structural characteristics on antibiotic utilization in NHs.

Methodological Approach

Sample Size: 9 Nursing Homes participating in a recently completed Nursing Home Antibiotic Stewardship intervention.

Outcomes: Number of antibiotic starts and days of treatment per 1,000 resident days over a 12 month pre-intervention period.

Independent Variables: Focused on leadership stability, infection control practitioner and staff retention (see Table).

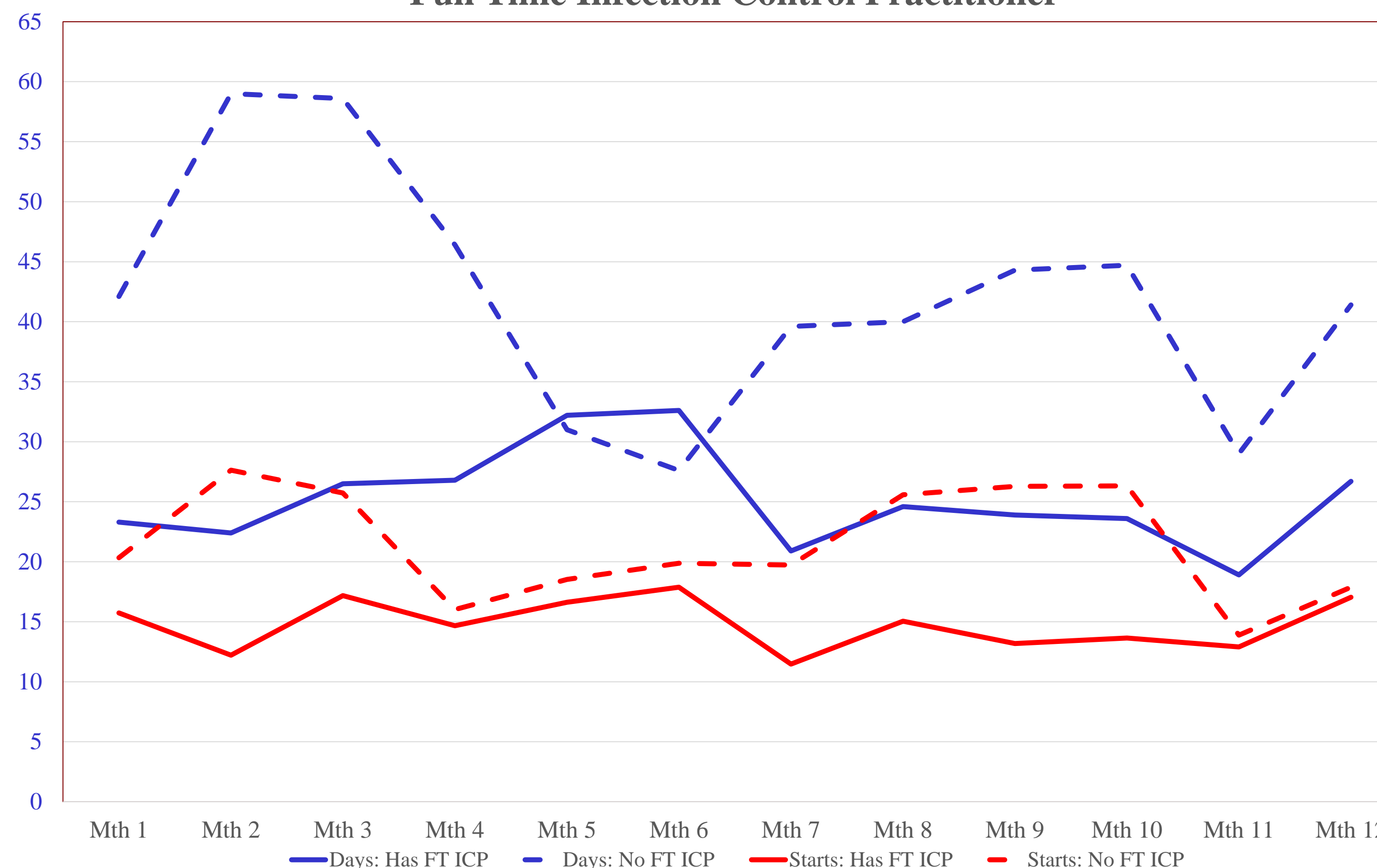
Analytical Approach: GLM repeated measures to explore differences between dichotomous variables.

Results

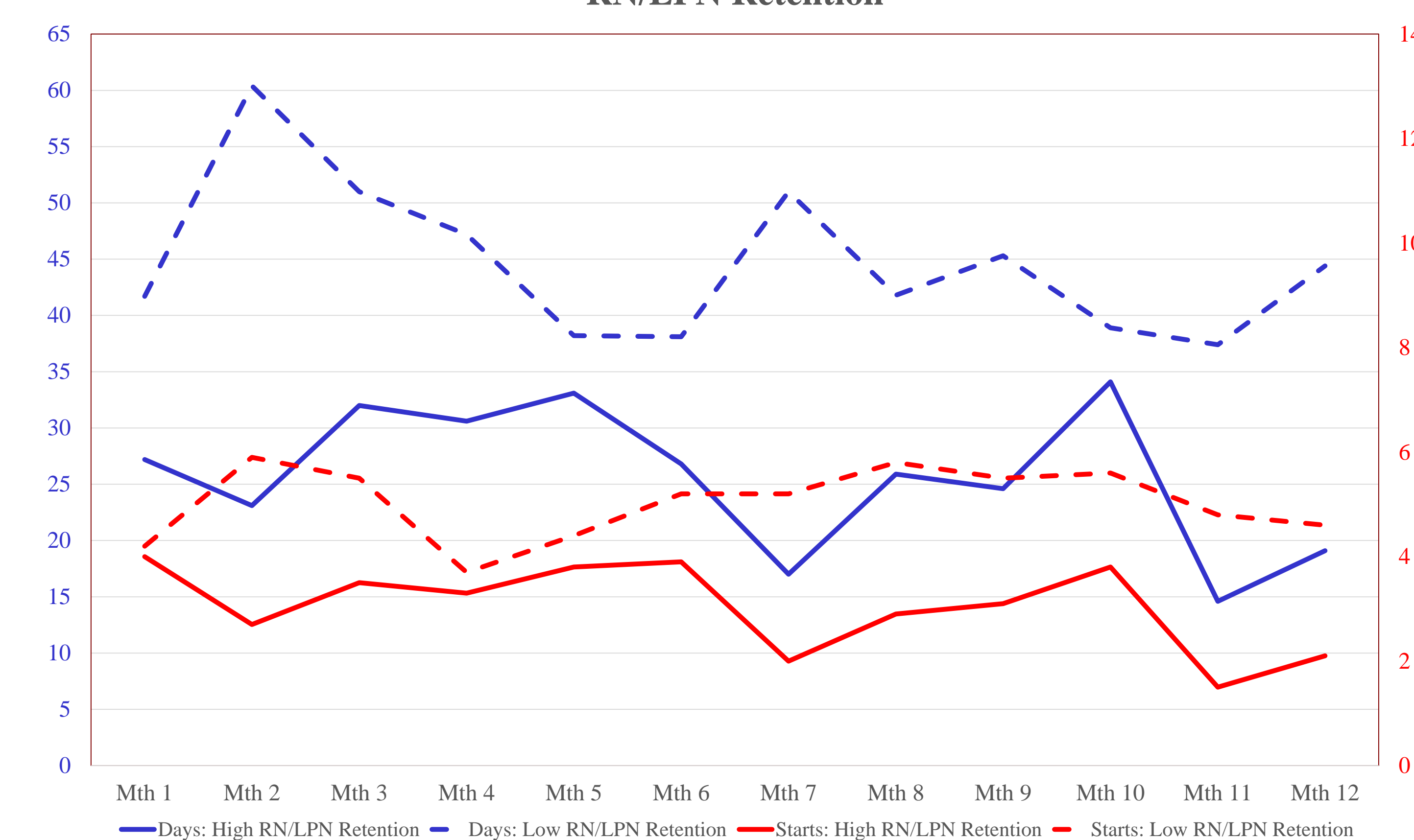
Independent Variable	Definition	Number of Cases			Antibiotic Starts per 1,000 Resident Days			Days of Treatment per 1,000 Resident Days		
		Yes	No	Missing	Yes	No	P-Value	Yes	No	P-Value
Leadership Stability										
Administrative Leadership	Only 1 in past five years	5	4	0	3.7	3.6	0.90	29.2	32.8	0.68
Director of Nursing	Only 1 in past five years	3	6	0	4.2	3.4	0.37	33.2	29.6	0.69
Medical Director	Only 1 in past five years	7	2	0	3.5	4.2	0.47	29.0	37.0	0.44
Director of Nursing and MD	Only 1 in past five years	3	6	0	4.2	3.4	0.37	33.2	29.6	0.69
Infection Preventionists										
Full Time IP	Works 50% of the time or more	6	3	0	3.2	4.6	0.05	25.2	41.9	0.03
Stable IP	Been at Nursing Home 2 or more years	4	5	0	3.3	4.1	0.32	28.5	33.6	0.56
Staff Retention (Employed after 1 Year)										
RN and LPN (Median)	Greater than or equal to Median of 79.5%	3	4	2	3.0	5.0	0.001	25.7	44.6	0.01
RN and LPN (Mean)	Greater than or equal to Mean of 78.8%	3	4	2	3.0	5.0	0.001	25.7	44.6	0.01
RN (Median)	Greater than or equal to Median of 71.5%	3	4	2	3.5	4.4	0.35	26.7	43.3	0.05
RN (Mean)	Greater than or equal to Mean of 70.1%	5	2	2	3.4	5.0	0.10	28.3	47.6	0.03
LPN (Median)	Greater than or equal to Median of 87.6%	4	4	1	3.0	4.5	0.04	25.7	38.1	0.16
LPN (Mean)	Greater than or equal to Mean of 86.9%	4	4	1	3.0	4.5	0.04	25.7	38.1	0.16
CNA (Median)	Greater than or equal to Median of 77.3%	4	4	1	3.5	4.0	0.53	26.7	37.1	0.25
CNA (Mean)	Greater than or equal to Mean of 72.4%	5	3	1	3.4	4.3	0.30	28.2	38.0	0.31

Green highlighted results were marginally significant

Antibiotic Starts and Days per 1,000 Resident Days: Full Time Infection Control Practitioner



Antibiotic Starts and Days of Treatment per 1,000 Resident Days: RN/LPN Retention



Impact and Limitations

- Higher NHs staff retention is significantly associated with lower antibiotic starts and days of treatment per 1,000 resident days.
- NHs with an IP working more than > 20 hours per week have significantly lower antibiotic days of treatment per 1,000 resident days.
- Given the observed association between antibiotic use and the presence of a full time IP, NHs should consider ensure antimicrobial stewardship is the major role (>50%) of the IP.
- Limitations include small sample size (n=9), missing retention data and data reporting on the organizational profile by NH administrator or champion which may create a normative influence on the findings.

Next Steps

While we found an associations between nursing staff characteristics and antibiotic stewardship outcomes, this study was not designed to identify the mechanism by which nursing staff structure may influence antibiotic stewardship. Future research should seek to answer the following questions:

- What are the mechanisms by which nursing structure impacts NH antibiotic utilization?
- What is the likelihood that NHs with these structural staffing characteristics will respond more favorably to antibiotic stewardship interventions?

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