

# Staffing Trends in Magnet and Non-Magnet Hospitals After State Legislation

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## ABSTRACT

**Background:** Evidence suggests that Magnet and non-Magnet hospitals differ with respect to quality of care.

**Purpose:** Our study examined registered nurse (RN) staffing over time in Magnet and non-Magnet hospitals using unit-level, publicly available data in New Jersey.

**Methods:** A secondary analysis of longitudinal RN staffing data was conducted using mandated, publicly reported data of 64 hospitals representing 12 nursing specialties across 8 years (2008-2015). Staffing ratios were trended over time to compare RN staffing changes in Magnet and non-Magnet hospitals.

**Results:** Staffing was comparable in Magnet and non-Magnet hospitals for 9 of 12 specialties. On average, from 2008 until 2015, RN staffing slightly increased, with a greater percent increase in Magnet hospitals (6.9%) than in non-Magnet hospitals (4.7%).

**Conclusions:** Over 8 years in New Jersey, RN staffing improved in Magnet and non-Magnet hospitals. Although there was a slight increase for Magnet hospitals, there was no meaningful difference in staffing for all 12 specialties.

**Keywords:** hospitals, Magnet hospitals, nursing specialties, registered nurses, staffing

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*Funding has been received to complete this work from the Agency for Healthcare Research and Quality (AHRQ) (1K08HS024339-01A1) Mentored Clinical Scientist Research Career Development Award. Funding was also received for Ms Riman from the National Institute of Nursing Research (NINR) "Advanced Training in Nursing Outcomes Research" (T32-NR-007104, Linda Aiken, PI).*

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*The authors declare no conflicts of interest.*

*Supplemental digital content is available for this article. Direct URL citations appear in the printed text and are provided in the HTML and PDF versions of this article on the journal's Web site ([www.jncqjournal.com](http://www.jncqjournal.com)).*

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*Accepted for publication: February 3, 2020*

*Published ahead of print: March 5, 2020*

*DOI: 10.1097/NCQ.0000000000000479*

Seminal studies have shown that higher levels of nurse staffing are associated with improved patient outcomes and lower mortality rates.<sup>1,2</sup> In one of the largest reviews, researchers found that lower registered nurse (RN) staffing impacts patient safety in acute care hospitals.<sup>3</sup> Based on the consistency of the evidence, nurse staffing is included among quality indicators focusing on nursing resources.<sup>4</sup> After decades of research, it is widely accepted that appropriate nurse staffing, in conjunction with a healthy work environment, is associated with high-quality patient care.

Magnet recognition, which recognizes hospitals for having high-performing work environments, has also been linked to high-quality patient care; yet, these associations are inconsistent. In a systematic review of 10 studies of Magnet hospitals, researchers attempting to empirically determine whether Magnet hospitals have better patient and nurse outcomes found mixed results.<sup>5</sup> Evidence in support of high-quality patient care for Magnet hospitals includes a national study of the National Database of Nursing Quality Indicators, in which researchers found that Magnet hospitals had lower patient falls,

lower catheter-associated urinary tract infections, and lower central line-associated bloodstream infections than non-Magnet hospitals.<sup>6</sup> Also, Medicare inpatient claims researchers found that patients treated in Magnet hospitals were 7.7% less likely to experience mortality and 8.6% less likely to die after postoperative complications than patients treated in non-Magnet hospitals.<sup>7</sup> However, other work has found the opposite effect. For example, Magnet hospitals performed worse on nationwide quality metrics including the Hospital-Acquired Condition Reduction Program, with no significant difference between hospital type and Hospital Value-Based Purchasing and Hospital Readmissions Reduction Program penalties.<sup>8</sup> Furthermore, nurse leaders are cognizant that achieving Magnet recognition is an expensive endeavor, a for-profit enterprise, and often reserved for those hospitals with the resources to apply.

Some evidence suggests that RN staffing is part of the causal chain linking Magnet status to improved quality; however, those associations are also inconsistent. In an examination of 132 Magnet hospitals matched to 264 non-Magnet hospitals, researchers found that the mean RN staffing rate per bed was 23% higher in Magnet hospitals than in non-Magnet hospitals.<sup>9</sup> Likewise, certain researchers found that RN staffing was higher in non-Magnet hospitals with fewer adverse effects, including central line infections, sepsis, and metabolic derangements.<sup>10</sup> The importance of staffing to quality care is integral to the review process for Magnet recognition. For that reason, to achieve Magnet status, nurse leaders need to demonstrate that structures are in place to ensure adequate staffing<sup>11</sup> and can benchmark performance on this quality indicator against peer facilities.<sup>12</sup>

When critiquing and evaluating staffing research, the methodological limitations of the data sources the researcher uses should be noted. Early researchers designed their studies by using cross-sectional surveys of RN staffing, which was later critiqued because staffing may change over time.<sup>13</sup> Data that are collected yearly, including the American Hospital Association (AHA) Annual Survey, are also limited in that staffing is calculated from payroll data based on total nurse full-time equivalents (FTEs) and/or total hours paid to RNs.<sup>14</sup> The AHA data also include RNs not involved in direct care and are aggregated at the hospital level with no consideration of

variation in nursing specialty.<sup>14,15</sup> Staffing researchers are cognizant that unit-level, longitudinal data are more robust than some administrative data sets; however, obtaining those data may be challenging.

Clinicians understand the importance of considering staffing at the unit level rather than at the hospital level. For example, a nurse-to-patient ratio of 1:4 has a different meaning depending on the specialty compared with a hospital aggregate staffing ratio of 1:4. Staffing ratios also are limited in that they do not consider patient volume, acuity, delivery model, or provider skill mix. Beyond solely considering the number of nurses when creating staffing plans, nurse leaders should consider the levels of RN education, certification, competency, and experience of those nurses.

In response to the decades of evidence supporting the importance of RN staffing, some US states have implemented legislation aimed at improving RN staffing. New Jersey is one of the states that requires by law (Pub L No. 1971, c.136 [C26:2H-1 et seq]) a designee from each hospital to publicly report the number of RNs, licensed practical nurses, and unlicensed assistive personnel per patient on each unit daily.<sup>16</sup> By law, staff not involved in direct patient care are excluded from those staffing estimates; consequently, the NJ staffing levels may be more reflective measures of direct care nurse staffing than administrative data.

It is well established that achieving Magnet recognition is a symbol of nursing excellence; however, whether staffing differs by nursing specialty among Magnet hospitals compared with non-Magnet hospitals remains unclear. In our study, we use unit-level, longitudinal, publicly reported staffing data to explore potential differences between Magnet and non-Magnet hospitals in New Jersey. Using unit-level RN staffing data may help identify the extent to which nurse staffing contributes to the Magnet effect. Therefore, the purpose of this study was to examine RN staffing by specialty in Magnet and non-Magnet hospitals over time.

## **METHODS**

### **Design, data sets, and sample**

We conducted a secondary analysis from 3 data sources: publicly available nurse staffing data from the New Jersey Department of Health (NJDOH); hospital characteristic data from the

AHA Annual Hospital Survey; and Magnet recognition data from the American Nurse Credentialing Center (ANCC).<sup>17</sup> Study dates were September 30, 2008, through December 31, 2015, which represented 30 quarters of unit-level nurse staffing data. All NJ hospitals are mandated to reported nurse staffing, yet not all hospitals participate in the AHA survey. Therefore, we included all hospitals that participated in the AHA survey ( $n = 64$ ;  $n = 65$  in 2009) for each year of the study and excluded hospitals that do not provide data to the AHA survey ( $n = 8$ ), which represents 90% of all NJ hospitals. We obtained institutional review board approval from a large university.

### Data collection

Nursing supervisors are responsible to ensure that each hospital unit reports accurate staffing ratios to the NJDOH. Ratios are entered by a designee monthly and submitted to the NJDOH.<sup>16</sup> Staff at the NJDOH calculate quarterly averages of patient-to-nurse ratios and upload these data to the NJDOH Web site labeled the Hospital Patient Care Staffing Quarterly Reports.<sup>16</sup>

### Measures

#### Hospital characteristics

We determined Magnet recognition from the ANCC Web site<sup>17</sup> by examining the recognition year and verified this information by checking hospital Web sites. Using the AHA data, we created 4 hospital-level variables: (1) hospital ownership (for-profit and not-for-profit); (2) bed size (<100 small, 101-250 medium, and >251 large); (3) technology status (low technology and high technology, where a high-technology hospital was defined as one that had the capability to perform organ transplantation and/or open-heart surgery); and (4) teaching status (nonteaching, minor, and major) determined from FTE medical and dental residents per total facility beds). We identified hospitals without any postgraduate medical residents as nonteaching and distinguished them from minor teaching hospitals (1:4 or smaller trainee-to-bed ratio) and major teaching hospitals (higher than 1:4 trainee-to-bed ratio).

#### Nurse (RN) staffing

Nurse staffing was derived as a patient per RN ratio (PNR). The PNR is computed by staff at the NJDOH from the monthly hospital reports con-

taining the number of RNs and patients present each shift by the unit.

#### Nursing specialty

Specialties were categorized and coded into 16 recognized nursing units. The threshold for excluding missing data was set at 25%, meaning that specialties missing data for more than 7 of the 30 quarters were excluded. We included 12 unit types: critical care (adult, pediatric, and neonatal); intermediate care (adult and neonatal); acute care (medical-surgical, postpartum, pediatrics, and newborn); psychiatric (adult closed psychiatric and adult open psychiatric); and the emergency department (ED).

### Data analysis

We described the hospital sample and examined differences between Magnet and non-Magnet facilities for hospital characteristics using a  $\chi^2$  test for 2015. We calculated differences in RN staffing by unit type by subtracting staffing estimates for non-Magnet hospitals from staffing estimates of Magnet hospitals. For each year of the study, we identified changes in the PNR by Magnet and non-Magnet hospitals and calculated the percent change in the PNR from 2008 to 2015. We also calculated the mean absolute deviation (MAD) for each specialty to identify variability and coded the variation as  $x =$  small,  $y =$  moderate, and  $z =$  large. All analyses were conducted in STATA version 14.0 (Stata LP, College Station, Texas) and Microsoft Excel version 16.19 (2018).

## RESULTS

### Hospital characteristics

There were 21 Magnet-designated hospitals in each year of our study excluding 2010 where there were 20 Magnet hospitals. Over the study period, 2 hospitals gained Magnet recognition while 3 hospitals lost Magnet recognition (see Supplemental Digital Content, Table 1, available at: <http://links.lww.com/JNCQ/A708>). Only 10% of hospitals were classified as for-profit institutions and none were Magnet hospitals. In 2015, we found statistically significant differences between Magnet status and hospital characteristics. Compared with non-Magnet hospitals, Magnet hospitals were larger ( $\chi^2_2 = 158.4, P \leq .01$ ) with higher technology status ( $\chi^2_1 = 261.7, P \leq .01$ ) and more likely to be a teaching institution ( $\chi^2_2 = 19.42, P \leq .01$ ).

## Staffing trends

Staffing was comparable in Magnet and non-Magnet hospitals for 9 of 12 specialties from 2008 through 2015. When examining the average percent changes of RN staffing, we found a greater percent increase in staffing ratios in Magnet hospitals (6.9%) than that in non-Magnet facilities (4.7%). When examining by specialty, Magnet and non-Magnet facilities had similar PNRs. We found slightly lower PNRs in Magnet hospitals for 6 units (adult and neonatal critical care, adult intermediate care, medical-surgical acute care, open psychiatric, and closed psychiatric units), slightly lower PNRs in non-Magnet hospitals for 5 units (pediatric critical care, neonatal intermediate care, pediatric acute care, newborn nursery, and the ED), and essentially the same in postpartum (see Supplemental Digital Content, Table 2, available at: <http://links.lww.com/JNCQ/A709>).

### Critical care

On average, RNs cared for 1 to 2 patients per shift in critical care units in Magnet and non-Magnet hospitals, with the lowest PNRs in pediatric critical care units. PNRs remained essentially unchanged in adult critical care over time but decreased among pediatric and neonatal critical care units in both hospital types. The percent change was highest among pediatrics in Magnet hospitals (11.1%) and neonatal in Magnet hospitals (14.3%). The variation in RN staffing between Magnet and non-Magnet hospitals was small (average MAD = 0.15).

### Intermediate care

On average, RNs cared for 4 patients per shift in adult intermediate care and on average 2 babies per shift in Magnet and non-Magnet hospitals. PNRs decreased for all units; however, the largest decline occurred in neonatal intermediate care units (16.7% in Magnet hospitals and 9.5% in non-Magnet hospitals). The variation in RN staffing between Magnet and non-Magnet hospitals was moderate (average MAD = 0.27) and slightly higher in intermediate than in critical care specialties.

### Acute care

On average, RNs cared for 5 patients per shift on medical-surgical units, 4 patients per shift in postpartum, 3 patients per shift in pediatrics, and 4 babies per shift in the newborn nursery

in Magnet and non-Magnet hospitals. In 2015, we found large reductions in PNRs among medical-surgical and postpartum units in non-Magnet hospitals. The largest reduction in PNR occurred among pediatric units in Magnet hospitals (13.8%). The variation in RN staffing between Magnet and non-Magnet hospitals was also moderate (average MAD = 0.35), with the newborn nursery having the largest variation (MAD = 0.89).

### Psychiatric care

On average, RNs cared for 5 to 6 patients per shift depending on whether the unit was open or closed across the study period in Magnet and non-Magnet hospitals. In 2015, on open adult units, PNRs increased (3.7% in Magnet hospitals and 3.3% in non-Magnet hospitals) and decreased in closed psychiatric units (6.6% in Magnet hospitals and 3.2% in non-Magnet hospitals). The variation in RN staffing between Magnet and non-Magnet hospitals was also moderate (average MAD = 0.73).

### Emergency department

On average, RNs cared for 8 to 11 patients in the ED across the study period in Magnet and non-Magnet hospitals. In 2015, PNRs decreased in both hospital groups, with the largest decline occurring in Magnet hospitals (7.0%). The variation in RN staffing between Magnet and non-Magnet was large (MAD = 4.1), representing the greatest staffing variation in all specialties.

## DISCUSSION

This is among the first studies to examine unit-level RN staffing using state-mandated public reporting data over 7 years. As expected, our findings support variation in RN staffing across levels of care: as acuity increased (from acute to intermediate to critical care), the number of patients per RN decreased over time, thereby confirming the importance of using unit-level data or shift-level data when studying staffing. When examining RN staffing differences between Magnet and non-Magnet hospitals, our results revealed that both types of hospitals demonstrated an increase over time in RN staffing for 9 of 12 specialties, with a greater increase in Magnet hospitals (6.9%) than in non-Magnet hospitals (4.7%). Although the increase in RN staffing in Magnet hospitals was greater, this result was an average of all 12 specialties.

Some specialties had a greater variation in staffing between Magnet and non-Magnet hospitals than others; thus, the increase in the actual ratios in Magnet hospitals does not appear to be meaningfully different from that in non-Magnet facilities.

Our findings related to RN staffing across nursing unit types support small differences in staffing between the hospital groups and modest improvements in nurse staffing over time for most unit types. Although it may be assumed that Magnet hospitals have more financial resources, and thus more RN staffing, our results surprisingly did not support this assumption for all specialties. We found that Magnet hospitals had slightly better staffing in 6 of the represented nursing specialties, slightly worse staffing in 5 nursing specialties, and essentially the same staffing in 1 specialty. Generally, Magnet hospitals were better staffed in adult units and non-Magnet were better staffed in pediatric and neonatal units. These differences may be related to the complexity of a pediatric or neonatal patient regardless of Magnet status. For the pediatric population, nurses who work in freestanding children's hospitals reported better staffing than nurses working in children's hospitals within hospital systems or general hospitals,<sup>18</sup> which suggests that it is the type of hospital, rather than Magnet recognition, that is associated with better RN staffing for children.

The highest variation in RN staffing between Magnet and non-Magnet hospitals occurred in the ED. Our findings revealed that Magnet hospitals were larger and more technologically advanced, which may indicate that Magnet hospitals have the capacity to accept more ED patients. Furthermore, RN staffing in the ED is unique, as the ED functions differently from other nursing specialties. Because of the higher mixture of patients including trauma, observation, treat-and-release, and admitted patients, the ratios will fluctuate more frequently than those in the rest of the hospital. For example, researchers studying 26 EDs in Australia found that staffing data are difficult to interpret, given the high complexity of shift patterns with multiple start times and varying shift length.<sup>19</sup> A wide variation in staffing levels—which may not be linked to patient acuity—may indicate that ratios should not be used to determine the optimal staffing levels in the ED.<sup>19</sup>

In 2019, New Jersey had 29 Magnet hospitals, representing more than one-third of all hospitals in the state and the greatest proportion of Magnet facilities nationally. Although our study ended in 2015 and excluded 3 Magnet hospitals because of lack of AHA data, our sample represented a high concentration of Magnet hospitals in a small geographic area. It is possible that the Magnet culture has permeated the nursing market and hospitals may be highly homogeneous to each other and function similarly regardless of Magnet recognition. We also found that NJ Magnet hospitals are larger and more technologically advanced than non-Magnet facilities, a finding that is consistent with existing evidence<sup>20</sup>; however, this finding did not contribute to RN staffing differences.

### Implications

Nurse leaders may strive to achieve Magnet recognition because it provides a competitive advantage, ensures clinicians deliver evidence-based care, and encourages managers to use innovation for professional nursing practice. Magnet recognition may lead to a 3.89% increase in net inpatient revenue, earning about \$127.06 more per discharge compared with a non-Magnet hospital.<sup>21</sup> On the contrary, nurse leaders may choose to invest their resources in other quality initiatives simply because of the cost and time needed for a Magnet application. These leaders may also be concerned that the evidence suggesting better quality of care in Magnet hospitals is linked to research conducted in Magnet hospitals and published in Magnet-affiliated journals. In addition, recognizing that staffing practices may vary for each unit and hospital, the ANCC does not specify specific thresholds for staffing to obtain the recognition.

### Limitations

Thresholds for meaningful differences in nurse staffing metrics are not established, and differences in PNRs must be interpreted with caution. In this study, our focus was to evaluate staffing differences between Magnet and non-Magnet hospitals; therefore, we did not examine the effects of such incremental unit-level RN staffing differences on patient outcomes. Although other researchers have found that small variations in staffing were associated with an increase in the frequency of missed nursing care for patients,<sup>22</sup> this further examination was beyond the scope

of this study and should be examined in future studies.

Although nurse staffing was measured at the unit level, this metric does not account for patient acuity or complexity of care. The uniqueness of the data set limited our analysis to one state with the highest proportion of Magnet hospitals. This may explain why RN staffing was comparable between Magnet and non-Magnet hospitals. These hospitals in New Jersey may be more alike, compared with other states with a lower concentration of Magnet hospitals. Finally, we were unable to capture non-Magnet hospitals that may be “on the journey” to becoming a Magnet in our data set.

## CONCLUSION

Using unit-level publicly available data, we found that Magnet and non-Magnet hospitals improved in RN staffing in 2015 compared with 2008 for 9 of 12 nursing specialties. Although the percent improvement was slightly greater in Magnet hospitals, there was no meaningful difference in staffing ratios between Magnet and non-Magnet hospitals for all 12 specialties. Proponents of Magnet recognition support the link between a positive work environment and improved patient and nurse outcomes,<sup>23</sup> whereas others argue that a large proportion of the evidence is generated from Magnet hospitals and presented in Magnet-affiliated journals. On the basis of our work, we recommend that nurse leaders need to carefully consider all options when investing in the process of applying and maintaining Magnet recognition, especially because RN staffing does not appear to differ. Regardless of the recognition, we recommend that nurse leaders continue to invest in RN staffing and a healthy work environment to ensure high-quality patient care.

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