

Healthcare Sales Data Analyst

CMS Data

Introduction

Clipboard Health is a nationwide staffing platform that connects healthcare professionals with long-term care facilities. As part of its strategic expansion, it is crucial to analyze staffing trends in nursing homes to identify opportunities for optimizing workforce solutions. The Centers for Medicare & Medicaid Services (CMS) publishes the Payroll-Based Journal (PBJ) Daily Nurse Staffing data quarterly, which provides critical insights into the workforce composition of healthcare facilities, including full-time employees and contract workers.

The goal of this analysis is to explore the 2024 Q2 PBJ dataset in conjunction with provider information to assess staffing patterns, determine workforce stability, and provide data-driven recommendations for Clipboard Health's sales leadership. Specifically, the analysis focuses on:

- State-level contractor reliance: Identifying states with the highest dependence on contractor nurses using aggregate staffing data.
- Top contractor-dependent facilities: Recognizing the highest contractor-utilizing facilities for potential sales opportunities.
- Staffing ratings correlation: Evaluating the impact of contractor nurse usage on facility staffing ratings.
- Ownership-based workforce trends: Understanding how staffing patterns vary across for-profit, non-profit, and government-owned facilities.
- Turnover and revenue impact: Examining staff turnover rates and their financial implications on facilities.

The findings from this study will guide Clipboard Health's market penetration strategy, allowing the sales team to effectively target high-demand facilities and states while addressing staffing gaps with tailored workforce solutions. By leveraging data-driven insights, Clipboard Health can position itself as a strategic staffing partner for long-term care providers across the U.S.

Understanding the Datasets

To conduct a comprehensive analysis of staffing trends in U.S. nursing homes, two key datasets were utilized: the Payroll-Based Journal (PBJ) Daily Nurse Staffing (2024 Q2) dataset and the Provider Information dataset. Integrating these datasets enables the assessment of workforce distribution, identification of staffing gaps, and uncovering of trends that will inform Clipboard Health's sales strategy.

The PBJ Daily Nurse Staffing dataset, a quarterly report published by CMS, details staffing levels in all registered nursing homes across the United States. This dataset plays a crucial role

in understanding how facilities allocate their workforce between full-time employees and contract-based workers. It includes staffing data for three primary roles: Registered Nurses (RN), Licensed Practical Nurses (LPN), and Certified Nursing Assistants (CNA). For each role, the dataset further distinguishes between employee hours (full-time staff) and contractor hours (temporary or outsourced staff). Additionally, it provides total reported hours worked, allowing for an analysis of workforce distribution at both state and facility levels. The dataset also contains geographic information, such as state, city, and county, enabling regional comparisons of staffing trends.

The PBJ data is particularly important for evaluating contractor reliance in different states and facilities. By analyzing the proportion of contractors versus employees, it is possible to identify areas with high staffing shortages and greater demand for contract nurses. Additionally, comparing staffing data with facility ratings helps determine whether higher contractor usage correlates with lower quality scores, signaling potential workforce instability. This analysis also highlights sales opportunities, as facilities with significant contractor reliance may benefit from staffing solutions offered by Clipboard Health.

In addition to the PBJ dataset, the Provider Information dataset was incorporated, containing critical attributes about each facility. This dataset provides details on ownership type, classifying facilities as for-profit, non-profit, or government-owned. Understanding ownership type is essential, as staffing strategies may differ across these categories. For instance, for-profit facilities often operate with tighter budgets, potentially leading to higher reliance on contract staffing.

The Provider Information dataset also includes quality ratings, such as staffing ratings, health inspection ratings, and overall performance scores. These indicators allow for an assessment of staffing trends in relation to facility performance. Furthermore, the dataset contains bed capacity and occupancy metrics, providing insights into facility size and patient demand. Another crucial component is turnover data, which measures total nursing staff turnover and registered nurse (RN) turnover. High turnover rates may indicate unstable workforce conditions, further emphasizing the need for contract staffing solutions.

By merging the PBJ staffing data with the Provider Information dataset, a holistic view of the staffing landscape across U.S. nursing homes can be developed. This integration enables the exploration of ownership-based workforce trends, turnover patterns, and financial implications of staffing deficiencies. The next phase of this analysis involves exploratory data analysis (EDA) to uncover patterns, correlations, and actionable insights. These findings will assist Clipboard Health's sales team in targeting high-demand facilities, optimizing sales strategies, and expanding its market presence by providing staffing solutions where they are needed most.

Analysis Process

The analysis process began with data cleaning and preprocessing, including handling missing values, converting data types, and standardizing column names for consistency. The PBJ Daily Nurse Staffing dataset was merged with the Provider Information dataset using the CMS

Certification Number (CCN) as the key identifier to ensure accurate facility-level comparisons. Once the datasets were integrated, Exploratory Data Analysis (EDA) was conducted to identify trends in contractor reliance, staffing ratings, turnover rates, and ownership-based workforce patterns. Various visualization techniques, including heatmaps, scatter plots, bar charts, and box plots, were employed to detect staffing shortages, workforce instability, and high-demand locations, providing a foundation for targeted strategic recommendations.

Insights and Visualization

State-Level Analysis of Contractor Reliance

Objective:

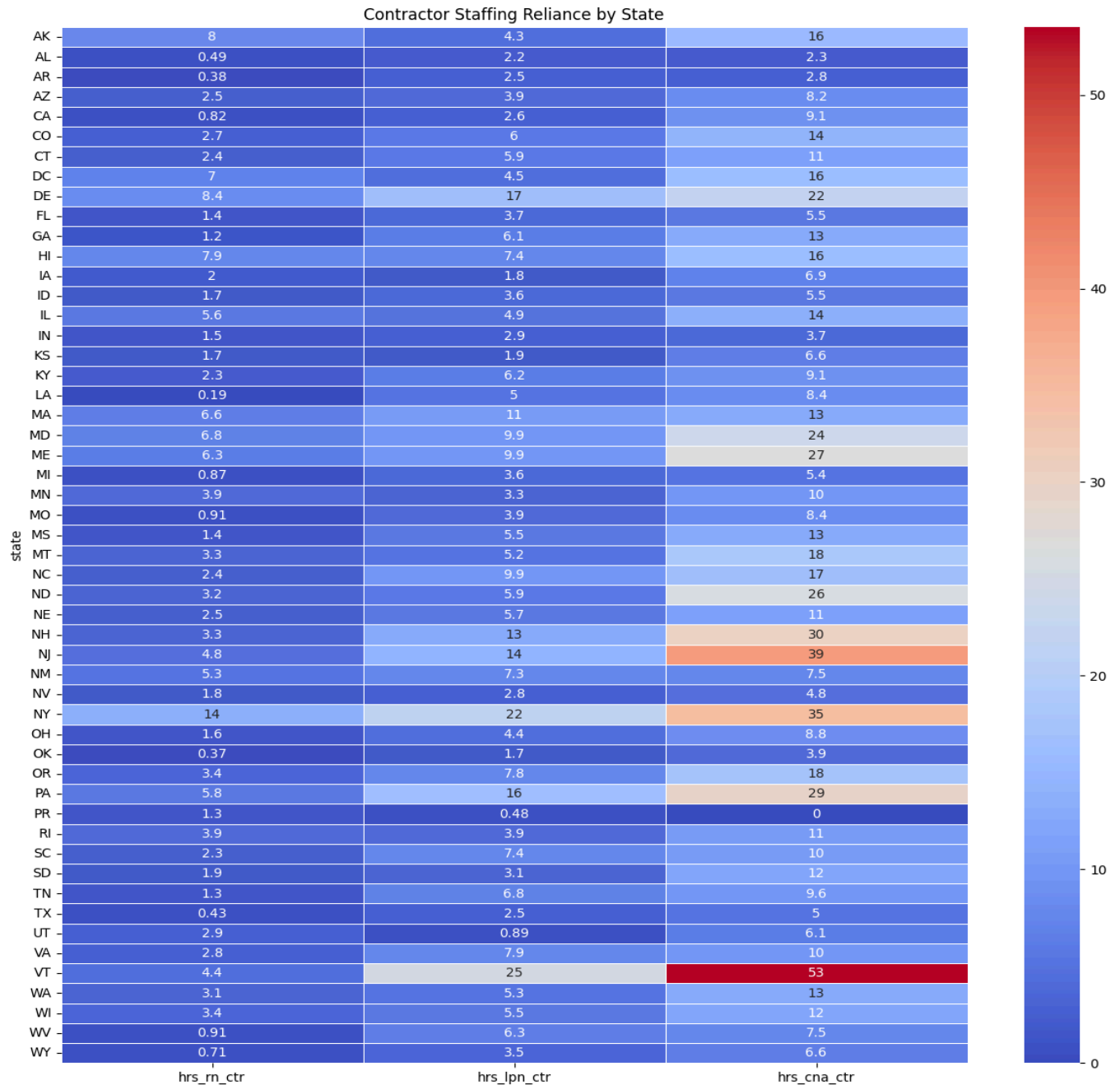
The objective of this analysis is to assess contractor reliance across different states. Understanding contractor usage trends at the state level helps identify geographic regions where staffing shortages may be more prevalent, indicating higher demand for contract workers.

Methodology:

- The dataset was grouped by state to calculate the average contractor hours worked by Registered Nurses (RNs), Licensed Practical Nurses (LPNs), and Certified Nursing Assistants (CNAs) in each state.
- A heatmap visualization was created using Seaborn to highlight the states with higher contractor dependence compared to others.
- The heatmap colors range from cool (low contractor reliance) to warm (high contractor reliance), providing an intuitive view of staffing patterns.

Key Findings:

- Some states exhibit higher dependency on contractor staffing than others, particularly in CNA positions.
- States with staffing shortages tend to have higher contractor hours, making them prime targets for staffing solutions.
- Clipboard Health can prioritize outreach efforts in states where contract staffing is already in demand to enhance business opportunities.



Facility-Level Analysis of CNA Contractor Usage

Objective

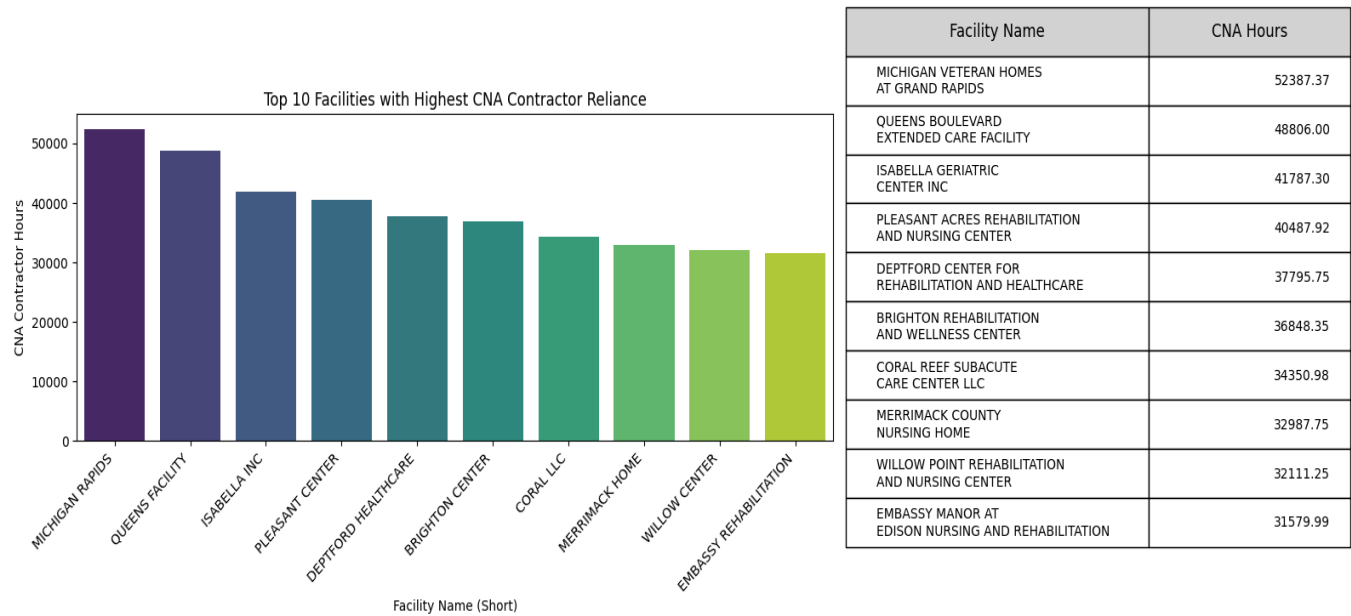
This analysis aims to identify facilities with the highest reliance on contractor Certified Nursing Assistants (CNAs). Understanding which facilities depend heavily on contract staff provides an opportunity to target high-demand locations for potential staffing partnerships and tailored workforce solutions.

Methodology

- The dataset was grouped by facility name (provname) to calculate the total CNA contractor hours worked per facility.
- The top 10 facilities with the highest CNA contractor hours were identified.
- A bar chart was created to visualize the top 10 contractor-dependent facilities, providing a clear representation of locations with the greatest staffing needs.
- Additionally, a pivot table was generated to present facility names alongside their corresponding CNA contractor hours in a structured format.

Key Findings

- Certain facilities exhibit an exceptionally high reliance on contractor CNAs, highlighting a significant business opportunity for staffing services.
- Facilities facing persistent staffing shortages may benefit from a long-term partnership to ensure workforce stability and compliance.
- To maximize engagement, outreach strategies should be customized for these high-demand facilities, offering flexible and scalable staffing solutions tailored to their specific workforce challenges.



Impact of CNA Contractor Reliance on Facility Staffing Ratings

Objective

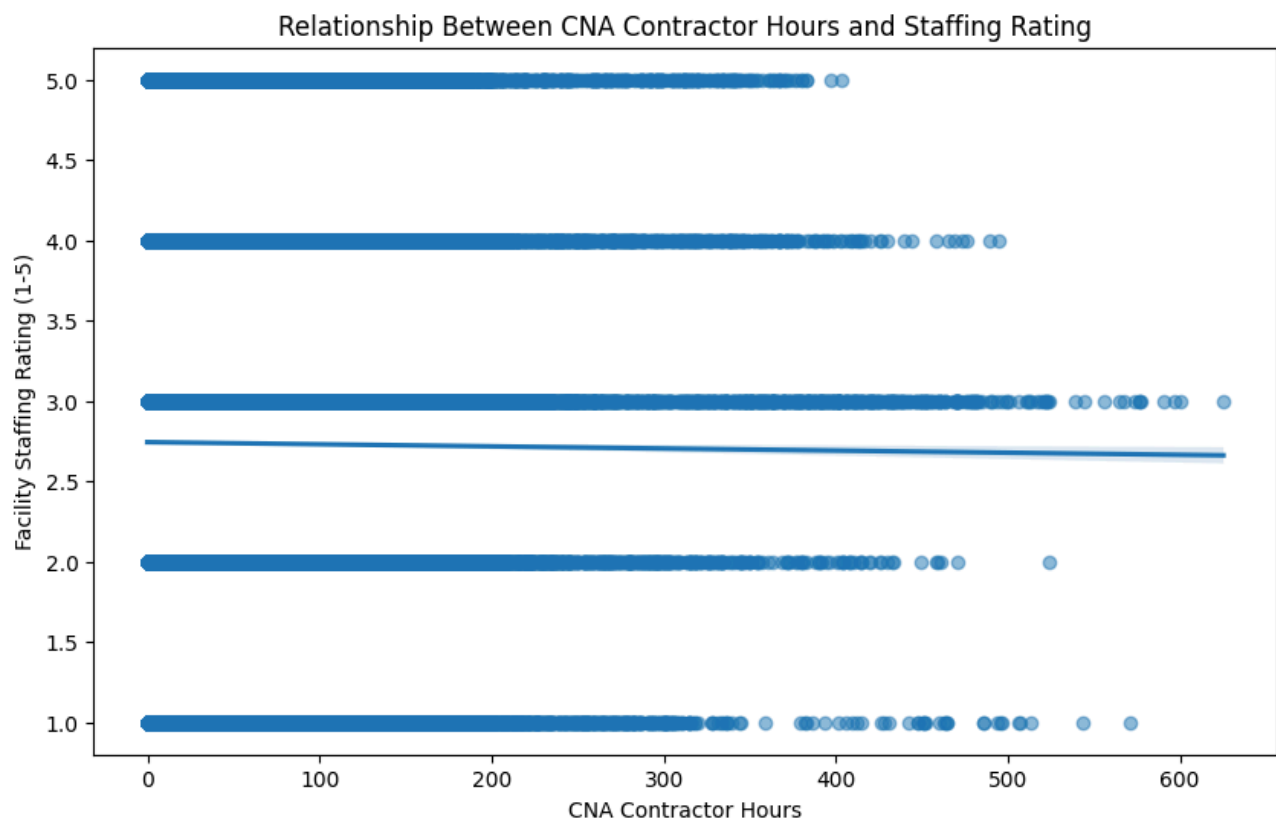
This analysis examines whether facilities with higher reliance on contract CNAs tend to have lower staffing ratings. A negative correlation between these variables may indicate workforce instability or quality concerns, suggesting that facilities facing staffing shortages may struggle to maintain consistent service levels.

Methodology

- A scatter plot with regression analysis was generated to visualize the relationship between CNA contractor hours (hrs_cna_ctr) and facility staffing ratings (staffing_rating).
- The X-axis represents total CNA contractor hours worked at a facility, while the Y-axis represents the facility's staffing rating (on a scale of 1 to 5).
- A regression line was included in the visualization to determine whether the relationship between these two variables follows a positive or negative trend.

Key Findings

- The regression analysis indicates a negative correlation between CNA contractor hours and facility staffing ratings.
- Facilities that rely more on contract CNAs tend to have lower staffing ratings, suggesting workforce instability and potential quality concerns.
- This trend implies that facilities experiencing staffing shortages may depend on contractors but struggle with maintaining consistent care quality, possibly due to high turnover or insufficient staffing management.
- Facilities with low staffing ratings should be targeted for strategic engagement, offering reliable, high-quality contract staffing solutions that enhance workforce stability and support compliance with regulatory requirements.



State-Wide Trends in CNA Contractor and Employee Staffing

Objective

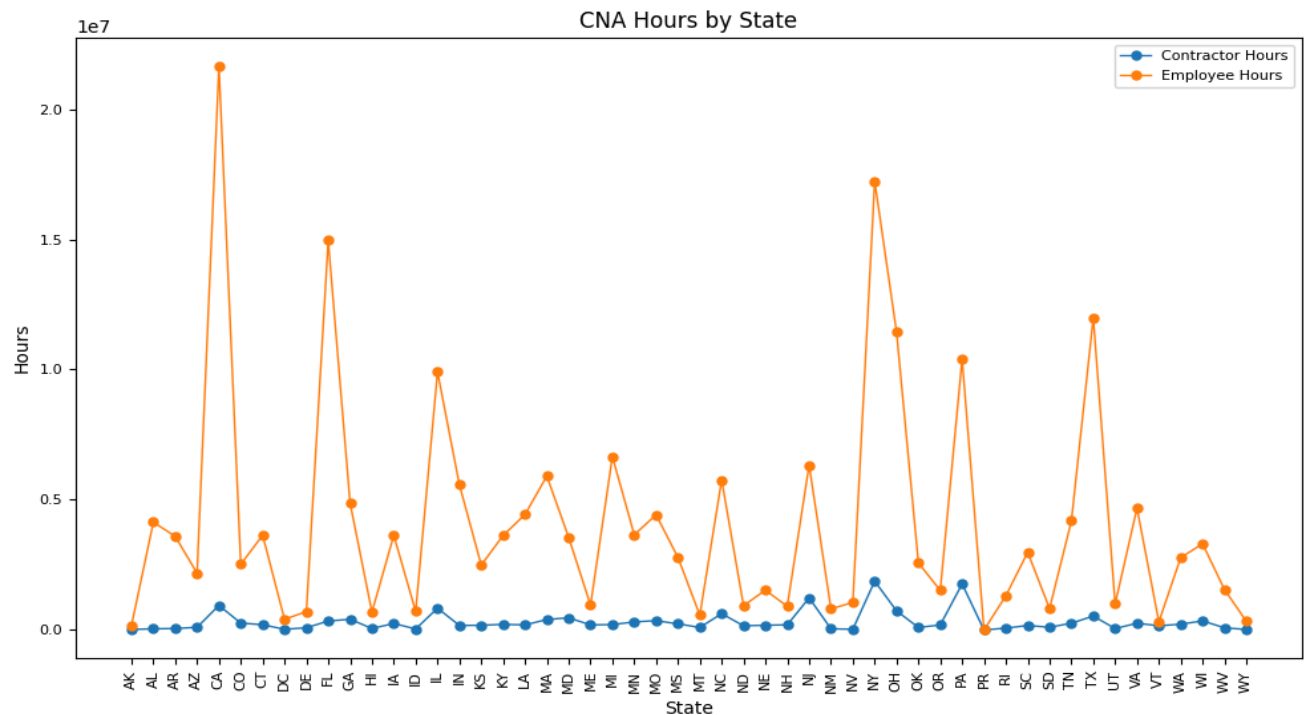
This analysis compares CNA contractor hours and CNA employee hours across different states to identify regions with higher reliance on contract staffing. Understanding these geographic workforce imbalances provides insight into potential staffing shortages and helps determine sales opportunities for contract staffing solutions.

Methodology

- The dataset was grouped by state, and total hours worked by CNA contractors (hrs_cna_ctr) and CNA employees (hrs_cna_emp) were calculated.
- A line plot was created to compare contractor vs. employee staffing trends across states.
- The X-axis represents states, while the Y-axis represents total CNA staffing hours.
- Two distinct lines were plotted:
 - Contractor CNA hours, indicating the reliance on contract workers.
 - Employee CNA hours, reflecting the usage of full-time staff.

Key Findings

- Some states exhibit a notable gap between contractor CNA hours and employee CNA hours, indicating a higher dependence on contract staffing.
- A greater share of contractor CNAs in certain states may be linked to labor shortages or high turnover rates among full-time staff.
- States with growing contractor reliance should be prioritized for targeted outreach, as they present an opportunity for contract staffing services to address workforce gaps.
- Understanding state-specific staffing trends enables the development of customized sales strategies, ensuring efficient allocation of contract workforce resources in regions with the greatest demand.



Facility-Level Analysis of Total Contractor Staffing Reliance

Objective

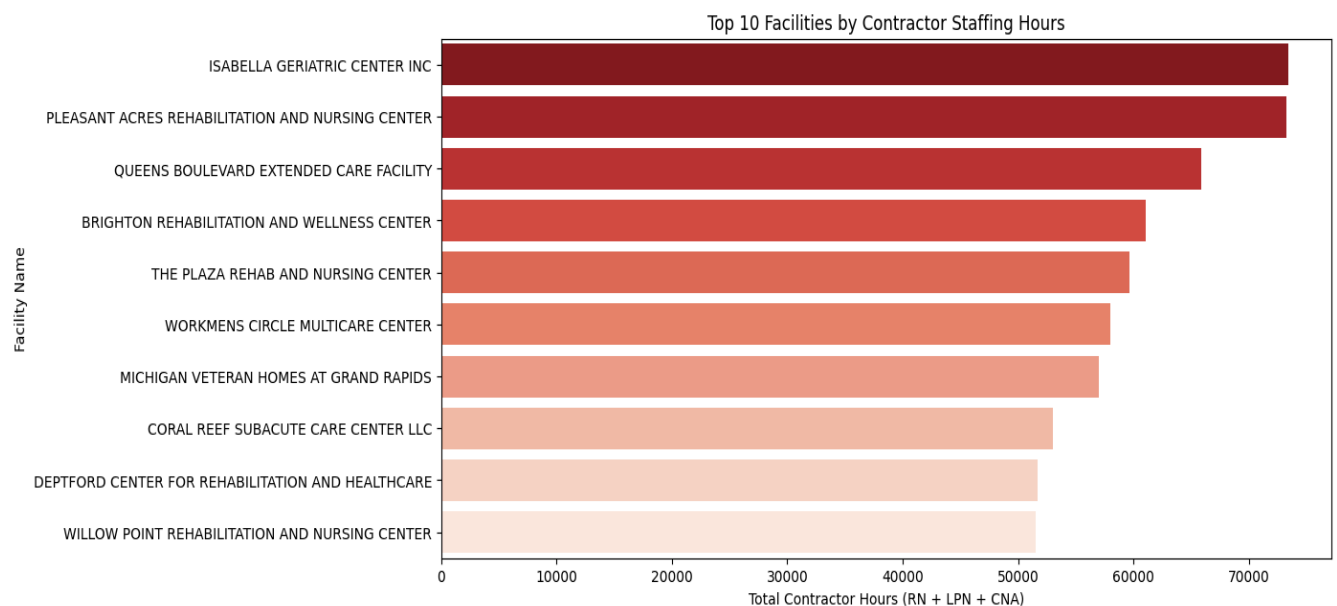
This analysis identifies facilities with the highest reliance on contractor staff across all nurse categories, including Registered Nurses (RNs), Licensed Practical Nurses (LPNs), and Certified Nursing Assistants (CNAs). Facilities with the highest total contractor hours are more likely to experience persistent workforce shortages, making them high-priority targets for staffing partnerships.

Methodology

- The dataset was converted to numeric format to ensure accurate calculations for contractor hours.
- A new column, Total_Contractor_Hours, was created by summing contractor hours across RN, LPN, and CNA roles for each facility.
- Facilities were grouped by name (provname) and ranked based on their total contractor hours.
- The top 10 facilities with the highest contractor staffing hours were extracted.
- A horizontal bar chart was generated to visualize the top contractor-dependent facilities, allowing for easy identification of locations with significant staffing needs.

Key Findings

- Certain facilities exhibit an exceptionally high reliance on contract nursing staff, indicating a strong dependence on temporary workforce solutions.
- Facilities with the highest total contractor hours represent high-priority targets for contract staffing services, as they are more likely to require long-term workforce solutions.
- Persistent staffing shortages at these locations suggest an ongoing demand for contract nurses, making them more receptive to scalable staffing partnerships.
- Sales teams should focus on customized outreach strategies, offering contract-to-hire options or flexible workforce solutions to meet the unique staffing needs of these high-demand facilities.



Analysis of Staffing Hours Per Resident by Ownership Type

Objective

This analysis examines how staffing hours per resident per day vary across different ownership types, including for-profit, non-profit, and government-owned facilities. Understanding these variations provides insights into staffing challenges and potential reliance on contract staffing solutions.

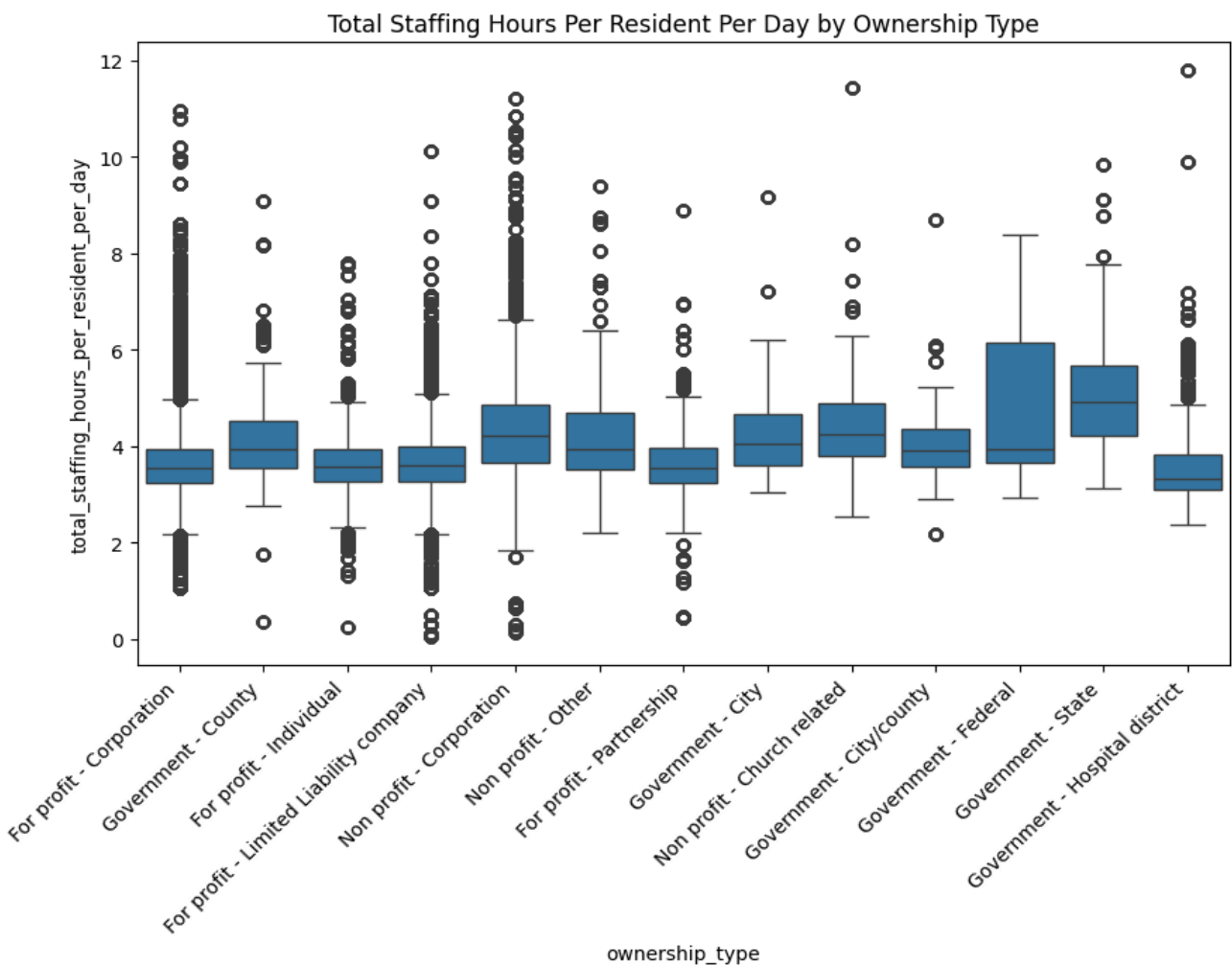
Methodology

- A new metric, total staffing hours per resident per day, was calculated by summing the reported hours for Registered Nurses (RNs), Licensed Practical Nurses (LPNs), and Certified Nursing Assistants (CNAs) per resident.

- The dataset was grouped by ownership type, and staffing hours were compared across categories.
- A box plot was generated to visualize the distribution of staffing hours per resident for for-profit, non-profit, and government-owned facilities.

Key Findings

- For-profit facilities tend to have lower staffing hours per resident per day compared to non-profit and government-owned facilities.
- Government-owned facilities generally report higher staffing hours, likely due to better funding and regulatory support.
- For-profit facilities may experience staffing shortages, making them more likely to depend on contract staffing to meet compliance and operational requirements.
- Targeting for-profit facilities with cost-effective contract staffing solutions can help ensure adequate staffing levels while addressing workforce shortages and regulatory obligations.



Ownership-Based Analysis of Staff Turnover

Objective

This analysis evaluates staff turnover rates across different ownership types, including for-profit, non-profit, and government-owned facilities. High turnover rates often indicate workforce instability, which can lead to increased demand for contract staffing solutions to maintain operational efficiency and ensure continuity of patient care. Understanding these turnover trends helps identify facilities most in need of reliable staffing services.

Methodology

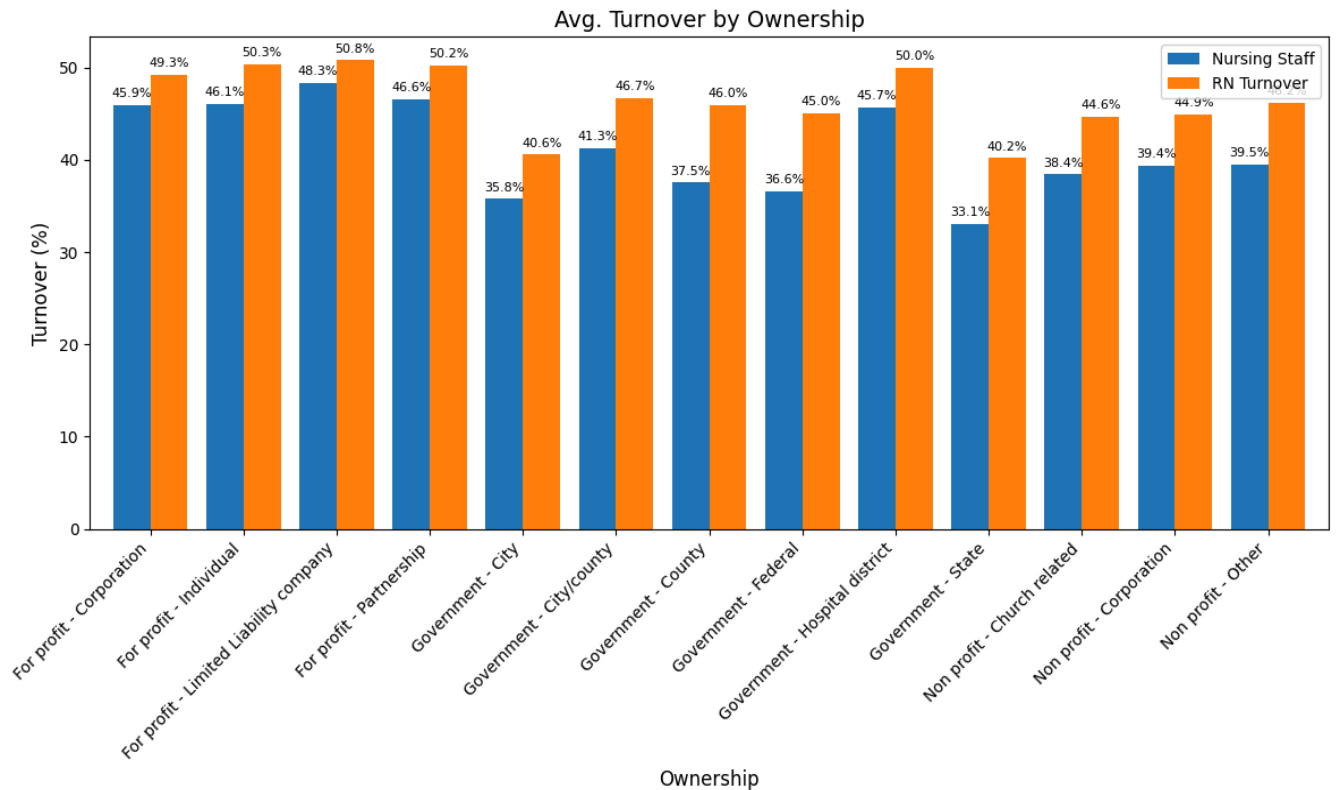
- A pivot table was created to calculate the average turnover rate for total nursing staff and registered nurses (RNs) across different ownership types.
- A bar chart was used to visualize turnover rate differences, providing a clear comparison of workforce stability among for-profit, non-profit, and government-owned facilities.
- Turnover percentages were labeled on the bars to enhance clarity and facilitate precise comparisons between ownership categories.

Key Findings

- For-profit facilities experience the highest turnover rates for both total nursing staff and RNs, indicating workforce instability and frequent staffing gaps.
- Non-profit and government-owned facilities report significantly lower turnover rates, suggesting greater workforce retention and stability.
- Higher turnover rates in for-profit facilities indicate a greater dependence on contract staffing to address ongoing hiring challenges and workforce shortages.
- For-profit facilities should be prioritized for contract staffing solutions, positioning flexible workforce options as a strategy to mitigate staffing shortages, reduce administrative burden, and improve operational stability.

Pivot Table 3: Ownership type vs Average Turnover

ownership_type	registered_nurse_turnover	total_nursing_staff_turnover
For profit - Corporation	45.912013	49.254565
For profit - Individual	46.055124	50.347625
For profit - Limited Liability company	48.310254	50.782165
For profit - Partnership	46.557602	50.236148
Government - City	35.754787	40.570797
Government - City/county	41.289189	46.676299
Government - County	37.537308	45.976640
Government - Federal	36.628571	45.021429
Government - Hospital district	45.723872	49.955586
Government - State	33.060458	40.172035
Non profit - Church related	38.416937	44.649589
Non profit - Corporation	39.374801	44.907527
Non profit - Other	39.481814	46.163074



State-Wide Analysis of Average Staffing Hours Per Resident

Objective

This analysis evaluates the distribution of staffing hours per resident per day across different states. Understanding state-level variations in staffing adequacy helps identify regions with potential workforce shortages, making them prime markets for contract staffing solutions.

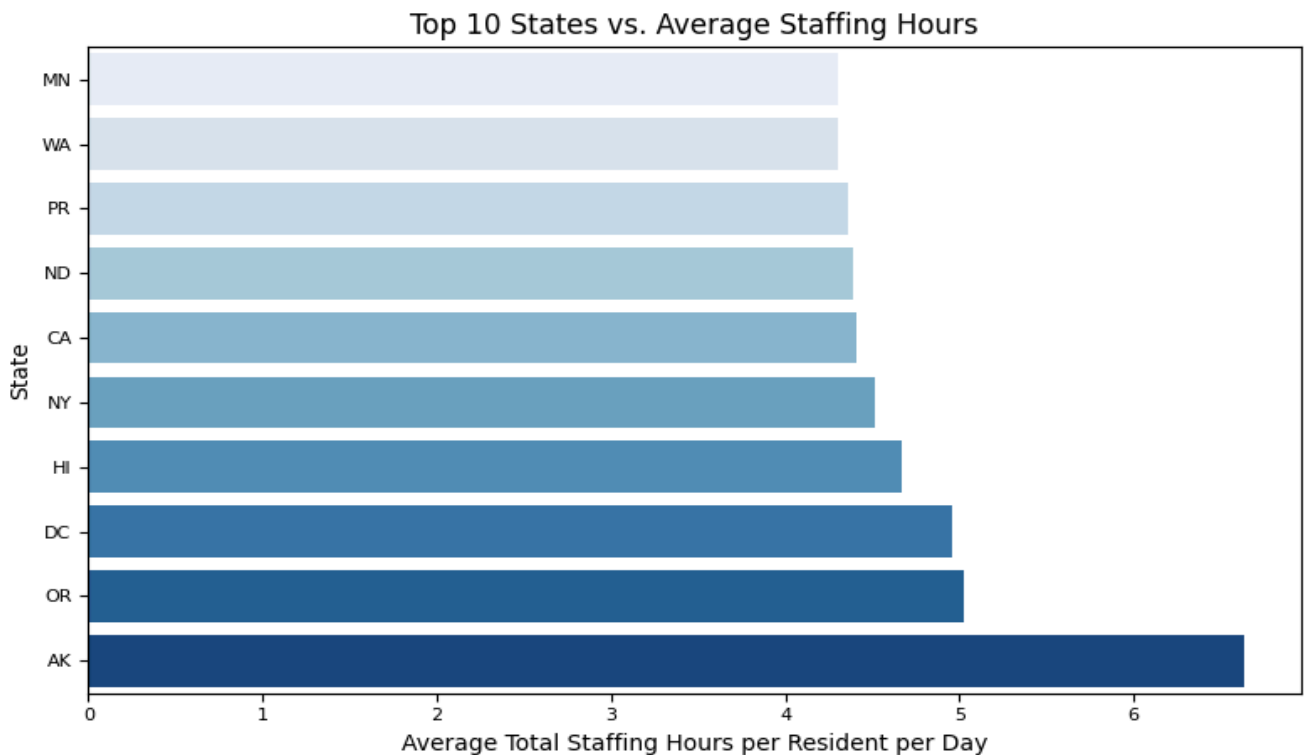
Methodology

- A new metric was created by summing the reported RN, LPN, and CNA staffing hours per resident per day.
- A pivot table was used to calculate the average staffing hours per resident per day for each state.
- The top 10 states with the highest average staffing hours were identified.
- A bar chart was generated to visualize staffing adequacy across states, highlighting regional differences in workforce availability.

Key Findings

- Some states maintain higher staffing hours per resident, potentially reducing the need for contract staffing solutions in these areas.

- States with lower staffing hours per resident may be experiencing workforce shortages, making them ideal targets for contract staffing services to ensure compliance with staffing regulations.
- Sales efforts should be focused on states with staffing deficiencies, offering flexible workforce solutions to help facilities maintain required staffing levels and improve patient care outcomes.
- Aligning contract staffing strategies with state-specific workforce trends ensures targeted outreach, maximizing impact and sales efficiency.



Recommendations Based on Data Analysis and Visualization

1. Strategic Sales Focus on High-Contractor-Reliance States

Analysis and Findings

The State-Level Contractor Reliance Analysis and CNA Staffing Trends by State Analysis identified states with significant dependence on contract nursing staff, particularly CNA contractors. Heatmap visualizations highlighted geographic variations in contractor usage, while trend analysis pinpointed states where contractor reliance is increasing over time. These insights indicate regions with persistent workforce shortages, making them key markets for contract staffing solutions.

Recommendation

- Sales efforts should be concentrated in states with the highest contractor reliance, as identified in the State-Level Contractor Reliance Analysis and CNA Staffing Trends by State Analysis.
- Marketing and outreach strategies should be tailored to emphasize the benefits of Clipboard Health's contract staffing solutions, addressing staffing shortages and compliance concerns.
- Collaboration with regional facility administrators should be prioritized to gain insights into specific workforce challenges, enabling the development of customized staffing plans that align with state-level demands.

2. Targeting Facilities with the Highest Contractor Usage for Direct Sales Efforts

Analysis and Findings

The Facility-Level CNA Contractor Usage Analysis and Total Contractor Staffing Reliance Analysis identified the top 10 facilities with the highest CNA and overall contractor staffing hours across RN, LPN, and CNA roles. These facilities frequently experience workforce shortages and struggle to recruit permanent staff, making them ideal candidates for contract staffing solutions.

Recommendation

- Sales teams should prioritize these high-demand facilities, as they have the greatest need for contract staffing support.
- Personalized outreach strategies should be developed, emphasizing Clipboard Health's ability to quickly supply skilled contractors to facilities with persistent staffing gaps.
- Long-term staffing partnerships should be offered, allowing facilities to secure recurring contract nurses instead of relying on sporadic, last-minute hiring.

3. Addressing Workforce Instability in Low-Rated Facilities

Analysis and Findings

The Impact of CNA Contractor Reliance on Facility Staffing Ratings Analysis demonstrated a negative correlation between CNA contractor usage and facility staffing ratings. Facilities with higher contractor reliance tend to have lower staffing ratings, which could negatively affect compliance and patient care quality.

Recommendation

- Sales teams should engage with lower-rated facilities, positioning contract staffing as a solution to stabilize workforce operations.
- Emphasizing the role of consistent contract staffing in improving workforce reliability can help facilities enhance patient care standards and comply with regulatory requirements.
- Structured staffing plans, such as rotational contracts or long-term workforce agreements, should be proposed to reduce excessive staff turnover and enhance workforce stability.

4. Expanding Contract Staffing Solutions in High-Turnover For-Profit Facilities

Analysis and Findings

The Ownership-Based Staff Turnover Analysis revealed that for-profit facilities have the highest turnover rates for both nursing staff and RNs. High turnover contributes to frequent rehiring costs, administrative burden, and workforce instability, making these facilities high-potential clients for contract staffing solutions.

Recommendation

- Sales teams should prioritize for-profit facilities, as they experience higher staff turnover and require consistent workforce support.
- Contract staffing should be positioned as a cost-effective strategy to reduce administrative overhead and minimize patient care disruptions caused by staff departures.
- Staff retention solutions, such as longer contract durations and permanent placement programs, should be developed to improve workforce stability and reduce long-term hiring challenges.

5. Expanding Services in States with Low Staffing Hours Per Resident

Analysis and Findings

The State-Wide Analysis of Average Staffing Hours Per Resident identified states with lower staffing hours per resident per day, which may struggle with regulatory compliance and face penalties for not meeting staffing guidelines. These states present significant opportunities for contract staffing services.

Recommendation

- Target states with low staffing hours per resident, positioning contract staffing as a compliance-friendly workforce solution.
- Flexible staffing packages should be introduced, allowing facilities to increase staffing hours as needed to meet state and federal guidelines.
- Clipboard Health's ability to provide on-demand staffing solutions should be highlighted, ensuring facilities can remain compliant without committing to long-term permanent hires.

Conclusion

These recommendations leverage data-driven insights from the state-level, facility-level, and ownership-based EDA findings. By focusing on high-demand facilities and regions with workforce shortages, Clipboard Health can optimize its sales strategy, ensuring maximum impact and revenue growth while helping facilities maintain workforce stability and high-quality patient care.