

# HGA

POST OCCUPANCY EVALUATION RESEARCH DATA PREPARED FOR

## FROEDTERT HEALTH 7NT & 8NT RENOVATION

A Lean Methodology Report





# EVIDENCE-BASED RESEARCH DRIVES DESIGN

**FROEDTERT & MEDICAL COLLEGE OF WISCONSIN | NORTH TOWER - 7TH AND 8TH FLOOR UNIT RENOVATIONS |  
MILWAUKEE, WISCONSIN**

HGA used a series of Lean exercises and research tools to create a Lean and evidence-based unit design for the 7th and 8th floors of the North Tower. Lean exercises such as critical-to-quality (CtQ) prioritization, peer-to-peer interviewing, and space adjacency diagramming were held with user groups. Pre-design research tools including shadowing and interviewing staff and patients were used. This baseline data created critical-to-quality metrics that guided planning and design.

Common travel paths uncovered during shadowing were diagrammed in three proposed configurations of a 24-bed, 28-bed and 32-bed decentralized inpatient unit. With shell space already defined, the major difference between the prototypes were room count and size. Our designers used shadow data to demonstrate the improved efficiency of the lower bed count unit and to validate our CtQ guided design decisions.

HGA conducted a post-occupancy report consisting of a three phased time-and-motion study of nursing staff during day shifts on the medical-surgical unit 8NT. Approximately 18 registered nurses were shadowed in 1.5 to 2-hour segments at three months post-occupancy in April, at eight months post-occupancy in September, and at 12 months post-occupancy in December 2014.



## OUTCOMES

The POE demonstrated that not only did the new unit design deliver the promised results, but these results improved over time.

- Nurses spent roughly 45% of their time in patient rooms and at servers; a 6% or 36-minute increase per nurse compared to pre-occupancy results.
- Nurses on average traveled 2.08 miles; one of the lowest recorded findings from other benchmark decentralized units.
- Roughly 82% of time was spent at value-added activities such as providing direct care in patient rooms, coordination of care, charting, retrieving

supplies or medications, and cleaning or sanitizing hands. Time spent increased by 2% at each post-occupancy data collection phase.

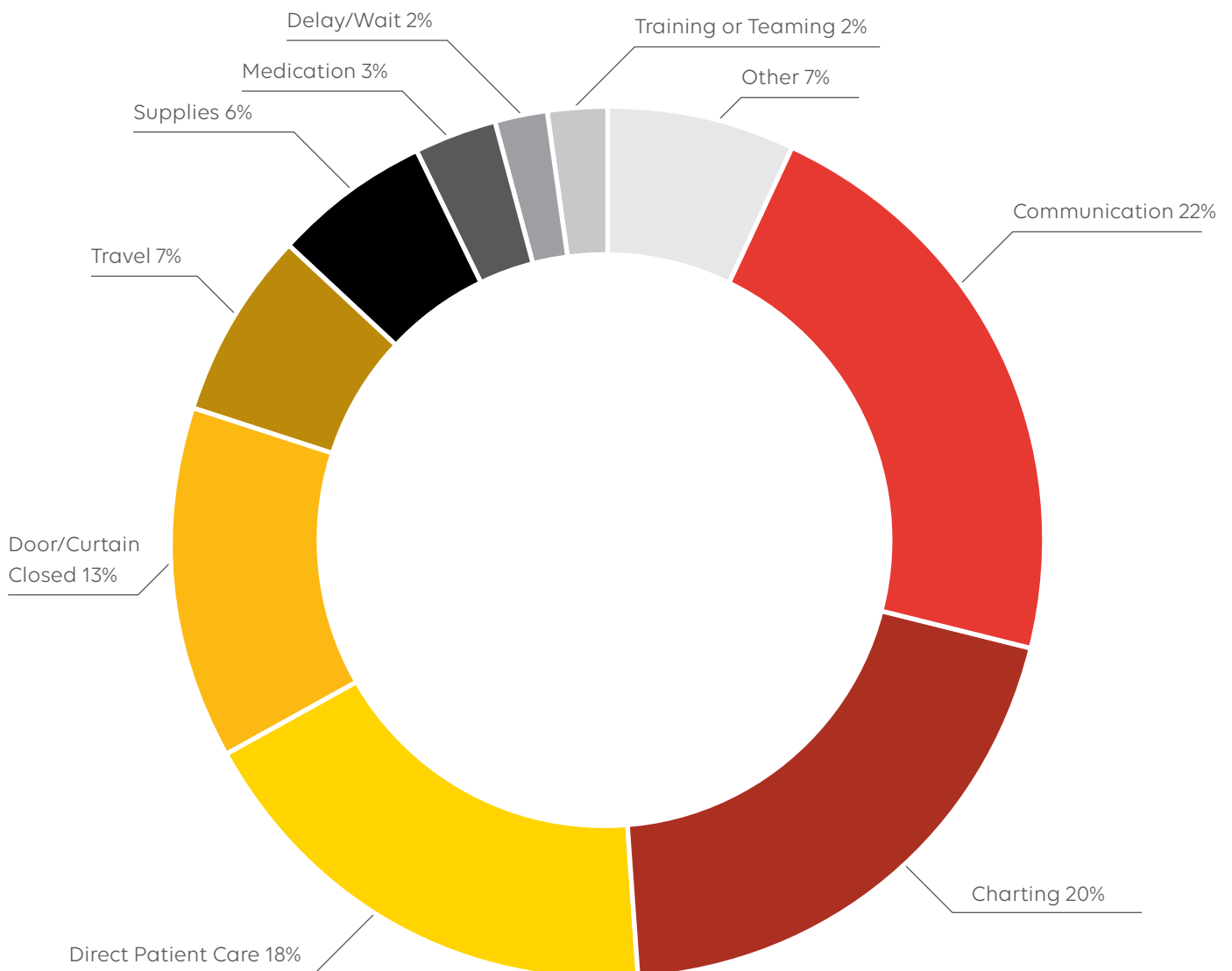
- A substantial reduction in the frequency of visits to areas on the unit among the three data collection phases post-occupancy. As the frequency of visits were reduced, the duration per visit increased. Over time, nurses have become more efficient in their workflow process.
- 7NT and 8NT are the highest performing units on the campus; estimated ROI from the new layout is projected to deliver a seven year payback of the \$6.25M renovation cost.

# ACTIVITIES PERFORMED

Nurses spent 40% of their time in patient rooms and another 5% of their time at servers, for a total of 45% or 4 hours and 30 minutes. Nurses spent 19% of their time at charting stations, 17% in the teaming area, and 5% stopped in the corridor for a total of 41% or roughly 4 hours. Only 7% of nurses' time was spent traveling, or 42 minutes of the day. In total, 6% of nurses' time was spent in the medication room, HUC, supply room, nourishment area or sanitizing hands. Only 3% was spent off the unit or on break.

The graph below distributes the percentage of time spent performing specific activities. The purpose of this graph is to provide a visual distribution of activities. For example, 22% of time was spent communicating either by phone or face-to-face. Charting accounted for 20% of nurses' time, while direct patient care was roughly

18%. However, observers were unable to enter patient rooms. Some observations were recorded from the corridor, but on average, 13% of the time doors were either closed or privacy curtains were pulled. Therefore, more time could have been spent at direct patient care in patient rooms.



# WORKFLOW PROCESS

On average, nurses made 225 trips or visits to areas on the unit over a 10-hour dayshift. The most common sequence was from a server to a patient room (32 events) to a server (15 events) to a patient room (9 events). Other common sequences were from a charting station to a patient room (9 events) to a charting station (3 events), OR to a server (3 events).

There are a few redundancies in work where a nurse traveled from one server to another server (9 events) and then to another server (3 events). Some of these occurrences were because the nurse was finishing up work from one patient visit and then traveled to another server to prep for a different patient visit. However, most of the redundancies were to search for supplies. Another common redundancy was from one med room to another med room (5 events) in search for medication.

## THE MOST COMMON SEQUENTIAL PATHS OF TRAVEL ARE AS FOLLOWS:

Server → Patient Rooms (32 events) → Server (15 events) → Patient Rooms (9 events)

Charting Stations → Patient Rooms (9 events) → Charting Station (3 events)

Charting Stations → Patient Rooms (9 events) → Server (3 events)

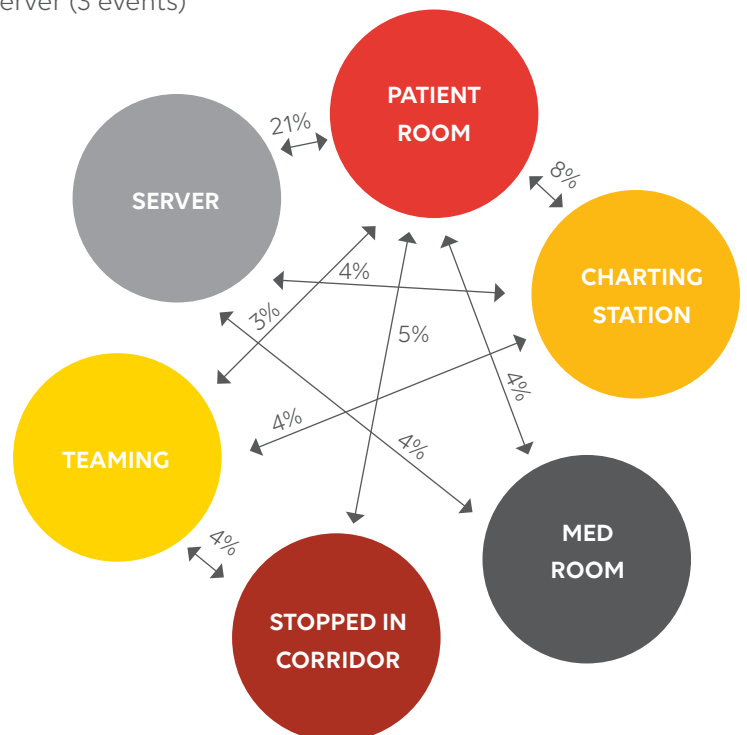
Server → Server (9 events) → Server (3 events)

Charting Stations → Server (6 events) → Charting Stations (3 events)

Med Room → Med Room (5 events) → Server (1 events)

Server → Med Room (4 events) → Server (3 events)

The diagram to the right demonstrates common paths of travel between two locations. The highest frequency of travel was between patient rooms and server (21%), followed by patient rooms and charting stations (8%). The remaining distributions of common paths indicated in the graph are 3 to 5%. The workflow data demonstrates paths and rooms commonly visited areas are decentralized and adjacent to each other, such as patient rooms, charting stations, and servers.





# DISTANCE TRAVELED

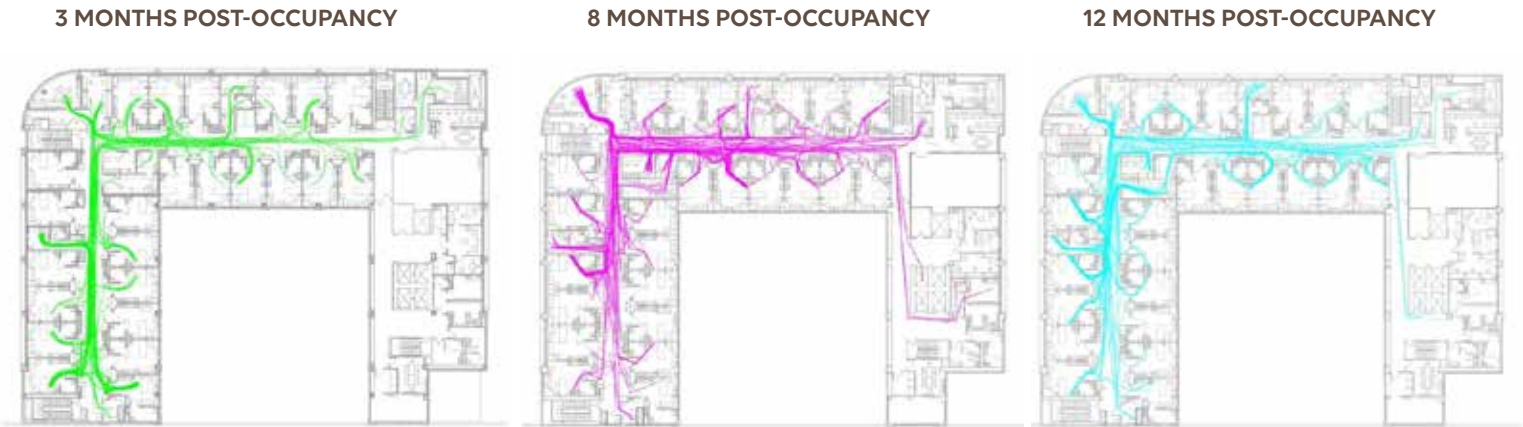
A major hypothesis tested in post-occupancy was reduction in nurse travel distance in the new environment. Nurses’ distance traveled was averaged per a 10-hour dayshift. Total distances include corridor motion and traveling into rooms; it does not consider distance traveled off the unit. Nurses on average traveled 2.08 miles. As demonstrated in the previous chart, this distance is one of the lowest reported findings from other comparable decentralized units (mean=2.24 miles). It is likely that the decentralized environment, which entails locating supply servers and charting stations outside each patient room and creating two semi-decentralized medication rooms and nourishment locations, had contributed to shorter distance traveled.

However, nurses were considerably more efficient in their workflow process over the time of the postoccupancy study. There was a significant improvement ( $p < 0.001$ ) in distance traveled from 3 to 8 to 12-months post-occupancy. If the data from the 3 months data collection phase was removed from our dataset, the overall mean is reduced even further to 1.85 miles.

### OVERALL PERCENTAGE OF TIME SPENT

The floor plans of 8NT below each show a spaghetti diagram overlay of nurses’ travel paths for the different shadow phase (3, 8 and 12 months). The diagrams demonstrate that nurses are assigned to patient rooms according to proximity to other patients and charting stations. This likely had positively influenced efficiency of care, such as travel distances. For the most part, motion was evenly distributed among the unit because of the dispersed supplies and decentralized environment. As expected, the elbow of the floor plan near the HUC and teaming room received the highest amount of traffic.

	8NT POST-OCCUPANCY @ 3 MONTHS	8NT POST-OCCUPANCY @ 8 MONTHS	8NT POST-OCCUPANCY @ 12 MONTHS	8NT OVERALL AVERAGE
Distance Traveled	2.89 miles	2.04 miles	1.64 miles	2.08 miles



# VALUE AND TIME

Overall, roughly 81% of nurses' time was spent at value-added activities. Although benchmark standards are not given on this measure, 80% is a typical standard to meet for other measures (e.g., percent satisfied). Approximately 19% of nurses' time was spent performing non-value added activities. The graph shows that time spent at value-added activities increased by 2% at each data collection phase.

## VALUE-ADDED ACTIVITIES

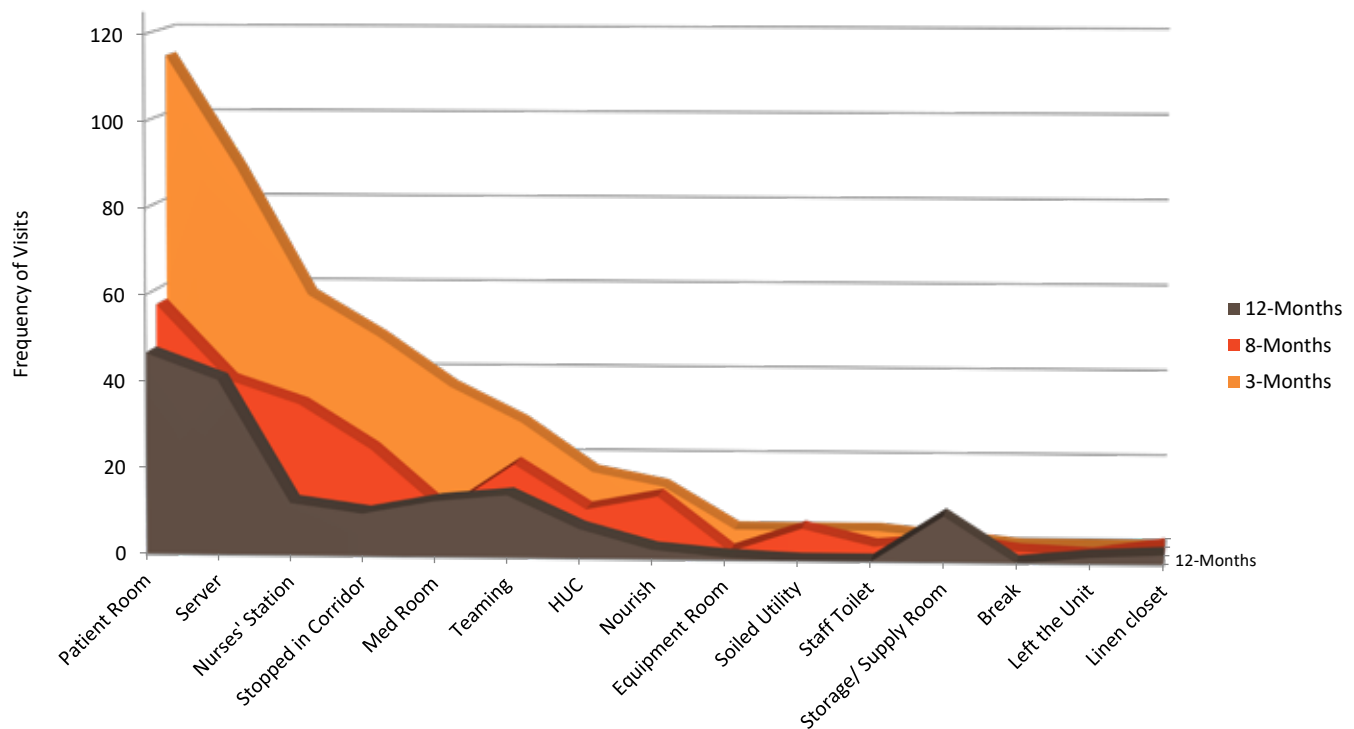
- Providing direct care in patient rooms
- Coordination of care, communication with others
- Charting
- Retrieving supplies or medications
- Cleaning/sanitizing hands

## NON-VALUE ADDED ACTIVITIES

- Traveling
- Off the unit
- Interrupted
- Break
- Delay, waiting, reworks
- Searching for supplies, medication, or a caregiver retrieving food and drinks
- Retrieving linens
- Retrieving and dropping off equipment



# IMPROVEMENT OVER TIME



## FREQUENCY OF VISITS

The graph above shows the frequency of visits to areas on the unit at 3, 8 and 12 months post-occupancy. This graph clearly demonstrates that nurses have become more efficient in their workflow process over time. There was a reduction in the frequency of visits to areas on the unit. It should be noted that after each data collection phase, a report was provided to the nurse manager that detailed observations of workaround and redundancies. Suggestions to workflow operations were provided and modifications were executed by appropriate staff. For example, the results of the 3 months data gathering event showed nurses hunting for medical supplies from one server to another towards the end the shift. It was suggested to add another restocking period and create a par list of needed supplies per patient care needs. Another observation was the need for nurses to travel from the medication room in the middle of a corridor, to the teaming area in the elbow of the unit to verify medications with the pharmacists. The nurse manager worked with pharmacy to rectify this redundant task.



# PATIENT METRICS

In 2017, there were 5.2 FEWER STAGE 2 AND ABOVE PRESSURE ULCER INCIDENCES with a ROI of

**\$224,536 yearly**

Significantly less ALOS, approximately 30 less patient days yearly with a ROI of \$93,765 yearly

**35% reduction**

in falls (per 1,000pt/days); 5.75 fewer falls with injuries yearly with a ROI of \$53,667 yearly

Significant increase in key HCAHPS items:

**15%** in Quietness (p<0.000\*\*\*)

**7%** in Cleanliness (p<0.000\*\*\*)

**7%** in Overall Care (p<0.000\*\*\*)

**4.5%** in Likelihood to Recommend (p=0.003\*\*)

**3.5%** in Communication with Nurses (p=0.024\*)

# STAFF METRICS

Improve staff efficiency  
by 6% with a ROI of

**\$182,097 yearly**

**Seven less**

voluntary staff turnover with a ROI of  
\$23,949 in recruitment yearly

## IMPROVED STAFF SATISFACTION

by 31.76% and a 6.3% turnover rate

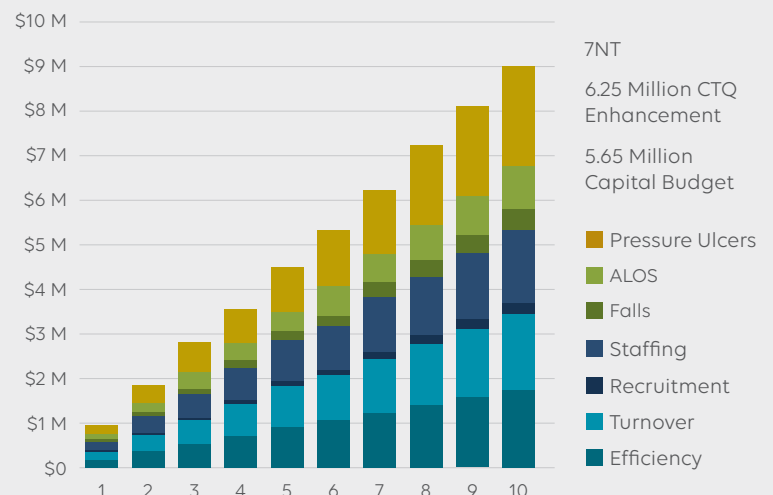
with a yearly ROI of

**\$103,962** in hiring and training of new staff  
and **\$160,200** in premium pay

In total it is estimated that with only four staff metrics (efficiency, turnover, recruitment, and staffing) there is a combined annual cost savings of \$526,272.00; and with only three patient metrics (falls, pressure ulcer, and LOS) there is a combined annual cost saving of \$371,968.00. Overall, an estimated ROI of \$898,240.00 that it will take roughly 7 years to recoup the one-time construction cost of \$6.25 million for the 24-bed inpatient unit.

This is the highest performing unit within the organization, justifying the value-add of the increased room size.

STAFF & PATIENT METRICS ROI



HGA

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