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# Promoting Rest and Sleep: A Randomized Trial Across Multiple Hospitals

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Acknowledge funding received by PCORI (MPI: Vahidy & Taffet) to study the comparative effectiveness of a sleep hygiene bundle aimed at reducing in-hospital delirium among older adults

The study described is supported by Patient Centered Outcomes Research Institute (PCORI): DE-2023C1-31325

***Improving In-Hospital Sleep Hygiene to Prevent and Curtail Delirium Among Older Adults***

# Learning Objectives



- Discuss the conceptualization and implementation of a sleep bundle intervention across multiple hospitals.
- Describe essential systemwide considerations when evaluating the effectiveness of a sleep intervention.

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# Contextualizing the Nature of the Problem

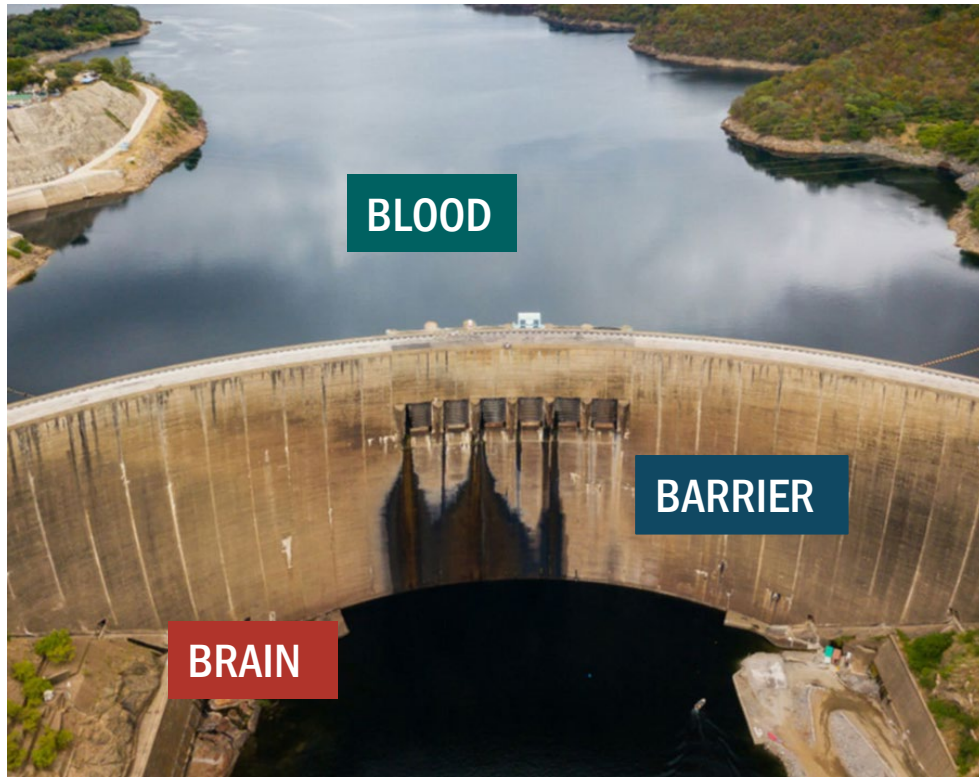
# What is Delirium?

- Delirium is a sudden, often severe, state of confusion caused by a medical illness or medication.
- It is a global problem with thinking:
  - patients may be very sleepy or agitated
  - will not be able to pay attention or stay on task
- It may resolve quickly but can last weeks to months.
- **The most frequent complication of hospitalization for older adults.**
- Approximately 1/3 of patients 70 or older have evidence of delirium during their stay. (Marcantonio, NEJM 2017)
- Associated with increased risk of death and increased risk of being unable to return home and needing a nursing home.

Slide Source: Marcantonio ER. Delirium in hospitalized older adults. N Engl J Med. 2017;377(15):1456-1466. doi:10.1056/NEJMc1605501

# Sleep has Important Physiologic Roles to Protect the Brain

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Fortification of the Blood-Brain Barrier

Glymphatics: Facilitate removal of Metabolic Waste

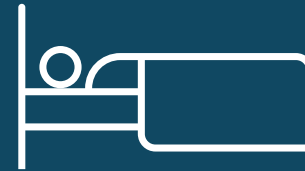
Wilson, J.E., Mart, M.F., Cunningham, C. et al. Delirium. Nat Rev Dis Primers 6, 90 (2020). <https://doi.org/10.1038/s41572-020-00223-4>

# Eliciting Patient Voices and Actions

# Survey Methods to Address Sleep Experience

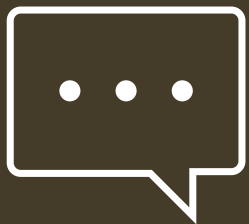


**Coordination with System Patient Experience**



**Actigraphy Sub-study**

- Measured sleep intervals & surveys



**Automated Text Messages**

- Daily Questions on How did you sleep last night?



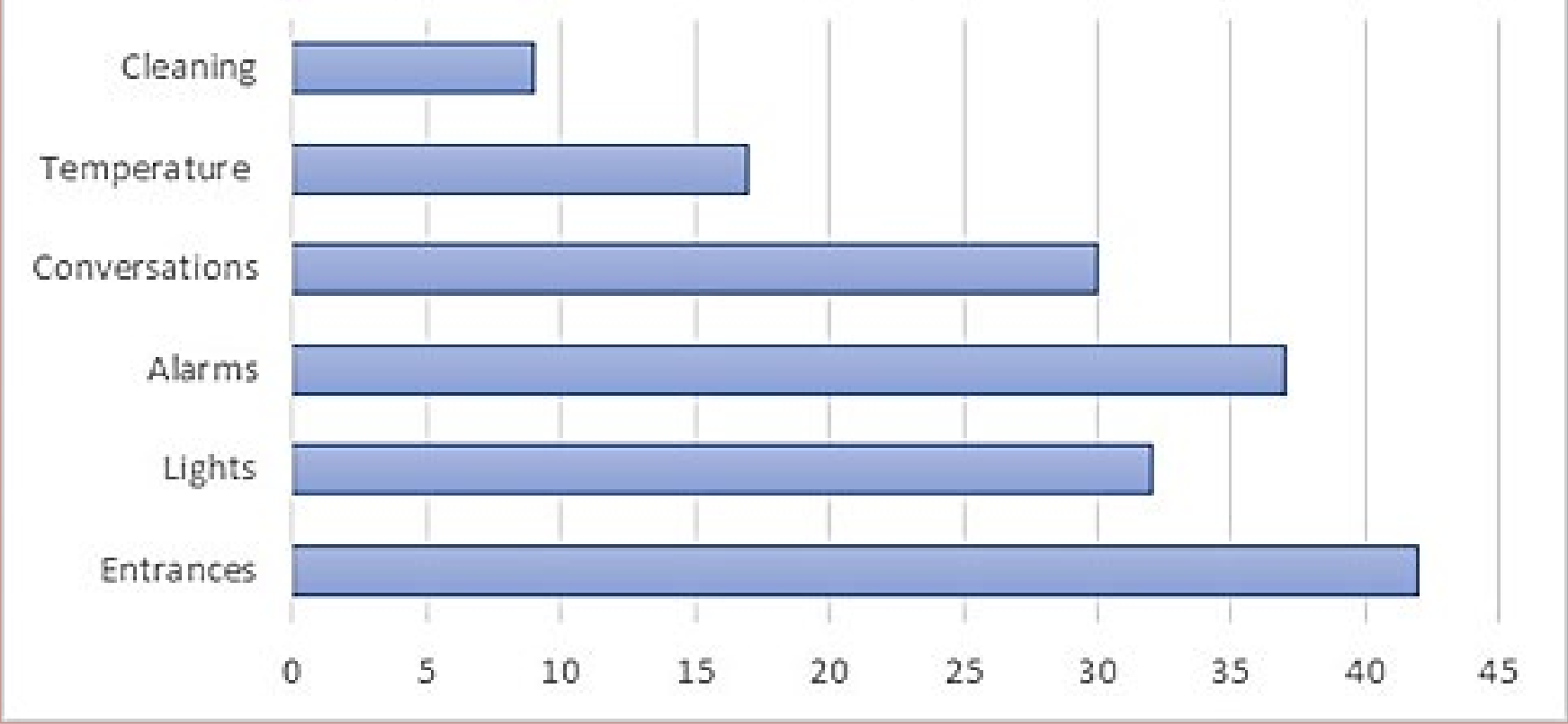
**Audits of Interruptions**

- Live & data audits of interruptions

# Our Patients Want to Sleep



**We believe targeting the top four would highly improve patient experience.**



***Percentage of Patients Reporting each Disturbance during Sleep Time.***

*Results of Survey of 241 Older Adults after in hospital stay in the HM system hospitals. (2023)*

# Text Message Survey

All patients on study units received a survey on day 3, 5, and 7

Who is answering Patient or Caregiver?

My sleep last night was...

- (1) good night's sleep
- (2) moderately good night's sleep
- (3) somewhat good / somewhat bad night's sleep
- (4) moderately bad night's sleep
- (5) bad night's sleep

Branching logic: If response option is (4) moderately bad or (5) bad night's sleep, then follow up question administered...

What was the reason for your bad or moderately bad night's sleep last night? Select all that apply.

- (1) Noises inside my hospital room (e.g., monitors beeping)
- (2) Noises outside my hospital room (e.g., staff or others talking)
- (3) Light exposure when trying to sleep
- (4) Staff or others entering my room when trying to sleep
- (5) Pain or discomfort
- (6) Unknown reasons
- (7) Other reason(s) Please provide other reason: \_\_\_\_\_

# Survey Responses

## Baseline – Non-Intervention

978 responses, **684 unique patients**

- Age <70 years: 45.5%
- Age 70+ years: 54.5%

15% Overall report Moderately Bad to Bad sleep experience



Response, n%	
Good	26.2%
Moderately Good	32.5%
Somewhat Good	26.4%
Moderately Bad	8.5%
Bad	6.4%

**20% of younger patients report poor sleep vs 11% of older patients**

# Reasons for Poor Sleep

Table: Reasons for Poor Sleep, Stratified by Age at Admission



**Pain**

- #1 problem for sleep in young
- #2 problem in older

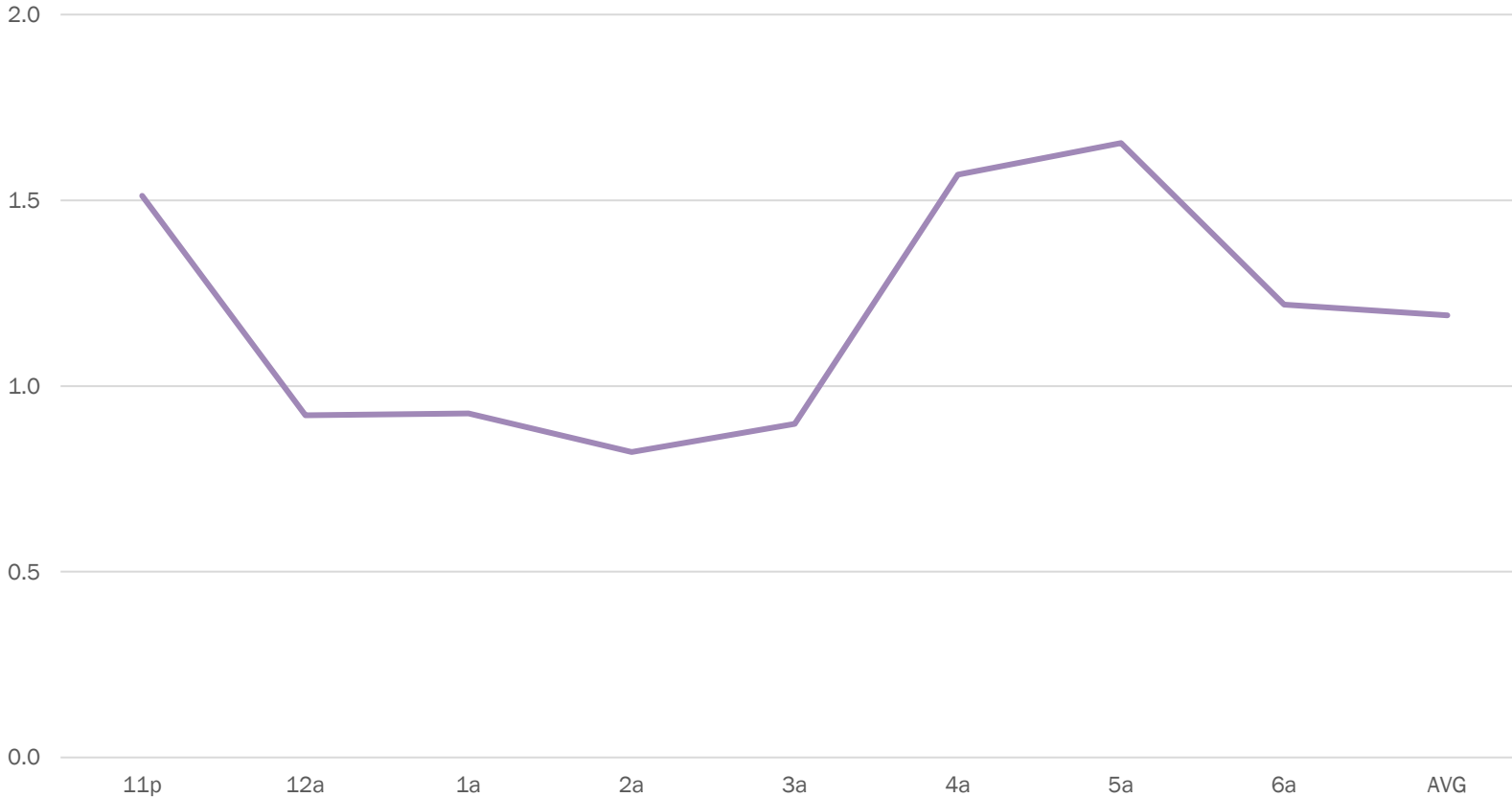
Other medical issues next – urinary issues, shortness of breath, anxiety

**30% attributed to environment**

	Age at Admission		
	Overall N = 146 <sup>1</sup>	<70 Years N = 80 <sup>1</sup>	70+ Years N = 66 <sup>1</sup>
Staff or others entering my room when trying to sleep, n (%)	21.9%	17.5%	27.3%
Pain or discomfort, n (%)	54.1%	68.8%	36.4%
Light exposure when trying to sleep, n (%)	8.2%	10.0%	6.1%
Noises inside my hospital room, n (%)	8.9%	7.5%	10.6%
Noises outside my hospital room, n (%)	8.2%	7.5%	9.1%
Other reasons, n (%)	35.6%	30.0%	42.4%
Unknown reasons, n (%)	8.9%	6.3%	12.1%
Intrinsic, n (%)	82.2%	90.0%	72.7%
Extrinsic, n (%)	30.8%	27.5%	34.8%
Unknown, n (%)	8.9%	6.3%	12.1%

# Observing Staff Workflow Real-time

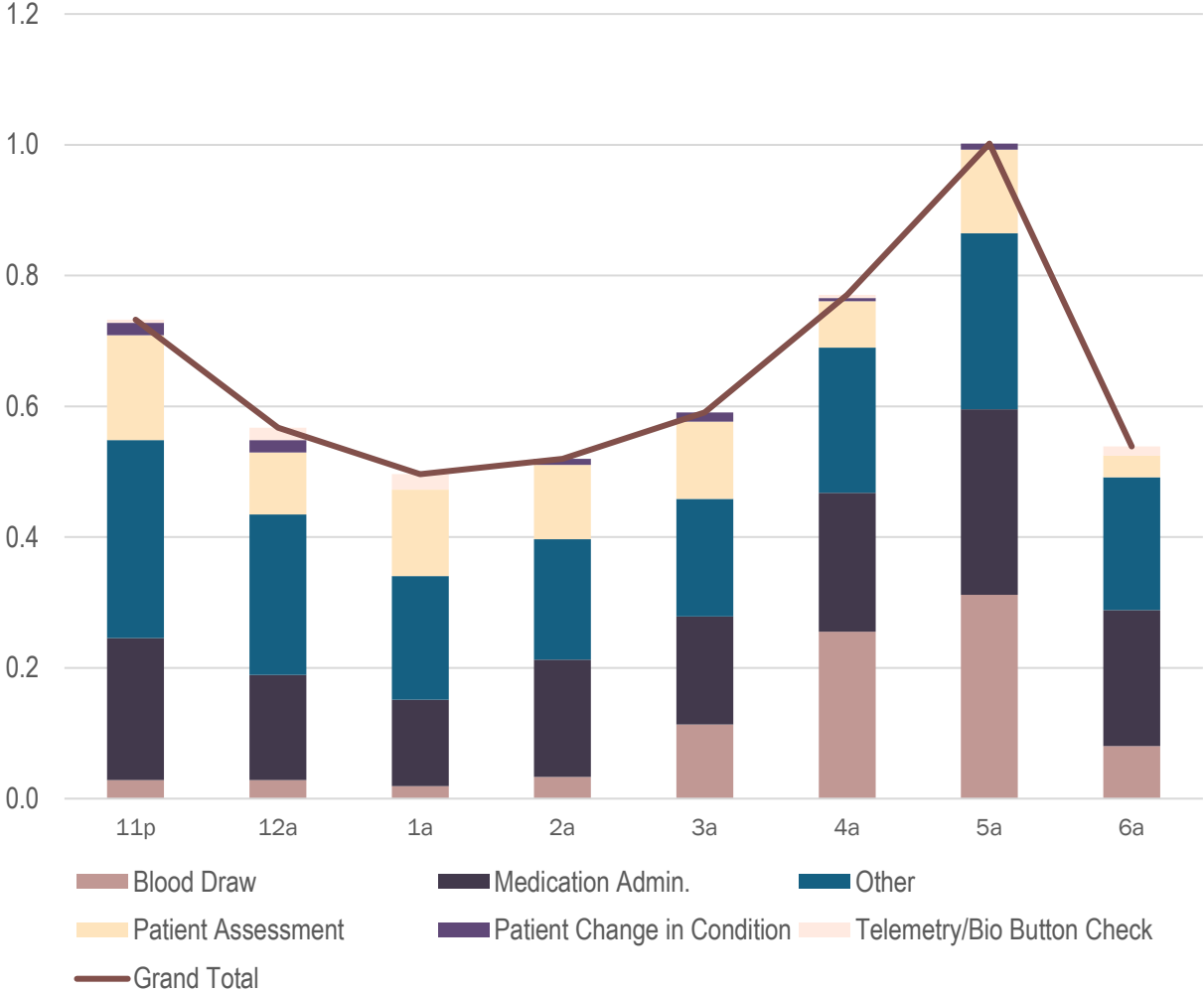
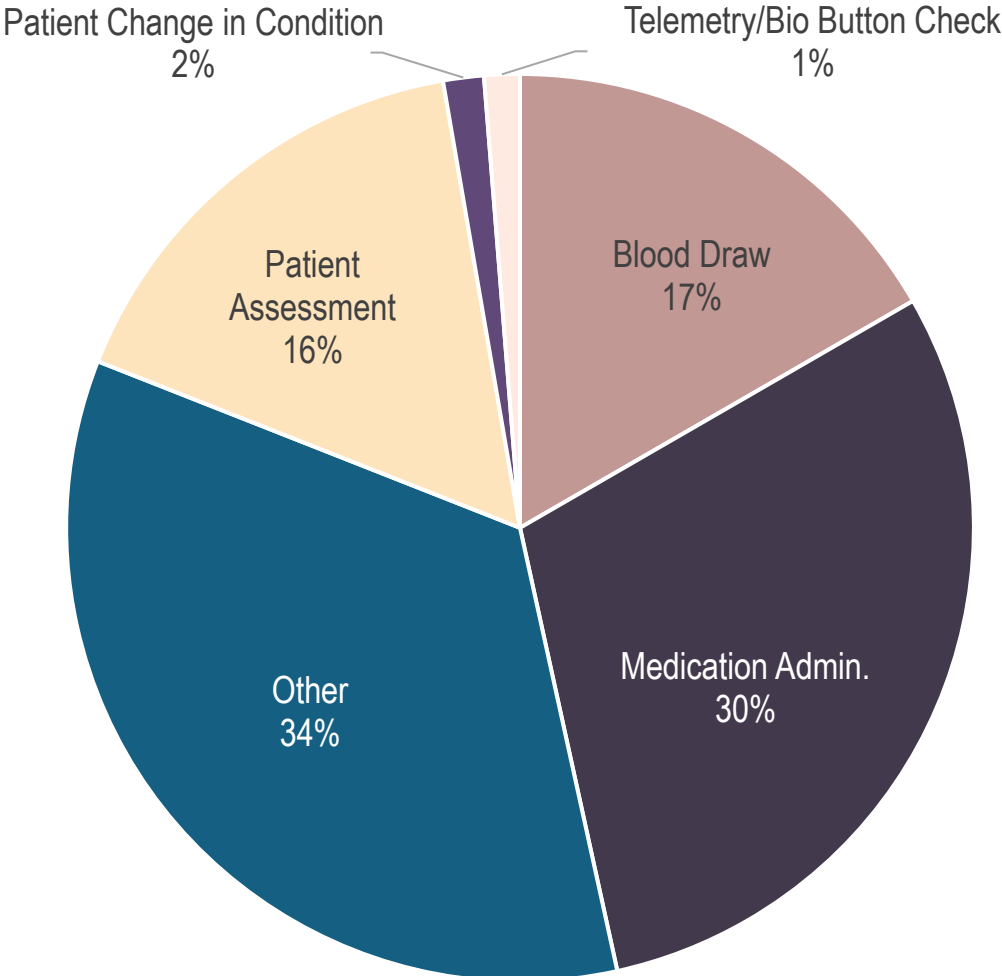
# Baseline average interruptions per room from 3 acute units



- Includes all job categories
- When RN & PCA entered together equals one visit
- Approximately **one interruption per hour** occurred on average

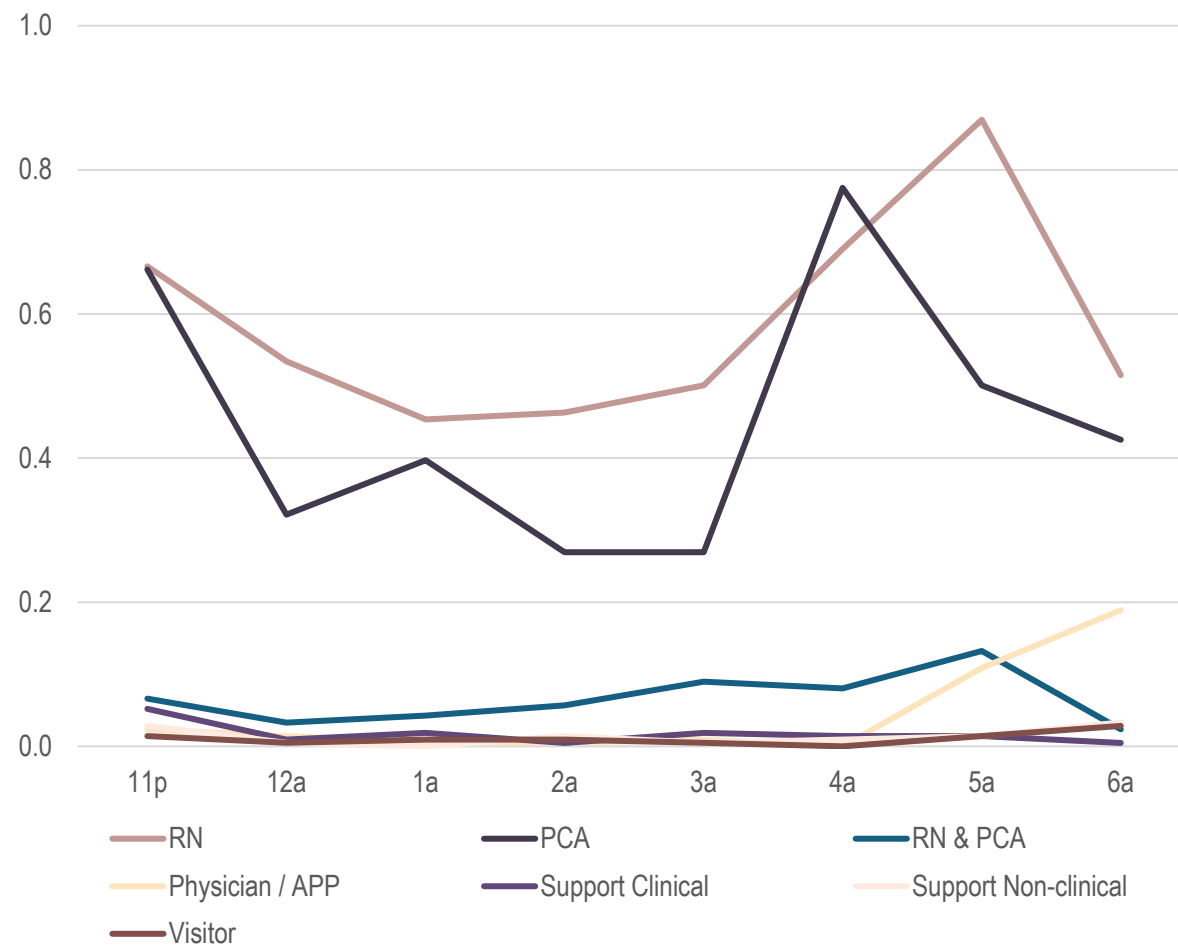
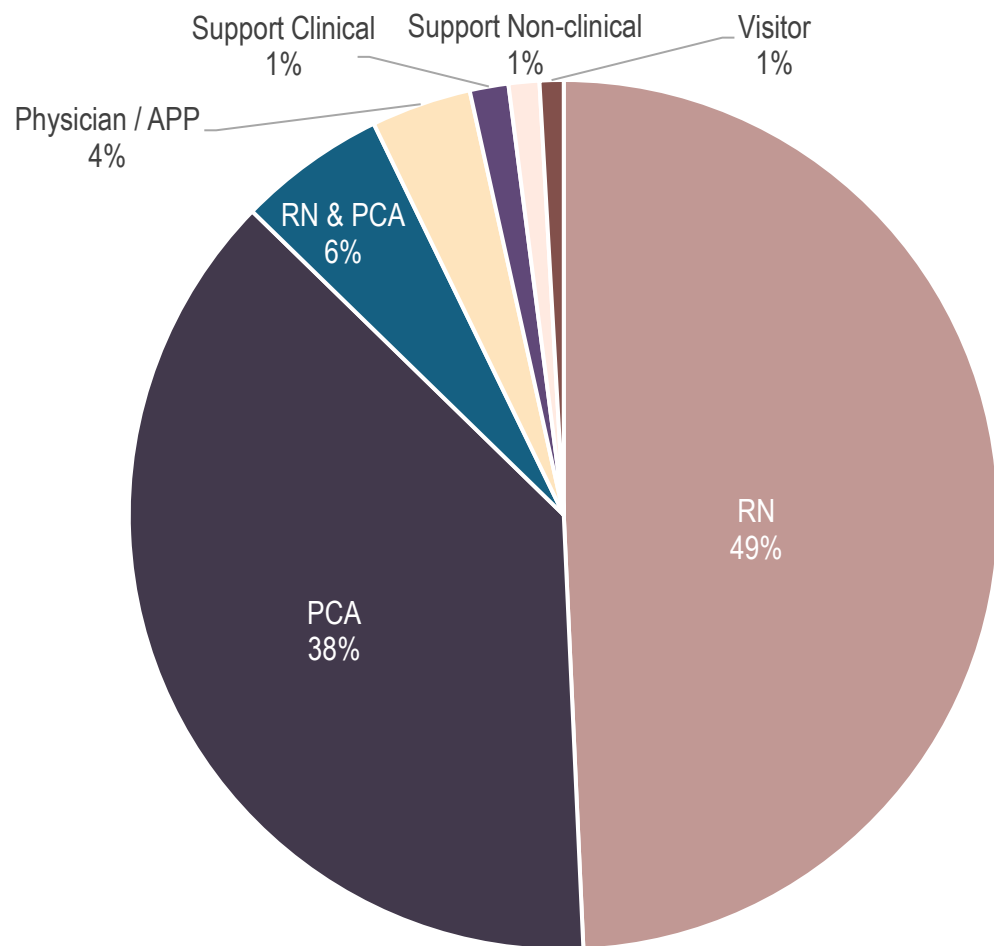
Slide Source: HM Time-Study Analysis, conducted by the Care Redesign Team, Sara Loewy and Gail Vozzella, et al. Fall 2024

# RN Task Details – All Units



Slide Source: HM Time-Study Analysis, conducted by the Care Redesign Team, Sara Loewy and Gail Vozzella, et al. Fall 2024

# Interruptions by Position – All Units



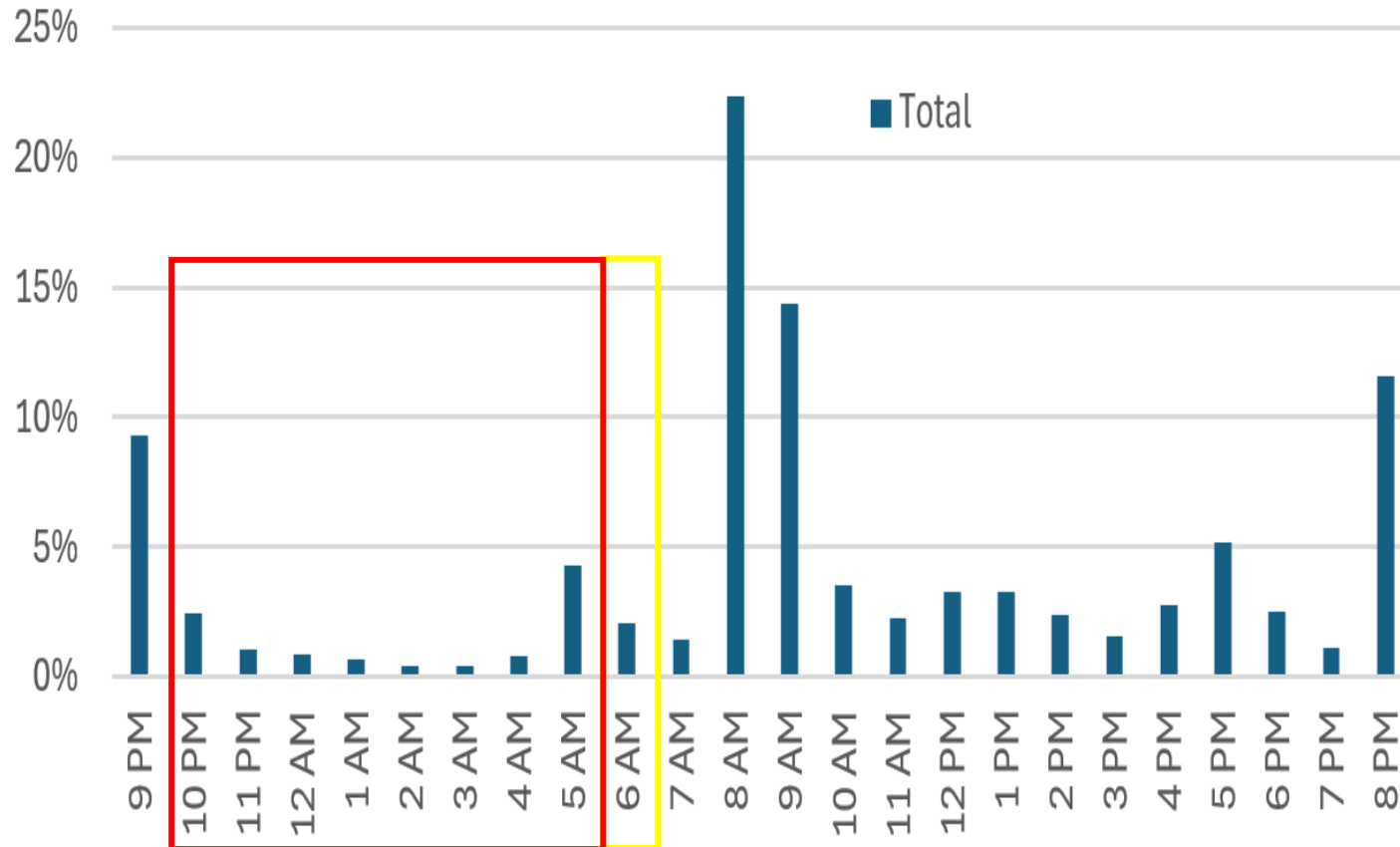
Slide Source: HM Time-Study Analysis, conducted by the Care Redesign Team, Sara Loewy and Gail Vozzella, et al. Fall 2024

# Developing and Implementing the Interventions

	PCORI Intervention	Description
Light & Noise	Reduce night alarms	<ul style="list-style-type: none"> <li>Change frequency of sounds</li> <li>Set timers to preempt pump alerts</li> </ul>
	Use white noise/sleep	<ul style="list-style-type: none"> <li>Use Echo dots in room</li> </ul>
	Offer ear plugs, eye masks	<ul style="list-style-type: none"> <li>Deferred to System</li> </ul>
	Schedule bright lights in day, dimming at night	<ul style="list-style-type: none"> <li>Use shades and light dimming functions</li> </ul>
Communication & Rounding	Set patient expectations on sleep	<ul style="list-style-type: none"> <li>Deferred to System</li> </ul>
	Cluster care before Z-time	<ul style="list-style-type: none"> <li>First layer of education on what clustering is</li> </ul>
	Blood draws before 22:00 or after 5:00 am	<ul style="list-style-type: none"> <li>Cluster care on blood draws</li> </ul>
Technological Changes	Use biosensors to reduce frequency of vital signs	<ul style="list-style-type: none"> <li>Deferred to System</li> </ul>
	Pharmacy EMR changes	<ul style="list-style-type: none"> <li>Adding "while awake"</li> <li>8-hour v 6-hour dosing to avoid Z-times</li> <li>Reduce sedative hypnotics &amp; use melatonin agonists</li> </ul>
	Increase day activities & mobility during day	<ul style="list-style-type: none"> <li>Use hearing amplifiers and engagement tools</li> </ul>

System Intervention		Description
Light & Noise	Noise assessments	<ul style="list-style-type: none"> <li>Audit tool developed for picture perfect team to assess sounds.</li> <li>Door closure signs added</li> </ul>
	Introduce quiet times	<ul style="list-style-type: none"> <li>Discouraging room entry in Z-time unless patient requests and/or safety checks</li> </ul>
	Offer ear plugs, eye masks	<ul style="list-style-type: none"> <li>Preproduced night kits offered</li> </ul>
Communication & Rounding	Set patient expectations on sleep	<ul style="list-style-type: none"> <li>Developed an acronym (REST) &amp; buttons/signage on promoting rest</li> </ul>
	Cluster care before Z-time	<ul style="list-style-type: none"> <li>Developed education for PCAs, nursing with several case simulations of what to do and what not to do</li> </ul>
	Night managers assessments	<ul style="list-style-type: none"> <li>Leaders rounding at night to check on clustering behaviors</li> </ul>
Technological Changes	Use biosensors to reduce frequency of vital signs	<ul style="list-style-type: none"> <li>Discretion afforded where BP falls outside of parameters</li> </ul>
	Virtual rounding at night	<ul style="list-style-type: none"> <li>Using technology and night dims to virtually conduct safety checks</li> </ul>

# Analysis of Medication Administration Times 1 month – 847,000 administrations



- 5% of all meds are given during sleep time (10pm – 5am)
- 3142 or 60% of patients 70+ years received at least 1 scheduled medication during sleep time

Tran G, Liebl M, Agarwal KS, Bui N. Baseline Assessment of Nighttime Medication Administrations among Older Adults at a Large Academic Health System. Preliminary Data 2025

# Highest Frequency Night-time Medications

## Interventions: Modifications to EMR

1. Move Scheduled Non-Time Critical Medications to Non-Sleep Times.
2. Give options for while awake for nebulized medications.
3. Adjust schedule for medication times further from sleep times.

Tran G, Liebl M, Agarwal KS, Bui N. Baseline Assessment of Nighttime Medication Administrations among Older Adults at a Large Academic Health System. Preliminary Data 2025

	INSULIN LISPRO SLIDING SCALE	4.87%
	IPRATROPIUM-ALBUTEROL 0.5-2.5 MG/3ML IN SOLN	4.39%
	IPRATROPIUM BROMIDE 0.02 % SOLUTION FOR INHALATION	4.23%
★	HEPARIN (PORCINE) 5 000 UNIT/ML INJECTION SOLUTION	3.59%
	ACETAMINOPHEN 500 MG TABLET	2.19%
★	LIDOCAINE 4 % TOPICAL PATCH	2.13%
	METHYLPREDNISOLONE SOD SUCC (PF) 40 MG/ML SOLUTION FOR INJECTION	2.08%
	FUROSEMIDE 10 MG/ML INJECTION SOLUTION	1.53%
	METHOCARBAMOL 500 MG TABLET	1.40%
	ACETAMINOPHEN 325 MG TABLET	1.34%
	ATORVASTATIN 40 MG TABLET	1.14%
★	PANTOPRAZOLE 40 MG TABLET DELAYED RELEASE	1.13%
	METOPROLOL TARTRATE 5 MG/5 ML INTRAVENOUS SOLUTION	0.99%
	GABAPENTIN 300 MG CAPSULE	0.97%
★	SENNOSIDES 8.6 MG-DOCUSATE SODIUM 50 MG TABLET	0.95%
	DEXAMETHASONE SODIUM PHOSPHATE 4 MG/ML INJECTION	

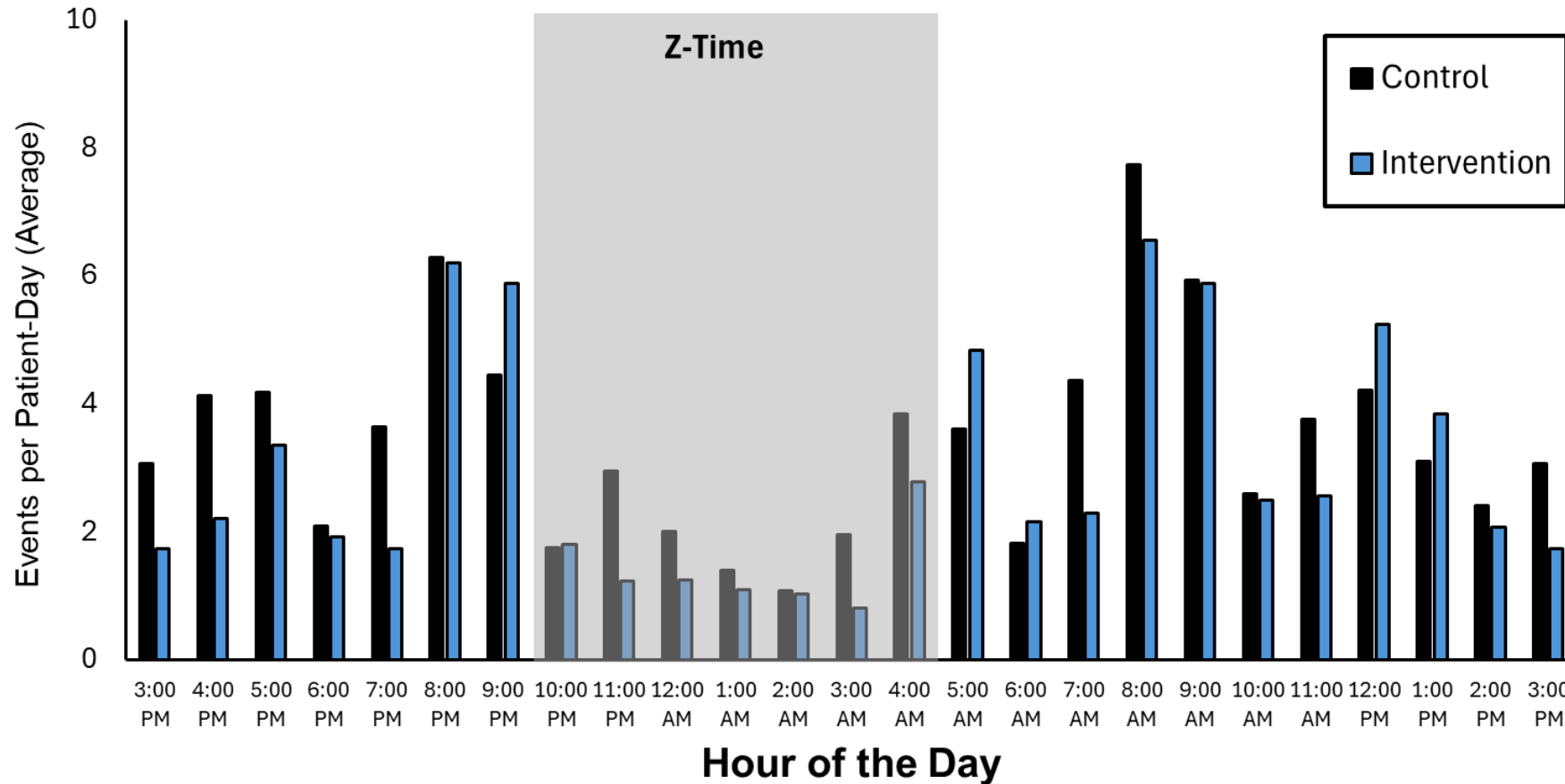
# Results and Implications

# Initial Study Outcomes: June 1, 2024 – June 1, 2025 *(Preliminary Data Only)*

Characteristics	Control Group (n = 10,230)	Intervention Group (n = 872)
<b>Primary Outcomes</b>		
Aim 1: Incidence (proportion) for HAD	7.8%	7.1%
Aim 2: DBI (POA or HAD)	3.20 [0.5 - 8.0]	2.39 [0.67 - 6.23]
Aim 3: Adherence to Multi Modal Sleep Hygiene components		66%
Aim 3: Implementation Factors		---
<b>Secondary Outcomes</b>		
Aim 1: Incidence rate per 1,000 patient-days	12.60	14.78
Aim 2: Resolution of DPOA	31.9%	46.1%
Aim 1 & 2: Delirium Positivity Rate	24.6%	21.0%
Aim 1 & 2: LOS Days: median (IQR)	4.0 [2.0-6.0]	3.0 [2.0-5.0]
Aim 1 & 2: Delirium Free Days	47885 (75.8%)	3345 (79.9%)

Vahidy F, Taffet GE. Improving In-Hospital Sleep Hygiene to Prevent and Curtail Delirium Among Older Adults. (PCORI): DE-2023C1-31325. Ongoing study.

# Hourly Implementation and Fidelity Data (through June 2025)



Vahidy F, Taffet GE. Improving In-Hospital Sleep Hygiene to Prevent and Curtail Delirium Among Older Adults. (PCORI): DE-2023C1-31325. Ongoing study.

*\*Interruption events constitute imaging, labs, and medications. Events are defined based on distinct times of administration / collection, so multiple labs collected at the same time constitute a single event.*

# Workflow Considerations

- Rounding pressures & demands from different people at different times, including morning surgeries.
- Biosensors – BP meds have parameters in night; routine vitals hard to shift
- Patient-centered care & experience versus optimal care/what works best for a workflow perspective
- Paradigm shifts in practice behaviors
- Sustainment
  - Education for new staff on the why behind it

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# Lessons Learned

- Bedside nursing involvement from development, implementation, sustainment.
- Reassessing how it's going over time to measure change fatigue & settling.
- Reassess and scale up or down based on what's working or not.
  - Won't add to their plate unless we find things to take away
- Inclusions of night shift:
  - Trainings at night
  - Validations, audits, and reassessments at night

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# Key Takeaways

- Key stakeholder identification and involvement
  - Nursing Leadership, Unit Leadership, Ancillary Leadership, etc.
- Initial and sustained education
  - To explain the Why and ensure new staff understand expectations
- Develop methods to track patient feedback and outcomes real time
  - Leverage data to drive decisions
  - Conduct real time observations to understand the voice of the patient and staff

# Questions?



## Contact:

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