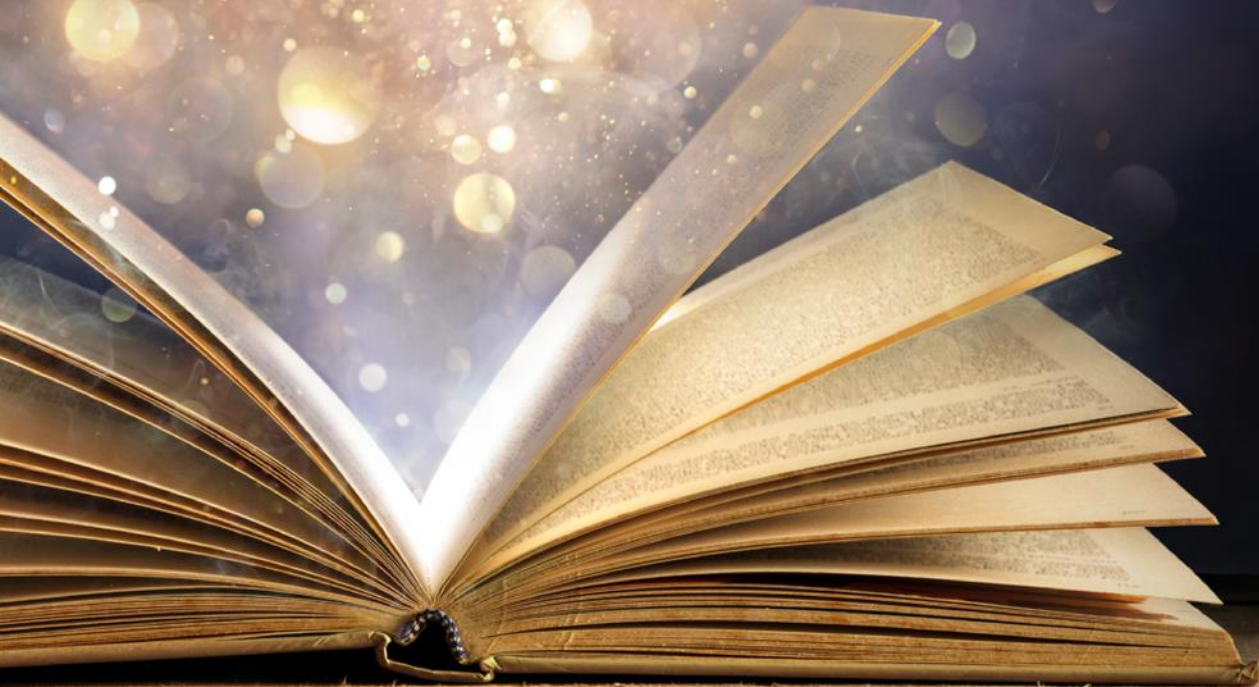


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Pressure Injury AI and Quality Improvement Tools: Millions in Cost Avoidance

Ashley Caceres, MSN, RN, Director of Nursing

Kim-Anh-Nhi (Nhi) Nguyen, M.Sc., Senior Data Scientist

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Learning Objectives



- Discuss the role of quality improvement in pressure injury management
- Explain the integration of AI in predictive risk models



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We think and act as one health system

We Are *One Mount Sinai*

One Mount Sinai for:



Our Patients

World-class, compassionate patient care for diverse communities we serve

Our People

Best-in-class and empowered workforce

Our World

Unrivaled research and education

to support:



**Mount
Sinai**

600,000

Annual ED visits
within Mount Sinai
Health System

700

Emergency Nursing
team members

240

Emergency Medicine
physicians and more
than 100 PAs and NPs

7

Emergency
Departments

10,000

Virtual Urgent Care
visits in 2024

Emergency Department

- 1 Mount Sinai Brooklyn
3201 Kings Highway
Brooklyn, NY 11234
- 2 The Mount Sinai Hospital
One Gustave L. Levy Place
New York, NY 10029
- 3 Mount Sinai Queens
25-10 30th Avenue
Astoria, New York 11102
- 4 Mount Sinai Morningside
1111 Amsterdam Avenue
New York, NY 10025
- 5 Mount Sinai West
1000 Tenth Avenue
New York, NY 10019
- 6A Mount Sinai South Nassau
One Healthy Way
Oceanside, NY 11572
- 6B Mount Sinai South Nassau
Freestanding Emergency
Department at Long Beach
325 East Bay Drive
Long Beach, NY 11561

Affiliates

- 1 Elmhurst Hospital Center
79-01 Broadway
Elmhurst, NY 11373
- 2 Queens Hospital Center
82-68 164th Street
Jamaica, NY 11432
- 3 Richmond University Medical Center
355 Bard Avenue
Staten Island, NY 10310

Long Island, NY

Source: Mount Sinai Brand Center

Definitions



- Community Acquired Pressure Injury (CAPI) refers to pressure injury developed prior to the hospital admission. The pressure injury must be documented on day 1 of the hospital stay.
- Hospital Acquired Pressure Injury (HAPI) refers to a new pressure injury that develops after admission to a facility. If there is no documentation within 24 hours that the pressure injury was present on admission, then the pressure injury should be counted as hospital acquired.

Cost

Exhibit 7. Summary of meta-analysis additional cost estimates

	Studies (n)	Range of Estimates	Estimate (95% CI)
Adverse Drug Events (ADE)	2	\$1,277–\$9,062	\$5,746 (-\$3,950–\$15,441)
Catheter-Associated Urinary Tract Infections (CAUTI)	6	\$4,694–\$29,743	\$13,793 (\$5,019–\$22,568)
Central Line-Associated Bloodstream Infections (CLABSI)	7	\$17,896–\$94,879	\$48,108 (\$27,232–\$68,983)
Falls	3	\$2,680–\$15,491	\$6,694 (-\$1,277–\$14,665)
Obstetric Adverse Events (OBAE)	2	\$13–\$1,190	\$602 (-\$578–\$1,782)
Pressure Ulcers	4	\$8,573–\$21,075	\$14,506 (-\$14,506–\$41,326)
Surgical Site Infections (SSI)	5	\$11,778–\$42,177	\$28,219 (\$18,237–\$38,202)
Ventilator-Associated Pneumonia (VAP)	5	\$19,325–\$80,013	\$47,238 (\$21,890–\$72,587)
Venous Thromboembolism (VTE)	4	\$11,011–\$31,687	\$17,367 (\$11,837–\$22,898)
<i>C. difficile</i> Infections (CDI)	9	\$4,157–\$32,394	\$17,260 (\$9,341–\$25,180)

Source: Agency for Healthcare Research & Quality

Plan



Team

- Emergency Department Unit Based Council
- Shared Governance
- Magnet Champions
- Leadership
- Quality

Pilot Started February 2022

Aim: During the pilot period, increase the discovery of Community Acquired Pressure Injury in the ED by 50% and eliminate Hospital Acquired Pressure Injury as a result of lack of discovery in the ED setting.

Do



ED Community Acquired Pressure Injury (CAPI) PILOT										
MRN #	Age	Date	Time of Assessment	2 RN Check with Primary RN	LOS at time of assessment	Findings (Stage, DTI, not present)	CAPI Present on ED Admission documented?	LDA & Safety Net entered?	Prevention Actions	Comment

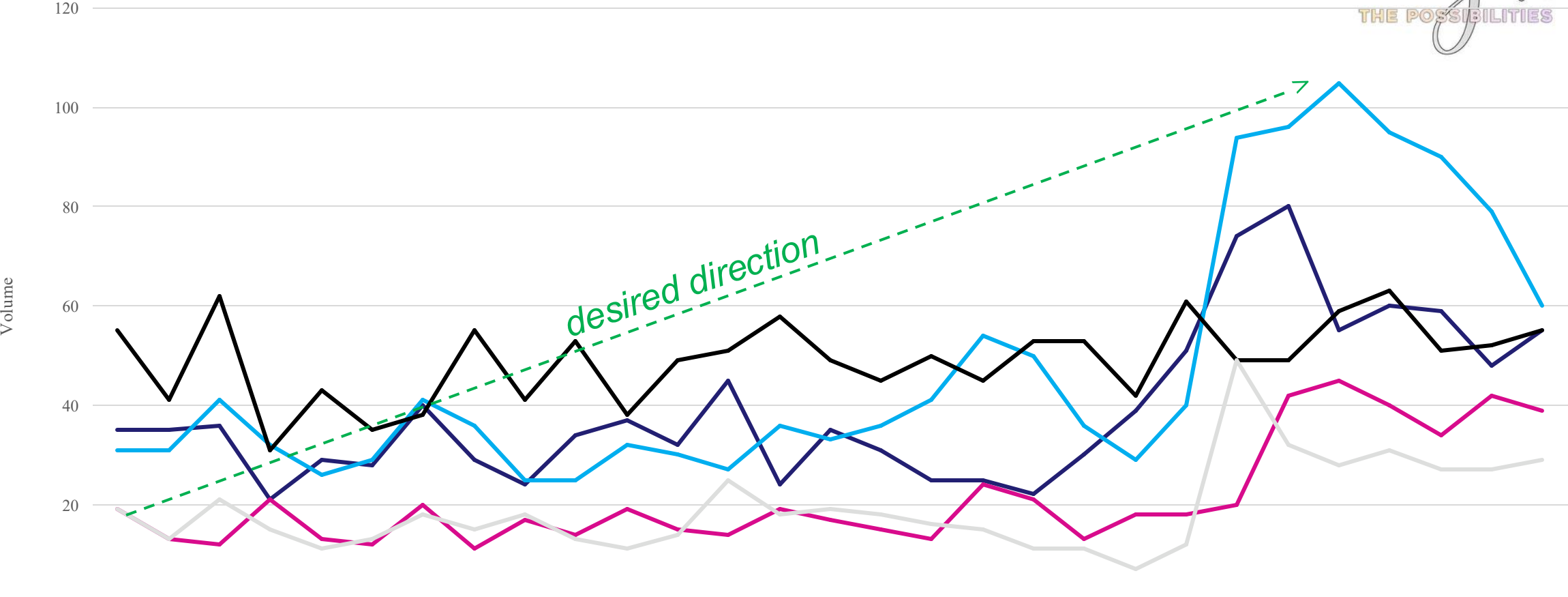
- Level 1-Admitted patients 65>
- Level 2-All Admitted patients
- Level 3-All patients 65>
- RN Assigned as skin nurse
- Goal for 16 hours per 24 hour shift
- Scan all pilot forms for QA
- Two RN Assessment for staging and plan
- Skin Nurse and Primary Nurse
- EMR documentation
- Preventative measures
- Safety Net Entry
- Trigger consults as needed

Do



- Wound Care Specialist Support (CWOCN)
- ED Wound Cart Development
- Educate ED RN & Assistive Staff
- Wound Consultations in ED
- New Hire Monthly Skin/Wound/Ostomy Orientation
- Sinai i-phone Aiding in CAPI Discovery & Documentation
- Pressure Injury EHR LDA documentation access
- Pressure injury pictures, uploading to EHR
- Easily accessible/usable Vs. a WOW stretcher-side in tight spaces

CAPI Per Site Jan 2023 – May 2025



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
	2023												2024												2025				
MSB	35	35	36	21	29	28	40	29	24	34	37	32	45	24	35	31	25	25	22	30	39	51	74	80	55	60	59	48	55
MSH	31	31	41	32	26	29	41	36	25	25	32	30	27	36	33	36	41	54	50	36	29	40	94	96	105	95	90	79	60
MSM	19	13	12	21	13	12	20	11	17	14	19	15	14	19	17	15	13	24	21	13	18	18	20	42	45	40	34	42	39
MSQ	55	41	62	31	43	35	38	55	41	53	38	49	51	58	49	45	50	45	53	53	42	61	49	49	59	63	51	52	55
MSW	19	13	21	15	11	13	18	15	18	13	11	14	25	18	19	18	16	15	11	11	7	12	49	32	28	31	27	27	29

Source: MSHS Nursing Strategic Dashboard

Results



Pre-pilot 460 CAPIs discovered – During Pilot 877 CAPIs discovered –
Standard Work 798 CAPIs discovered



HAPI discovery within 1-2 days went from 8.96% to 3.45%



Cost avoidance from August 2024-April 2024 - \$11,575,788



2023 – 70 HAPIs vs. 2025 – 8 HAPIs discovered within 1-2 days of admission

Source: <https://www.ahrq.gov/hai/pfp/haccost2017.html> / MSHS Nursing Strategic Dashboard

Challenges

A vertical diagram on the left side of the slide consists of three white circles connected by a thin grey line. Each circle is positioned to the left of a horizontal bar. The top bar is dark purple, the middle bar is teal, and the bottom bar is black. The text for each challenge is written in white within its respective bar.

Staffing demands (12-16 hours of Nursing Skin Care Rounds in 24 hour period)

Varying RN and Assistive staff education

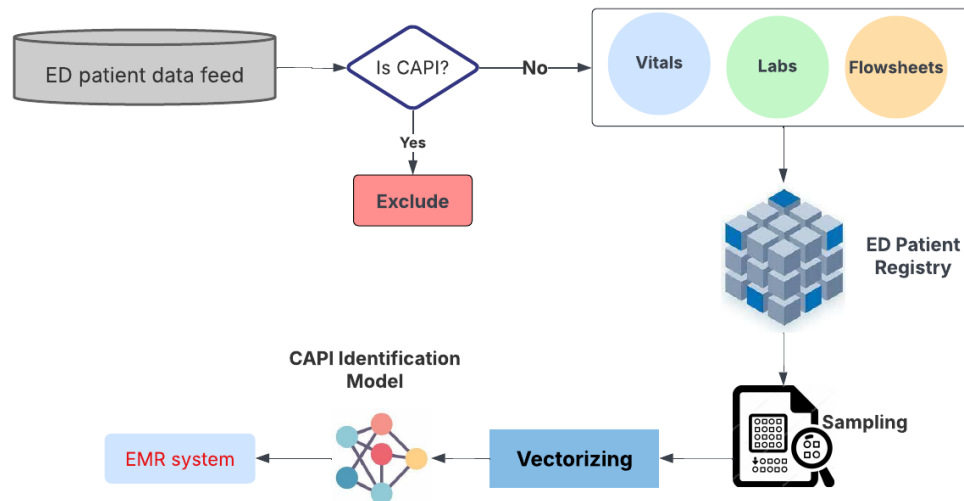
Prevention methods

Using AI to identify CAPI patients in the ED

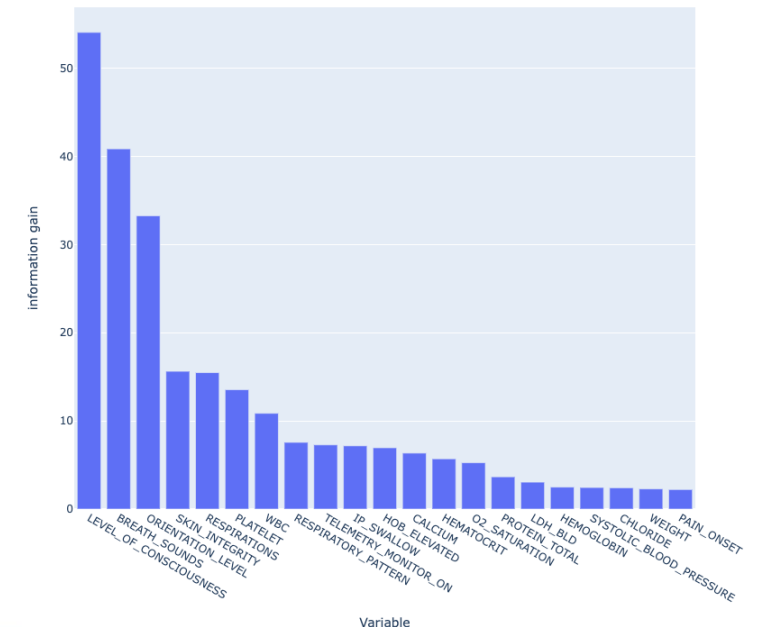


- **Goals:** perform profiling and identification of CAPI patients in the ED with a predictive model for **early and automatic identification**
- ➔ Improve CAPI documentation and take preventative measures to heal CAPIs

Computational Flow



Variable importance



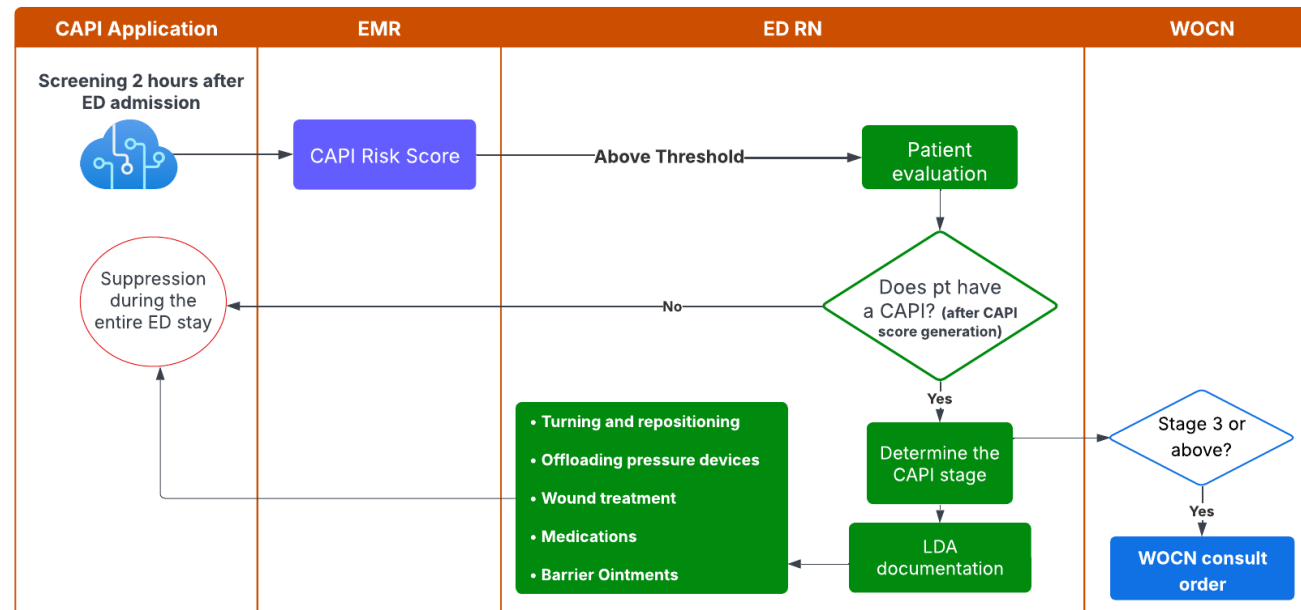
Source: Clinical Data Science team at Mount Sinai Health System

CAPI-AI workflow in the ED



- **Results on a retrospective ED cohort:**
73% Sensitivity, 73% Specificity, 81% AUC
- **Next steps:** pilot to start in Oct 2025

RN workflow



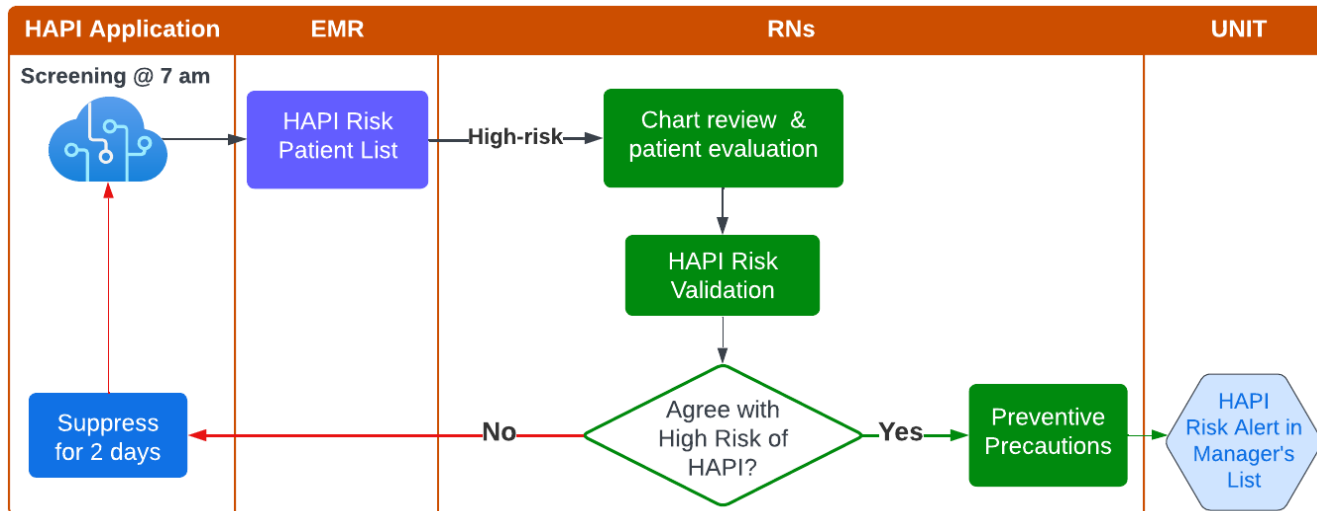
Source: Clinical Data Science team at Mount Sinai Health System

Using AI to prevent HAIs in the inpatient setting



- **Goals:** Identify patients at highest risk of developing HAPI with a predictive machine learning model
- ➔ Take preventative measures with WOCNs (Wound Care Nurses) and RNs to prevent HAIs

RN workflow



Pilot Start	Locations	Scaling Plan
2023/07	The Mount Sinai Hospital	Started with 2 units, now scaled up to 20 units
2025/07	Mount Sinai Brooklyn	2 units

Source: Clinical Data Science team at Mount Sinai Health System

Results of HAPI prevention using AI



KPI 1: Increase % of high-risk patients discharged without acquiring a HAPI

Result To-Date: +102% → \$18M saved

KPI 2: Increase accuracy of AI Model vs. benchmark Braden Score

Result To-Date: +32% improved Sensitivity

Lessons Learned



- Education and clarification of proper protocols regarding skin assessments was necessary
- Clear CAPI vs. HAPI definitions
- Harnessing data and AI, as well as collaborating closely with clinicians can significantly help early prevention and detection of pressure injuries both in the ED and the inpatient settings

Key Takeaways



- Dedicated time and staff to support patient assessments is crucial in high-volume areas
- Repetition and reinforcement of standard work
- A successful operationalization of AI tools requires staff education, EMR integration and continuous monitoring and feedback to prevent pressure injuries

Questions?



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