Break through the throughput plateau

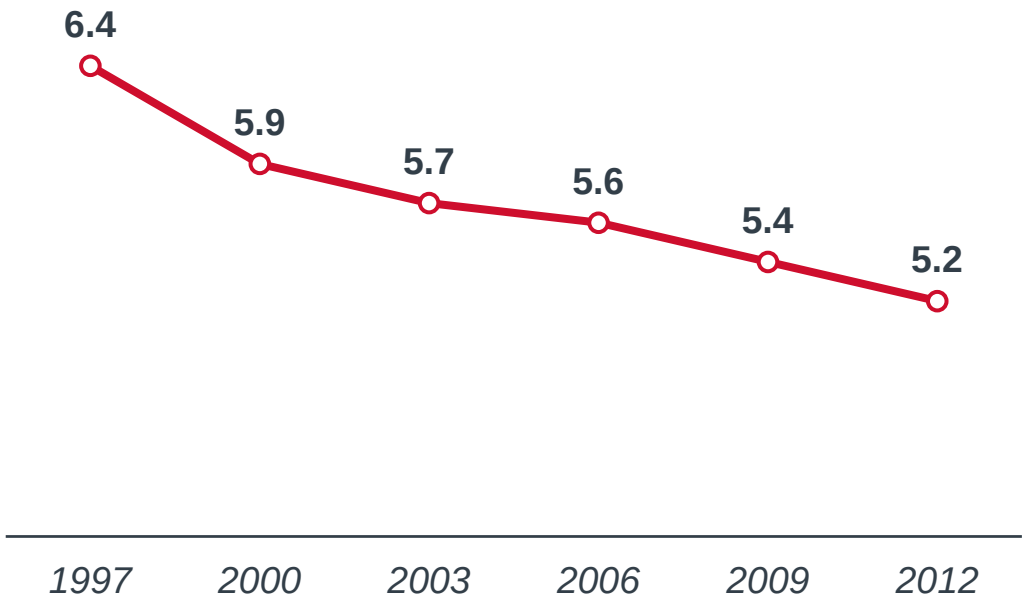
Five strategies to move from acute care throughput to system-wide patient flow

What's your pain level?

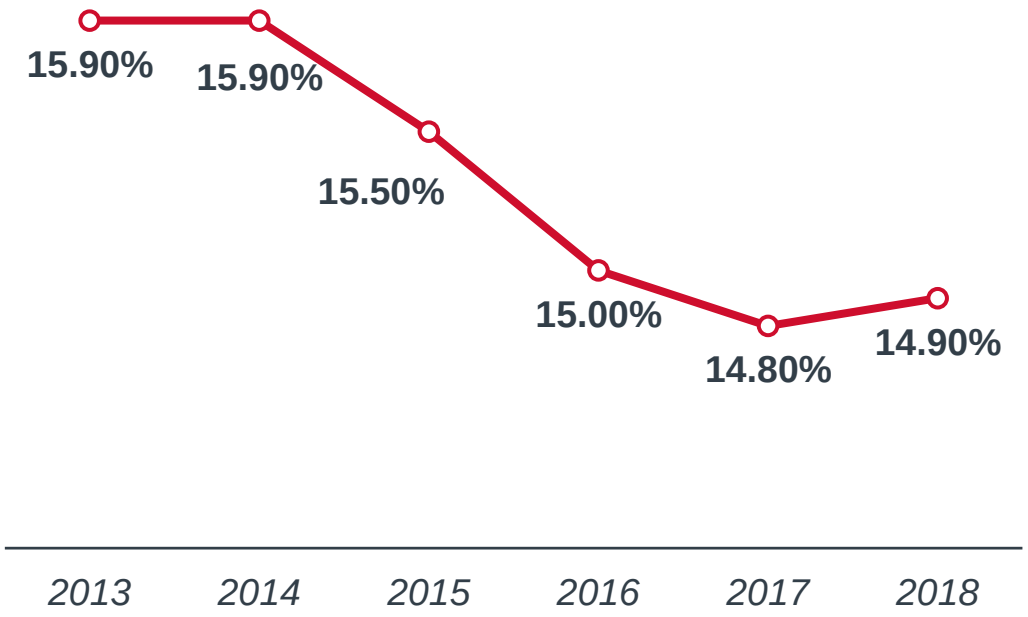
Representative throughput pain scale

Steady progress made on national numbers

Average length of stay in days, 1997–2012[1]



All-cause 30-day readmission rate, 2013–2018[2]

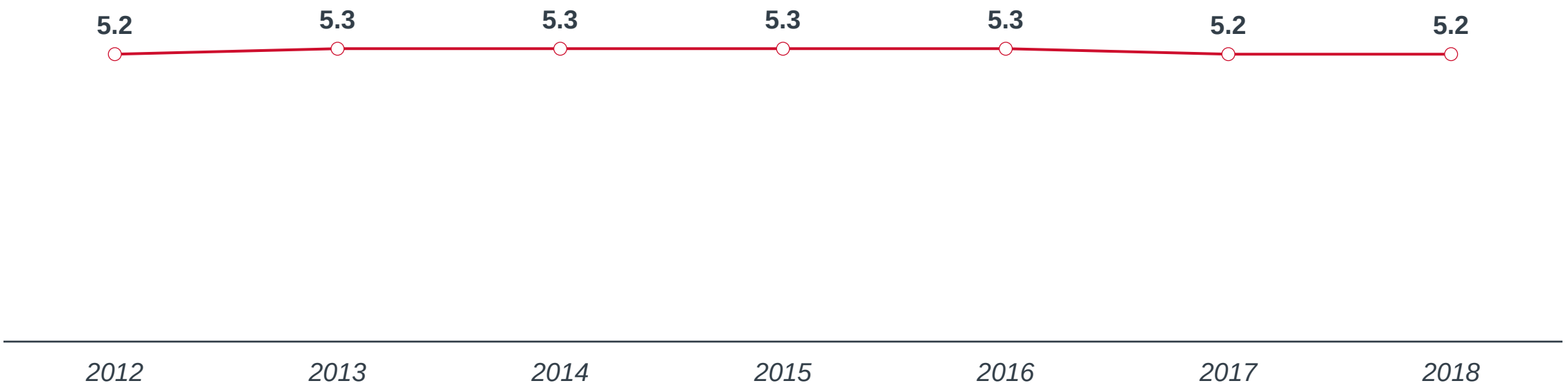


1. Medicare patients.
2. Percentage of Medicare enrollees ages 65 and older who were readmitted within 30 days of hospital discharge.

Source: HCUP Fast Stats, Healthcare Cost and Utilization Project (HCUP), Agency for Healthcare Research and Quality, www.hcup-us.ahrq.gov/faststats/national/inpatienttrends.jsp?measure1=04&characteristic1=04&time1=20&measure2=&characteristic2=01&time2=10&expansionInfoState=hide&dataTablesState=hide&definitionsState=hide&exportState=hide; America's Health Rankings analysis of The Dartmouth Atlas of Health Care, United Health Foundation, https://www.americashealthrankings.org/explore/senior/measure/hospital_readmissions_sr/state/ALL?edition-year=2019.

Sign of success or unwelcome plateau?

Average length of stay in days, 2012–2018[1]



1. Data from CMS' Standard Analytical Files (SAF), which covers 100% of Medicare Fee-for-Service claims for a given calendar year.

Source: CMS, Advisory Board Analysis.

Nursing Executive Center interviews and analysis.

We can’t afford to stop

Revenue impact of 0.25 day reduction in average length of stay[1]

$3.3 M

Additional revenue generation for a 100-bed hospital

$16.4 M

Additional revenue generation for a 500-bed hospital

$3.1 B

Additional revenue generation for U.S. hospitals[2]

Virtual capacity gains by LOS reduction, bed size[3]

	100	200	300	400	500
0.25 days	4	8	12	16	20
0.50 days	8	16	25	33	41
0.75 days	12	25	37	49	61
1.00 days	16	33	49	65	82

- **100-bed hospital:** 0.25 day reduction in length of stay equivalent to adding 4 beds
- **500-bed hospital:** 0.25 day reduction in length of stay equivalent to adding 20 beds

1. Assumes cost per stay of on all-payer basis of $11,700, average length of stay of 5.2 days, and 85% bed capacity.
2. Assumes 931,203 staffed beds in all U.S. hospitals, according to 2017 American Hospital Association survey data.
3. Representative annual gain based on length of stay reduction; assumes average midnight bed occupancy of 85%.

Source: Freeman WJ, et al., “Overview of U.S. Hospital Stays in 2016: Variation by Geographic Region,” HCUP Statistical Brief #246, 2018, Agency for Healthcare Research and Quality, www.hcup-us.ahrq.gov/reports/statbriefs/sb246-Geographic-Variation-Hospital-Stays.pdf; “AHA Hospital Statistics, 2019 edition,” Health Forum LLC, an affiliate of the American Hospital Association, 2019, https://www.aha.org/statistics/fast-facts-us-hospitals; Calculate Your Discharge Opportunity, Clinical Best Practice Collaborative, Advisory Board.

Bottlenecks harm patients, frustrate clinicians

Impact of bottlenecks on patient outcomes, clinicians

DATA SPOTLIGHT

1 in 5

Older adults experienced delirium after 12 or more hours in the ED[1]

2 lbs.

Loss of lean leg mass in older adults following 10 days of bed rest[2]

46%

Of older adults experienced decline in activities of daily living at discharge

12.1%

Of patients with delayed discharge developed one or more medical complications[3]

"I have three patients waiting on discharge orders, the ED won't stop calling me, and I can't reach our attending physician."

Med-surg nurse manager

"I saw a geriatric patient with severe stomach pain five hours ago, and he's still sitting in the ED."

ED physician

1. n=12.
2. Older adults +70 hospitalized for a non-disabling condition; n=2293.
3. Delayed discharges defined as discharges delayed >24 hours after being declared medically fit; n=158.

Source: Samaras N, et al., "Older Patients in the Emergency Department: A Review," Annals of Emergency Medicine, 56, no. 3 (2010): 261-9); Kortebein P, et al., "Effect of 10 days of bed rest on skeletal muscle in healthy older adults," *Jama*, 297, no. 16, 2007, https://www.ncbi.nlm.nih.gov/pubmed/17456818; Covinsky KE, et al., "Loss of independence in activities of daily living in older adults hospitalized with medical illnesses: increased vulnerability with age," *J Am Geriatr Soc*, 51, no. 4, 2003, https://www.ncbi.nlm.nih.gov/pubmed/12657063; Jasinarachchi KH, et al., "Delayed transfer of care from NHS secondary care to primary care in England: its determinants, effect on hospital bed days, prevalence of acute medical conditions and deaths during delay, in older adults aged 65 years and over," *BMC Geriatr,* 9, no. 4, 2009, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2639588/.

Still room for improvement

Avoidable acute care days, 2017–2018

10.8M

Avoidable days in the United States

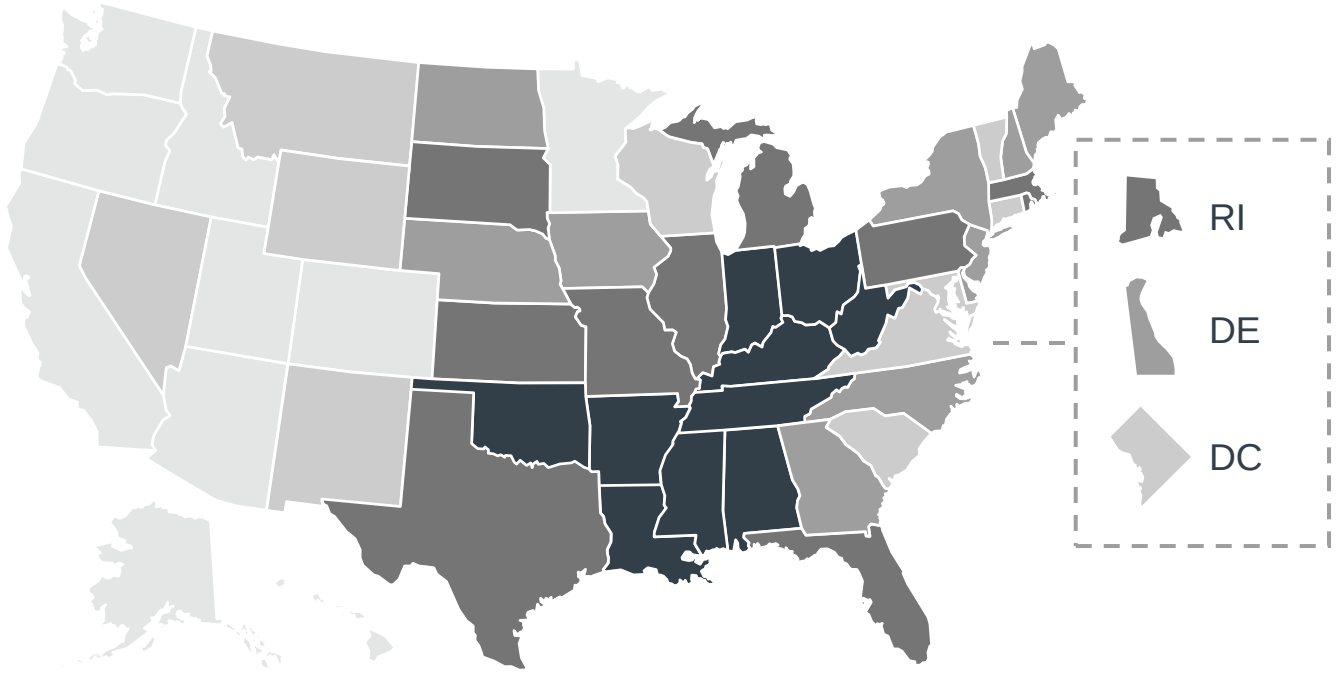
25%

Of hospital days are avoidable

For more on avoidable days, visit The Hospital Benchmark Generator

Number of discharges for ambulatory care-sensitive conditions, 2018

per 1,000 Medicare enrollees



≤36.6	36.7–46.7	46.8 – 50.2	50.3 – 56.6	≥ 56.7

Source: CMS, Advisory Board Analysis; America's Health Rankings analysis of The Dartmouth Atlas of Health Care, United Health Foundation, https://www.americashealthrankings.org/explore/annual/measure/preventable/state/ALL?edition-year=2018.

Global search to break the throughput plateau

Key research inputs

Your opportunity analysis

Patient flow blueprint

Goal	**Reduce avoidable inpatient length of stay**			**Direct patients to the most appropriate site of care**		**Segment financially impactful patient populations**		**Anticipate and address emerging bottlenecks**	
Strategy	Plan for discharge on day one	Streamline interdisciplinary communication to support on-time care plan execution	Empower clinicians to overcome common transition delays	Treat non-emergent patients in sub-acute settings	Shift away from default hospital admission	Create dedicated pathways for resource-intensive patient populations	Standardize predictable patient care for top-opportunity DRGs	Predict and plan for point-in-time demand surges	Centralize data and oversight to increase system-level line of sight
Audit	At my organization… ❑ …clinicians estimate date of discharge for at least	At my organization… ❑ …interdisciplinary care teams discuss patient care plans together at least	At my organization… ❑ …fewer than 5% of bed days are due to	At my organization… ❑ …fewer than 5% of ED presentations can be seen at an	At my organization… ❑ …the ED has low- and mid-acuity patient pathways	My organization… ❑ …proactively identifies highly complex patients	My organization… ❑ …has identified our top-opportunity DRGs	My organization… ❑ …uses data and staffing targets to predict plan for	My organization… ❑ …uses real-time data to track inpatient bed av

APPENDIX

Full copy of the patient flow blueprint

Five strategies to break through the throughput plateau

Think system-wide

1. **Centralize your approach to addressing bottlenecks**
2. **Create dedicated pathways for resource-intensive patient populations**

Meet clinicians where they are

3. **Lead with quality to cultivate frontline engagement**
4. **Anticipate emotional reactions to change**

Selectively harness new technology

5. **Leverage technology to accelerate decision-making**

Centralize your approach to addressing bottlenecks

- Practice 1: Red2Green

What's the shortfall?

Representative excerpt of a throughput dashboard

Metric	FY19 target	FY19 actual
Average length of stay, admitted patients	4.1 days	4.3 days
Emergency department	277 minutes	**320 minutes**
Step-down	4.5 days	4.5 days
ICU	3.7 days	3.6 days
Med-surg	4.19 days	**5.2 days**
Post-op	6.4 days	6.3 days

Department-level data doesn't tell the full story

Representative excerpt of ED dashboard

Metric	FY19 target	FY19 actual
ALOS[1] for admitted patients	277 mins	320 mins
Median time from admit order to arrival on floor	100 mins	150 mins
Median time from ED arrival to departure for discharged patients	300 mins	280 mins
Median time from bed assignment to arrival on floor	70 mins	65 mins

Root cause assumed by ED director

"Our inefficient intake process is delaying patients from getting to their bed on time."

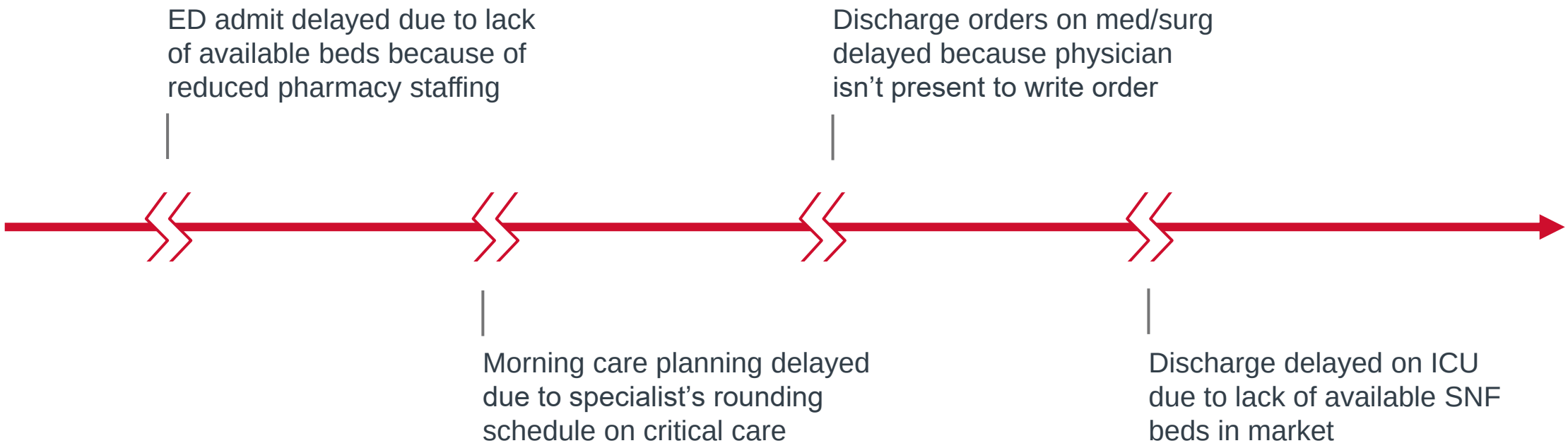
Actual root cause

Reduced pharmacy staffing delaying patient discharge, resulting in fewer open beds

1. Average length of stay.

Organization-wide impact not clear

Representation of bottlenecks within a hospital over one hour



New metrics to track acute care delays

Definitions of red, green days

Red day:

A day in which the patient does not receive the interventions necessary to progress toward their estimated date of discharge (EDD)

Green day:

A day in which the patient has received the interventions in accordance with their care plan to meet the identified EDD

Examples of red days

1. A patient waits more than 14 hours from initial referral to specialty review
2. A patient is waiting on external placement or equipment
3. A patient *only* received care that didn't need an acute care bed

Source: East Suffolk and North Essex NHS Foundation Trust, Suffolk, UK.

East Suffolk and North Essex NHS Foundation Trust (ESNEFT)

NHS Trust with two acute care sites, including Ipswich Hospital (550 beds) and Colchester General Hospital (763 beds), and community services

- ESNEFT created new metrics—red and green days—to track avoidable acute care days; leaders use data to identify and address emerging bottlenecks
- Staff define patients' progress as red or green every day; a unit leader tags the reason for the delay to each red day; leaders use this data to drive organizational patient flow strategy
- ESNEFT achieved substantial efficiency and cost reduction gains at their Ipswich acute care site, including a 41% reduction in delayed transfers of care in one year, a 28% decrease in stranded patient metrics for patients greater than seven days in one year, and a savings of £2.45 million in Cost Improvement Programmes (CIP)

Source: East Suffolk and North Essex NHS Foundation Trust, Suffolk, UK.

Red and green bed days in action

All patients are red until proven green

1

All patients default to red status at midnight

2

Multidisciplinary team develops daily care plan

- During morning rounds, clinicians define what care must be completed for patients to achieve green status
- Team escalates any early delays to operations center

3

Patients with completed care switch to green

- Discharge coordinator rounds on patients in the afternoon to determine if care plans are complete
- If so, they change patient status to green

4

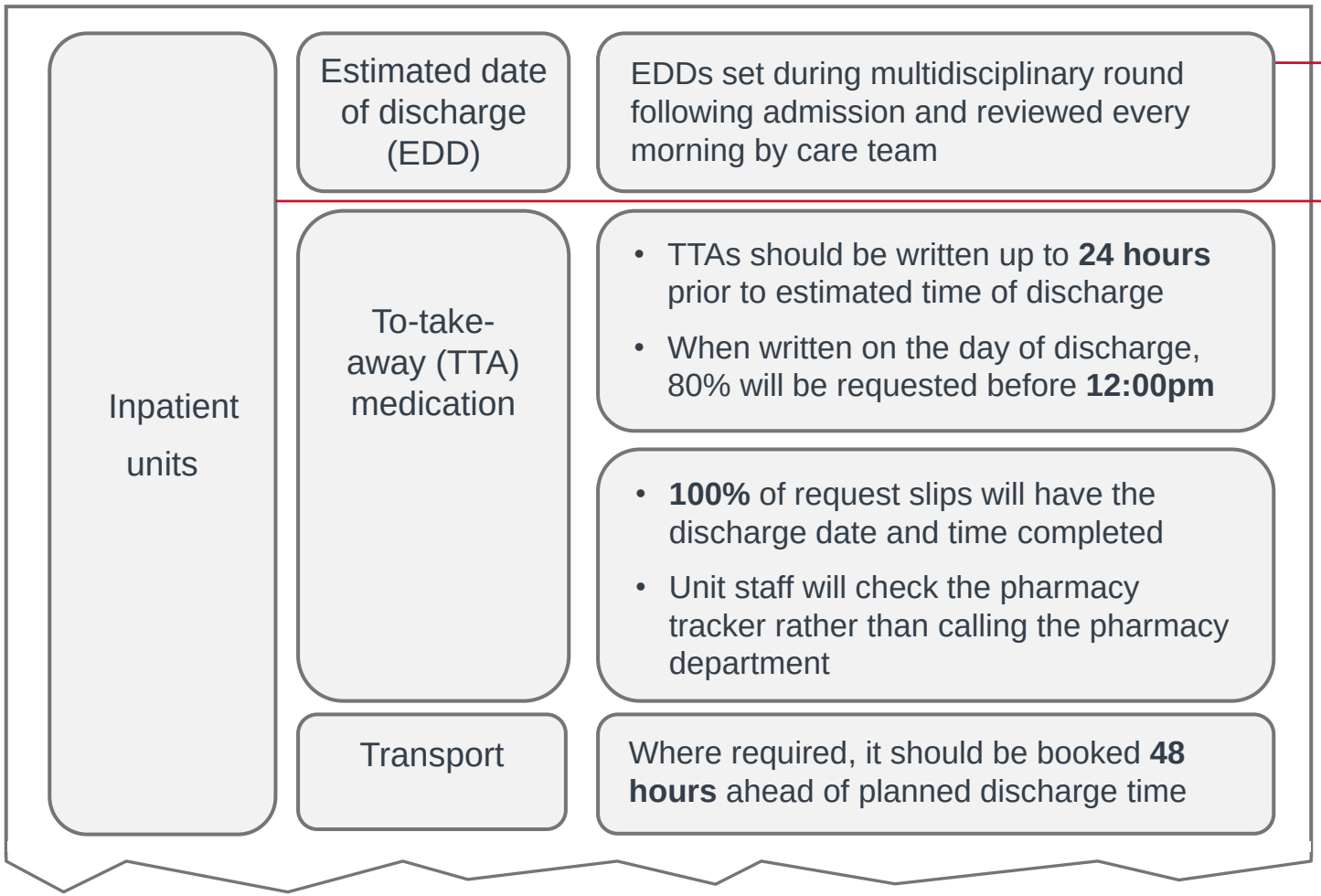
Unit leader assigns reason for each red patient

- Nurse manager rounds on remaining red patients to identify the most impactful care delay
- Nurse manager updates operations center with number and type of red patients on the unit

Source: East Suffolk and North Essex NHS Foundation Trust, Suffolk, UK.

Defined standards for “timely” care

Example clinical standards



Posted at nurses’ stations

- Visible and accessible to all staff

Standards developed for:

- Inpatient units
- Therapies
- Cardiology
- Diagnostic imaging
- Pathology
- Pharmacy
- Discharge to community hospitals

APPENDIX

Full Red2Green example clinical standards

Source: East Suffolk and North Essex NHS Foundation Trust, Suffolk, UK.

Quantifying the most common care delays

Sample care delays

Category	Internal or external
Assessment	
Equipment, adaptations	Internal
Falls risk assessment	Internal
Physio	Internal
Waiting for external agency assessment	External
Continuing health care	
Continuing health care package	External
Continuing health care panel decision	External
Diagnostics	
Blood result	Internal
Colonoscopy	Internal
Echo	Internal
EEG	Internal
Endoscopy	Internal
Gastroscopy	Internal

Source: East Suffolk and North Essex NHS Foundation Trust, Suffolk, UK.

Moving from unit- to system-wide solutions

Two ways to escalate care delays to leaders

Weekly nurse manager huddle

- Operations center compiles weekly organizational report to identify most common reasons for red days
- Leaders focus future interventions on most frequent cross-organizational delays

Annual Red2Green weeks

- All leaders cancel non-urgent meetings to re-calibrate patient flow processes
- Executives select 2-3 most impactful delays from the week to incorporate into organizational flow strategy

Patient flow interventions identified through Red2Green process

- **Delay**: Too many patients were waiting for angiograms, PCIs[1], and pacemakers
- **Solution**: Hospital decided to increase capacity and extend cardiology coverage over the weekend to reduce backlog

- **Delay**: Patients in acute care beds for subacute IV antibiotic administration
- **Solution**: Hospital created program to administer IV antibiotics at patient homes when medically appropriate

1. Percutaneous coronary interventions.

Source: East Suffolk and North Essex NHS Foundation Trust, Suffolk, UK.

Nursing Executive Center interviews and analysis.

Centralized approach decreases inefficiencies, costs

41%

Reduction in delayed transfers of care one year after implementation

28%

Decrease in stranded patients[1] one year after implementation

£2.45 million

In Cost Improvement Programmes (CIP) savings

APPENDIX

List of NHS Red2Green implementation resources

1. A UK term referring to patients who remain in the hospital for seven or more days after they were deemed medically ready for discharge.

Source: East Suffolk and North Essex NHS Foundation Trust, Suffolk, UK.

Create dedicated pathways for resource-intensive patient populations

- Practice 2: Stratified rounding
- Practice 3: Cross-continuum care planning
- Practice 4: Hospital to home

Looking beyond acuity

DATA SPOTLIGHT

Sample data on complex patients

23% Growth in proportion of inpatient admissions to adults with multiple chronic conditions, 2003-2014

12% Growth in mental health or substance abuse inpatient stays, 2005-2014

3.2 Projected decrease in average number of potential family caregivers for patients over 80[1]

65% Percentage of Medicare beneficiaries who have difficulty with one or more activities of daily life[2]

Source: McDermott KW, et al., "Trends in Hospital Inpatient Stays in the United States, 2005-2014," Healthcare Cost and Utilization Project, https://www.hcup-us.ahrq.gov/reports/statbriefs/sb225-Inpatient-US-Stays-Trends.jsp; Reinhard SC, et al., "Valuing the Invaluable: 2015 Update," AARP Public Policy Institute, https://www.aarp.org/content/dam/aarp/ppi/2015/valuing-the-invaluable-2015-update-new.pdf; Steiner CA, et al., "Trends and Projections in Hospital Stays for Adults With Multiple Chronic Conditions, 2003–2014," Healthcare Cost and Utilization Project, https://www.hcup-us.ahrq.gov/reports/statbriefs/sb183-Hospitalizations-Multiple-Chronic-Conditions-Projections-2014.pdf; Willink A, et al., "Are Older Americans Getting the Long-Term Services and Supports They Need?" The Commonwealth Fund, 2019, https://doi.org/10.26099/tdet-jr02.

1. Projected decrease between 2010 and 2030.
2. Excludes nursing home and non-nursing home residential care residents.

More opportunities for care delays

Representative care delays for highly complex patient

Polychronic behavioral health patient

- 55-year-old patient with CHF,[1] bipolar disorder
- Non-adherent to medications
- Experiences episodes of homelessness

Care delays

- Waiting on psychiatric ED consultation
- No beds available on psychiatric unit
- SNFs won't accept patients with behavioral health needs

Polychronic geriatric patient

- 78-year-old diabetic patient admitted for left ischemic stroke, comorbid vascular dementia and atrial fibrillation
- Lives alone on fixed income

Care delays

- Admitting physician waiting on PCP to send full list of medications
- Difficult to coordinate specialists involved in care for polychronic conditions
- No caregiver available at home, waiting on home health approval

1. Congestive heart failure.

Create dedicated pathways for resource-intensive patients

Significant investment for a select few

Create dedicated pathways for resource-intensive patients

1 **Identify your most resource-intensive patients**

Narrow your focus to a small subset of resource-intensive patients

2 **Divert resources to create robust pathways**

Double down on investment to create pathways that both improve acute care efficiency and quality of care for the subset of patients

Identifying your most resource-intensive patients

Excerpt of Mayo's risk scoring algorithm

Variable	Points
Age (years)	
18-44	0
45-64	4
65-79	6
80+	8
Disability[1]	
No significant disability	0
Slight disability	3

Profile of Nancy[2]

- 67 years old
- Moderate disability
- Lives alone
- Self-reports walking limitation

21 Nancy's risk score; indicates need for referral to discharge planning specialist

APPENDIX

Additional risk assessment tools

1. As determined by the Rankin Scale.
2. Fictional patient.

Source: Holland D, et. al., "Development and Validation of a Screen for Specialized Discharge Planning Services," *Nurs Res*, 55, no. 1 (2006): 62-71; Mayo Clinic, MN, US.

Smarter use of clinician time

Two types of rounding

1. Non-complex patient rounds
   - Occurs daily
   - About 20 minutes
   - Includes majority of patients in unit

2. Complex patient rounds
   - Occurs 2-3 times per week
   - 1 hour duration
   - Includes 2-3 patients per session

Risk factors used to stratify patients

- Principal diagnosis, comorbidities
- Poly-pharmacy
- High-risk, complex medications
- Prior hospitalizations and ED visits in last 6, 12 months
- Psychological state
- Health literacy
- Patient support
- Living situation
- Functional status

Source: Fraser Health Authority, British Columbia, Canada.

Fraser Health Authority

Integrated health care service in British Columbia, Canada

- Staff dissatisfied with time-consuming multidisciplinary rounds.
- In September 2011, Fraser implemented a two-tiered rounding practice to round separately on complex patients; rounds focus on risk assessment for new admissions, patient status changes impacting discharge, and planned discharges in next 24–72 hours.
- Reduced regular rounding time by over 80%; increased percentage of patients discharged by target LOS by over 40%.

Source: Fraser Health Authority, British Columbia, Canada.

Nursing Executive Center interviews and analysis.

Specific, pre-written agenda ensures the right staff attend

Questions to answer prior to complex rounding

- When should we meet?
- How long should we meet for?
- Where should we meet?
- Who should we include in the rounding?
- Should we stagger attendance of any care team members?
- What items should we cover in rounding?

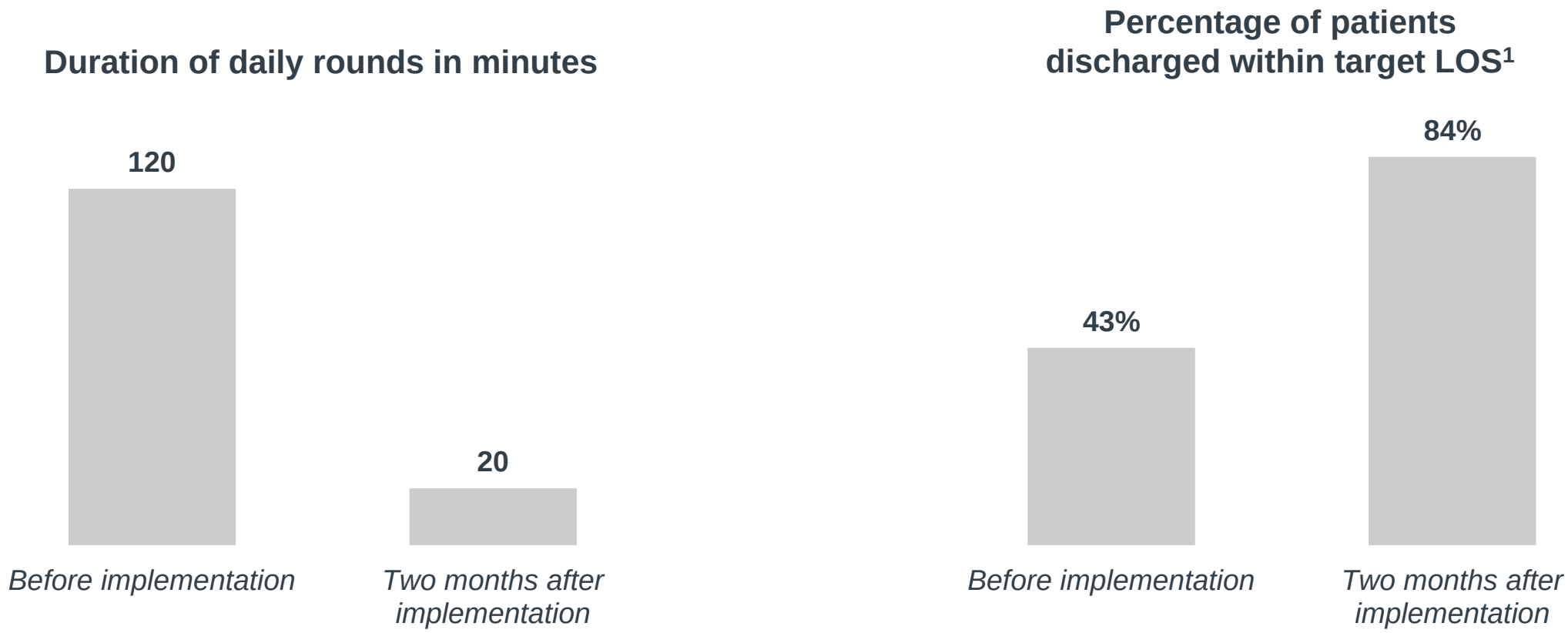
Sample checklist for complex patient discussion

Overall plan of care	✓
Patient safety concerns	✓
Discharge plan	✓
Patient education needs	✓
Anticipated discharge date	✗
Discharge needs	✗

Additional implementation guidance in the On-Time Discharge Toolkit

Source: Fraser Health Authority, British Columbia, Canada.

Stratifying improves rounding efficiency, LOS



1. 8.6 day target length of stay set based on 30% decrease in length of stay from previous year.

Source: Fraser Health Authority, British Columbia, Canada.

Nursing Executive Center interviews and analysis.

Care planning from the outside in

Allina Health's care transitions for behavioral health patients

1
Community health workers enroll eligible patients

- Community health workers (CHWs) review all Medicaid admissions to mental health and substance abuse units
- CHWs invite eligible patients to participate in care transitions program

2
CHW matches MCHN[1] services to patient needs

- CHWs identify patient needs and send referral requests to centralized hub for review
- MCHN agencies review requests and respond within 4-6 hours with the resources they are able to provide

3
MCHN designs post-discharge care plan

- MCHN care navigator comes to hospital to develop individualized care plan, foster early patient-care provider relationship
- Prescriptions filled at the hospital to increase likelihood of medication adherence

4
Both care sites track post-discharge care

- MCHN closes care gap between discharge and enrollment in state-funded programs by providing patient-centered services for 30-60 days
- MCHN staff can contact Allina CHWs about readmission, medication support, discharge care plan compliance, and more

1. Minnesota Community Healthcare Network (MCHN).

Source: Allina Health, Minnesota, US; Minnesota Community Healthcare Network, Minnesota, US.

Allina Health

Not-for-profit health care system with 13 hospitals and over 90 clinics throughout Minnesota and Wisconsin, US

- Collaborated with Minnesota Community Healthcare Network (MCHN) to improve care transitions for behavioral health patients admitted to Allina Health hospitals; the goal was to create a patient-centered care model, reduce readmission rates, and support long-term reintegration into the community
- Community health workers invite Medicaid patients admitted to mental health or addiction units to participate and match each patient to MCHN outpatient services; MCHN care navigators come to the hospital prior to discharge to design a individualized post-discharge care plan with patients
- Reduced potentially preventable readmission rate for enrolled patients by 27%, decreased ED visits for patients by 50%; 80% of patients followed their outpatient care plan 30 days post-discharge; 92% of patients established with at least one MCHN agency by discharge

Source: Allina Health, Minnesota, US; Minnesota Community Healthcare Network, Minnesota, US.

Cross-continuum care planning retains patients downstream

Program reduces avoidable acute care utilization …

27% Reduction in potentially preventable readmission rate for patients in pilot program[1]

50% Decrease in ED visits by patients after enrollment in program[2]

… While improving outpatient care plan adherence

92% Patients established with at least one MCHN agency by discharge

80% Patients in the established outpatient services at 30 days post-discharge

APPENDIX

List of services offered by MCHN agencies

1. As compared to a control group.
2. As compared to pre-enrollment in program.

Source: Allina Health, Minnesota, US; Minnesota Community Healthcare Network, Minnesota, US.

Nursing Executive Center interviews and analysis.

Acute care not always ideal

DATA SPOTLIGHT

Sample effects of hospitalization on geriatric patients

46% Percentage of geriatric patients who lose activities of daily living function while hospitalized

50% Percentage of geriatric patients who do not regain lost function 12 months after hospitalization

59%

Percentage of US seniors with compromised mobility who report not leaving their home

"Low mobility during hospitalization and functional decline in older adults," Journal of the American Geriatrics Society, 2011; Hwang U, et al., "Transforming Emergency Care For Older Adults", Health Affairs, 2013; Willink A, et al., "Are Older Americans Getting the Long-Term Services and Supports They Need?" The Commonwealth Fund, 2019, https://doi.org/10.26099/tdet-jr02.

Bringing the hospital home

Hospital to Home services

Emergent, ongoing medical care

- Paramedics, Nurse Practitioner respond to patient acute care needs at home; medical internist available for consult seven days a week
- PCP[1] delivers routine primary care at patient home as necessary

Medication administration

- Paramedics administer basic medications (such as insulin, oral antibiotics) at patient home
- Patients referred to Community Medicine Clinic for outpatient medication administration, such as PRBC[2] transfusions, IV Lasix

Diagnostic testing and imaging

- Paramedics conduct point-of-care lab tests at patient home; mobile diagnostic imaging service available if needed
- Patients referred to Community Medicine Clinic for on-site radiology and laboratory services as necessary

Nurse navigator:

- Serves as main point of contact for patient questions, actively triages patient medical concerns 7 days a week
- Proactively follows up via phone after home visits

1. Primary care physician.
2. Packed red blood cells.

Source: Markham Stouffville Hospital, Ontario, Canada.

Markham Stouffville Hospital

330-bed hospital delivering care at three locations in Ontario, Canada

- Developed the Hospital to Home (H2H) program to provide patients at high risk of readmission with interprofessional care at home
- Paramedics, Nurse Practitioner respond to acute patient needs at home, consulting with a dedicated internist as necessary; PCP[1] delivers routine primary care; nurse navigator coordinates care by phone to ensure care quality, continuity; program also includes the Community Medicine Clinic where patients can be treated for slightly more complex procedures
- Reduced ED visits for enrolled patients by 80% within six months, and to date has enrolled more than 650 patients; program also reduced Markham Stouffville's patient lengths of stay and ALC[2] rates

1. Primary care physician.
2. Alternative Level of Care; a Canadian metric of days in which a patient is occupying a bed but does not require the intensity of care provided in that care setting.

Source: Markham Stouffville Hospital, Ontario, Canada.

Nursing Executive Center interviews and analysis.

Referral criteria select patients with high readmission risk

Providers who frequently refer patients to Hospital to Home

- Emergency room physicians
- Internal medicine physicians
- Primary care providers
- Providers from retirement homes

Excerpt

Criteria for H2H referral

Inclusion criteria

- Complex patient with multiple comorbidities
- Assessed need for longitudinal care

Exclusion criteria

- Patients seen by the palliative care team
- Patients with a MD/NP who makes home visits
- Patient stable longer than six months

APPENDIX

Full Hospital to Home patient referral criteria

Source: Markham Stouffville Hospital, Ontario, Canada.

On-the-ground team relies on virtual medical consult

The team in action

Patient presents to ED with chest pain

Patient with cardiac heart failure enrolled in Hospital to Home, discharged from ED

Nurse triages patient's call

Nurse navigator triages call, informs paramedics to visit patient

Nurse follows up with patient

Nurse navigator calls patient to follow-up on status

Patient calls central phone line

Patient experiencing breathing difficulties, calls hospital to home office

Paramedics, internist assess patient

Paramedics conduct patient assessment and consult with internist through OTNconnect[1]; internist adjusts prescription medications to alleviate breathing problems

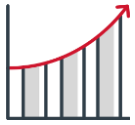
1. Virtual communication platform on mobile device that facilitates consultations between patients, specialists, primary care providers, and paramedics.

Source: Markham Stouffville Hospital, Ontario, Canada.

Nursing Executive Center interviews and analysis.

Many benefits of right care, right setting

Sample results from Hospital to Home



450-500

Number of active patients to date, and continuing to rapidly expand

95%

Patient satisfaction with program services, quality of care, and support from H2H staff

80%

Reduction in ED visits over six months for enrolled patients

> I am eternally grateful for having the support of the nurse navigator, paramedic and nurse practitioner. I do not have adequate support from my family doctor for my elderly parents care. This helps me know what to do and assists in frequent ED visits (my mom suffers delirium). Thanks you so much for everything you do!
>
> Daughter of H2H patient
>
> MARKHAM STOUFFVILLE HOSPITAL

Source: Markham Stouffville Hospital, Ontario, Canada.

Will this work for you?

Assessing feasibility of hospital to home at your organization

1

How do we pay for it?

Leverage your own health plans or partner with hospital at home solutions companies that have already contracted directly with payers[1]

2

What technology investments do we need?

Invest in telemedicine and remote monitoring capabilities to supplement in-person support provided by home health clinicians or paramedics

3

What partnerships do we need?

Develop relationships with proprietary or partner SNFs and home health agencies, as well as with community-based resources

4

How do we attract the right staff?

Prioritize hard-to-fill roles, such as home health staff and internists engaged by community-based care

APPENDIX

Best practices for supporting resource-intensive patients in the community

1. For example, Contessa Health and Medically Home.

Hospital to home programs spreading nationally

Sample list of US hospital to home programs

Marshfield Clinic Health System

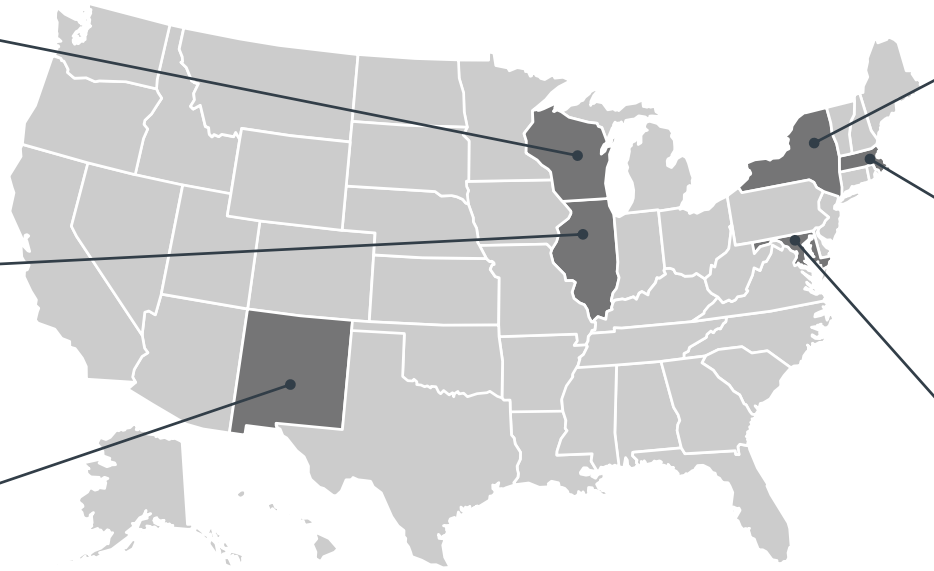
Patient satisfaction scores 93% since inception, consistently higher than traditional inpatient scores

Advocate Health Care

Services include home nursing care, hospice, home medical equipment, rehab therapy, infusion services, and neo-natal care

Presbyterian Health Services

ALOS[2] 0.91 days shorter; Mortality rates decreased to 0.93% from 3.4%, fall rates decreased to 0% from 0.8%



Mt. Sinai Health System

ALOS2 2.3 days shorter; Readmissions decreased to 8.6% from 15.6%, ED visits decreased to 5.8% from 11.7%

Atrius Health

Readmission rate decreased 50%, total cost of care decreased 30% in comparison to like patient cohort

Johns Hopkins Health System

In satisfaction surveys, patients and caregivers judge hospital at home care quality higher than acute hospital care

Source: E Shulman, "Acute Hospital Care in the Home: Year One Results and Lessons Learned," AMGA 2019 Annual Conference, [Powerpoint slides], 2018; A Federman, et al., Association of a Bundled Hospital-at-Home and 30-Day Postacute Transitional Care Program With Clinical Outcomes and Patient Experiences, JAMA, 178, no. 8:1033-1040, 2018, https://jamanetwork.com/journals/jamainternalmedicine/article-abstract/2685092; B Leff, et al., "Satisfaction with Hospital at Home Care," JAGS, 54:1355–1363, (2006), http://www.hospitalathome.org/files/HAH%20Satisfaction%20JAGS.pdf; "Advocate at Home," https://www.advocatehealth.com/health-services/advocate-at-home/; L Butcher, "Marshfield Clinic Finds Success with Home Recovery Care," HFMA, 2018, https://www.hfma.org/Leadership/E-Bulletins/2018/August/Marshfield_Clinic_Finds_Success_with_Home_Recovery_Care/; S Klein, et al., "The Hospital at Home Model: Bringing Hospital-Level Care to the Patient." The Commonwealth Fund, 2016, https://www.commonwealthfund.org/publications/case-study/2016/aug/hospital-home-model-bringing-hospital-level-care-patient#/#results.

Lead with quality to cultivate frontline clinician engagement

- Practice 5: Executive storytelling
- Practice 6: Patient-led handover

Have your nurses heard?

Representative patient flow communication to the front line

CFO says…

"Our margins are razor-thin. We need to free up beds and increase our patient volumes."

Flow coordinator says…

"Our goal is to decrease length of stay by 0.25 days this year."

Nurse manager says…

"Our unit isn't meeting our on-time discharge goals. We need all patients ready before 11:00am."

ED bottlenecks negatively impact quality

ED challenges at Anne Arundel Medical Center, 2016

25%	Average percentage of total hours on ED diversion
570 minutes	Door-to-bed turnaround time[1]
65%	ED patient satisfaction
5,000+	Number of patient hours spent boarded in the ED

1. Ranking in the 2nd percentile nationally.

Source: Anne Arundel Medical Center, Annapolis, MD.

Case in brief

Anne Arundel Medical Center

A regional health system headquartered in Annapolis, Maryland, with a 380-bed not-for-profit hospital

- Operates busiest ED in Maryland, with 100,000 emergency presentations per year.
- In 2016, experienced significant bottlenecks, resulting in poor performance on key flow metrics (ED diversion, boarding, door-to-bed time, patient satisfaction).
- CNO, CMO used storytelling to demonstrate the impact of inefficient flow on quality, and to engage frontline leaders and their staff in executing on the organization's initiatives to improve flow; leaders used storytelling at the executive level during leadership council meetings and during nursing leadership meetings.
- Clinician engagement in flow improvement initiatives have led to a 78% decrease in total hours spent on ED diversion, 81 minute decrease in median ED LOS, 150 minute decrease in door-to-bed-time, and a 16% increase in patient satisfaction.

Source: Anne Arundel Medical Center, MD, US.

Lead with quality to cultivate frontline clinician engagement

Key points from Esther's story

- 82-year old patient
- Has a pacemaker, hypertension, and mild heart failure (EF[1] of 35%)
- Widowed and lives alone; children live out of state
- Spends 19 hours in the ED due to severe capacity constraints
- Becomes delirious after long ED stay, and is hospitalized for four days

APPENDIX

A copy of Esther's story

1. Ejection fraction

Source: Anne Arundel Medical Center, MD, US.

Nursing Executive Center interviews and analysis.

How to craft an effective story

Key components of a compelling story

Adversity

The obstacle that makes the hero's objective appear difficult to overcome

Resolution

The process by which the hero attempts to overcome adversity

Hero

The main character who seeks to accomplish a goal

Value

The inspiring moral or call-to-action of the story

Source: Six Levers to Build a Differentiated Organizational Culture, HR Advancement Center, Advisory Board.

Spreading Esther's story to drive engagement

Forums used to share Esther's story

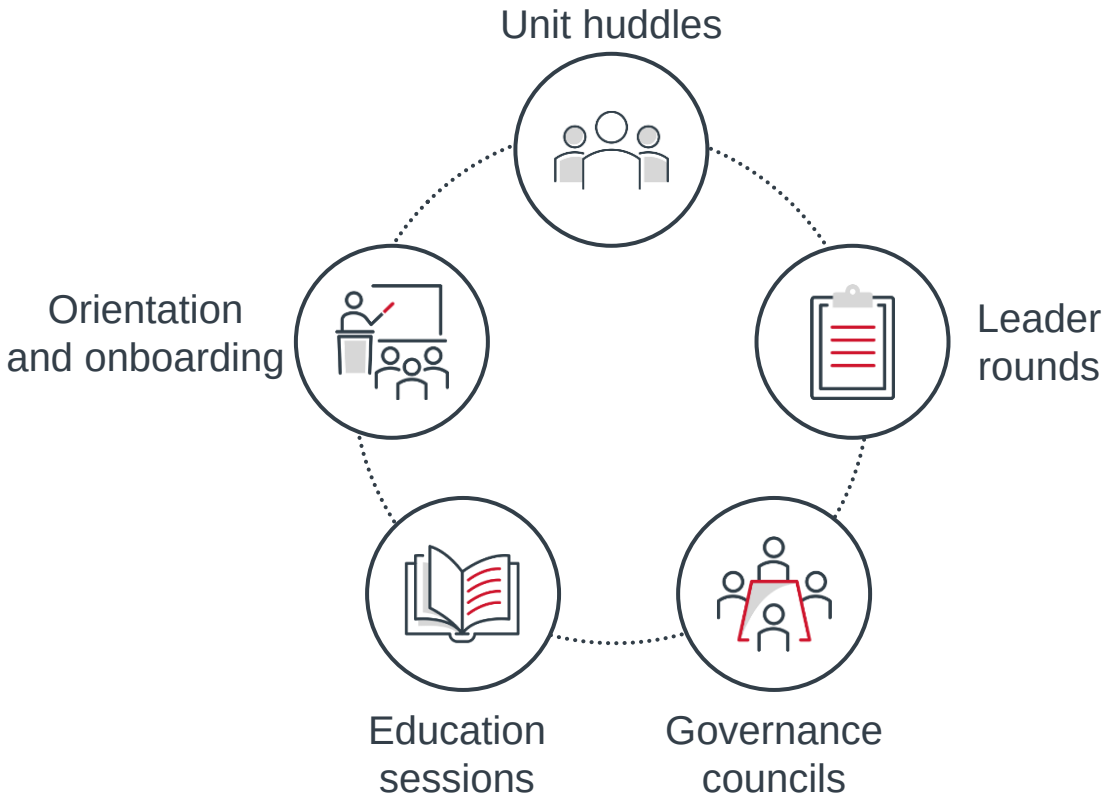
Leadership council

- Meeting of 200 multidisciplinary leaders[1] to discuss strategic system priorities
- CNO, CMO tell Esther's story and introduce new flow initiatives
- Leaders tasked with retelling Esther's story

Professional nurse council

- Staff-level nurses chosen by peers to represent their unit on council
- CNO tells Esther's story to engage frontline in new flow initiatives
- Nurses asked to retell Esther's story to peers on their unit

Additional opportunities for storytelling



1. Includes manager-level leaders and above. Leadership council meets 6-7 times a year.

Source: Anne Arundel Medical Center, MD, US.

Engaged clinicians help yield improvements

Anne Arundel Medical Center's patient flow initiatives, 2017

New ED processes

- Fast-track for low acuity patients
- Mid-acuity triage segmentation
- ED-to-inpatient bed pull process

Observation unit redesign

- Aligned staffing levels to patient demand
- Discharge to lounge

ED to inpatient transfer

- Redesigned care management role
- Updated EMR with new transfer form
- Embedded automated alert to transport

Changes to ED performance metrics, 2016-2017

78%

Decrease in total hours on ED diversion

81 min

Decrease in median of all ED admissions and discharges

150 min

Decrease in door-to-bed turnaround time

16%

Increase in patient satisfaction

Source: Anne Arundel Medical Center, MD, US.

How do you engage patients in their care?

Sample list of patient engagement best practices

Practice	Description
Patient-centered daily care plan	Care team provides patients with an automatically-generated daily care plan written in patient-friendly terms and then reviews the care plan with them
Two-way communication boards	Whiteboards are placed in patient rooms and updated daily by care team to convey key information to patients and family members about the plan of care
Multidisciplinary bedside rounds	Brings together the full care team at the patient's bedside to collaborate on patient's care with active patient and family involvement
Three-day integrated teach back	Care team members sequence knowledge, attitude, and behavior education across three days, asking patients to teach back lessons daily
Key learner identification	Care team asks patient three questions to identify the person most responsible for that patient's care at home, also known as the "key learner"
Motivational interviewing	Helps clinicians engage patients by asking questions that inform a patient's ability to follow their care plan and can strengthen a patient's own motivation and commitment to change
Patient decision aids	Clinicians use aids to inform patients about options for a specific care decision, showing pros and cons of options in a way that is unbiased and that patients can easily understand

Who’s more compelling to your clinicians?

Representative statements

Executive

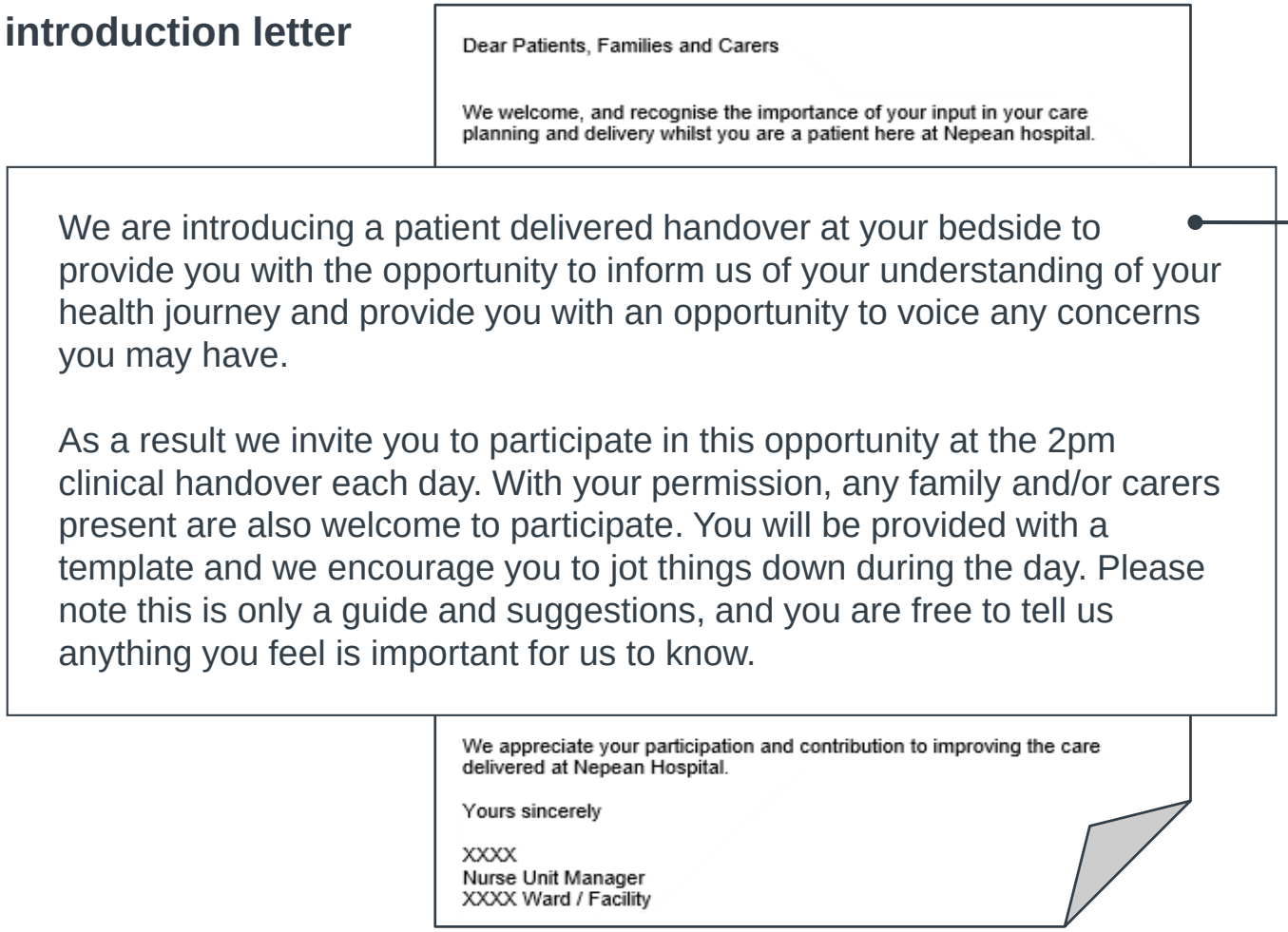
“All staff should complete discharge prep by 10:30am so we can hit our discharges before 11:00am targets.”

Patient

“I’m not ready to go home. What if I forget to take my medications? There are so many.”

Introducing the patient-led handover

Patient introduction letter



Dear Patients, Families and Carers

We welcome, and recognise the importance of your input in your care planning and delivery whilst you are a patient here at Nepean hospital.

We are introducing a patient delivered handover at your bedside to provide you with the opportunity to inform us of your understanding of your health journey and provide you with an opportunity to voice any concerns you may have.

As a result we invite you to participate in this opportunity at the 2pm clinical handover each day. With your permission, any family and/or carers present are also welcome to participate. You will be provided with a template and we encourage you to jot things down during the day. Please note this is only a guide and suggestions, and you are free to tell us anything you feel is important for us to know.

We appreciate your participation and contribution to improving the care delivered at Nepean Hospital.

Yours sincerely

XXXX
Nurse Unit Manager
XXXX Ward / Facility

- Explains benefits of patient-led handover
- Invites patient to participate in handover and clarifies their role in next steps

APPENDIX

A copy of the patient introduction letter

Source: Nepean Hospital, New South Wales, Australia.

Nepean Hospital

A 520-bed teaching hospital in Kingswood, New South Wales, Australia.

- Patients, families, and caregivers had limited opportunities to demonstrate an understanding of their health care journey, ask questions, or provide feedback to nursing staff during their hospital stay
- Nepean Hospital developed the patient-led handover on a pilot unit to give patients the opportunity to deliver a handover of their healthcare journey once a day to nursing staff. The handover occurs during the morning to afternoon shift change at 2pm. Patients receive a template with prompts to guide their conversations with nursing staff. The handover allows staff to confirm patients understand their care instructions and also prompts staff to spend more time communicating with patients to avoid delays in their care progression
- Since the implementation of the patient-led handover, Nepean Hospital has seen a 147% increase in patients reporting they are involved in their treatment and discharge planning

Source: Nepean Hospital, New South Wales, Australia.

Proactively surface, address patient anxieties

Excerpt of patient-led handover template

Good afternoon, I am .....

I am in hospital because.....

Today I feel.....

I need help with……..

I am worried about……..

I need you to know……..

I hope to go home on……..

Anything else I would add.....

APPENDIX

For a full copy of the patient-led handover template

Source: Nepean Hospital, New South Wales, Australia.

Patient-led handover in action

Patient-led handover process

1
Patient informed of handover process

- RN presents introduction letter, gives a verbal explanation of handover to the patient and family upon admission
- RN gives patient template to fill out or simply reference during handover

2
RN prepares clinical information

- RN updates patient's clinical information in electronic system prior to handover to get ready
- Clinical information available to staff during patient's handover

3
Patient-led handover, safety huddle occur

- Patient, family or caregiver, leads bedside handover at afternoon change of shift
- Nursing staff complete safety huddle after handover to identify barriers to patient's care progression

4
Follow-up and documentation

- Nursing staff or appropriate member of care team follows up on issues not addressed in-the-moment during handover
- All patient concerns documented in the patient's medical record

Source: Nepean Hospital, New South Wales, Australia.

Proactively address staff concerns

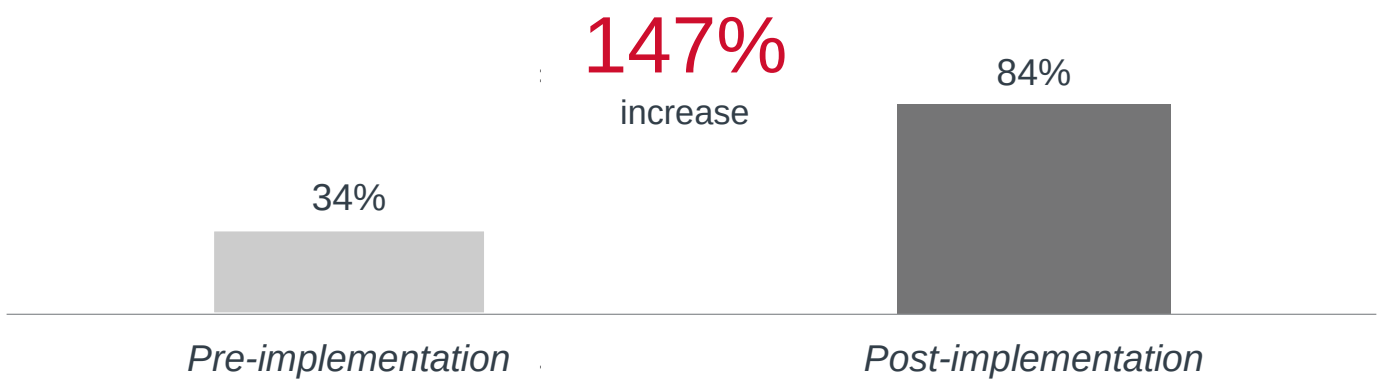
Nurse concerns	Organization's response
"I'm worried I won't have time to discuss important clinical information."	Patient-led handover is not a replacement of the clinical handover, but rather enriches current practice
"I don't want my patients to feel pressured to share sensitive or confidential information."	Patients never required to share private details
"What if my patient feels overwhelmed with clinical information they don't understand?"	Patient guides conversation according to their health literacy and comfort level
"My patients might be too shy or embarrassed to ask questions about their care."	Participation in the handover is voluntary

Source: Nepean Hospital, New South Wales, Australia.

Increased patient, clinician engagement

Increase in patient engagement

Patients reporting they are involved in their treatment and discharge planning



Decrease in readmissions

14%

Decrease in the average 28 day unplanned readmission rate[1]

Quality benefits of patient-led handover

Increases engagement with patients, families, and caregivers in care journey

Enhances patient understanding of their care plan both in-hospital and post-discharge

Prepares patients, families, and caregivers for smooth discharge or transition of care

1. From 11.3% pre-implementation to 9.7% post-implementation.

Source: Nepean Hospital, New South Wales, Australia.

Anticipate emotional reactions to change

- Practice 7: 1:1 pre-wire check-in

Acknowledging what staff stand to lose

> You know the adage ‘people resist change.’ It is not really true. People are not stupid. People love change when they know it is a good thing. No one gives back a winning lottery ticket. What people resist is not change per se, but loss.”
>
> *The Practice of Adaptive Leadership*

Representative losses that fuel staff reactions to change

Source: Heifetz R, Grashow A, Linksy M, “The Practice of Adaptive Leadership: Tools and Tactics for Changing Your Organization and the World,” Boston: Harvard Business Press, 2009; Talent Development Win Buy-in for Change (2018), Advisory Board.

Same decision, different reaction

Representative emotional reactions to change

Angry

"This is grounds to quit."

Shocked

"I had no idea this was going to happen."

Excited

"This is the right thing to do for our patients."

Sad

"I'll miss the way things were."

Worried

"I'm nervous that this change will hurt my patients in the long run."

Apathetic

"I don't really care about this."

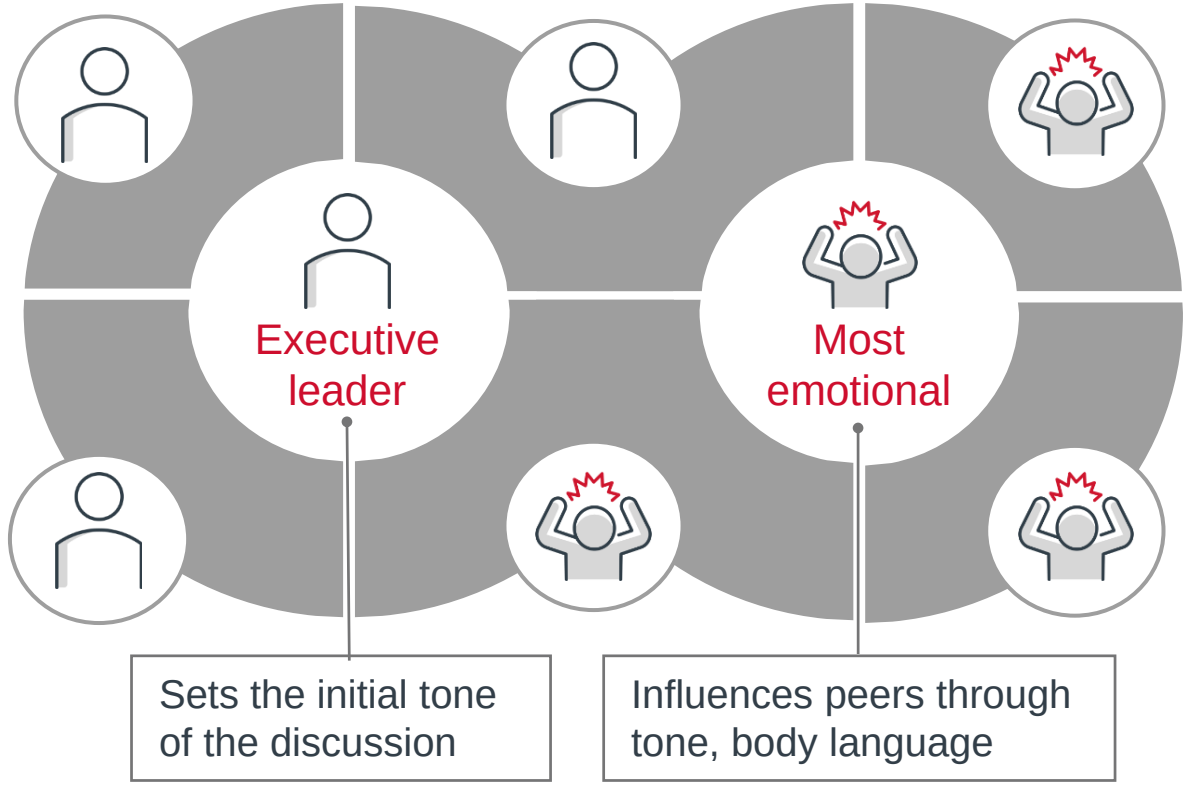
Talent Development Win Buy-in for Change (2018), Advisory Board.

The most powerful emotions prevail

Individuals with the biggest impact on staff reactions to change

Emotional contagion

A phenomenon by which the most positive or negative emotion in a group spreads from person to person, often without individuals realizing it. Driven by "mirror neurons," which compel us to mimic others' emotional response.



Talent Development Win Buy-in for Change (2018), Advisory Board.

Nursing Executive Center interviews and analysis.

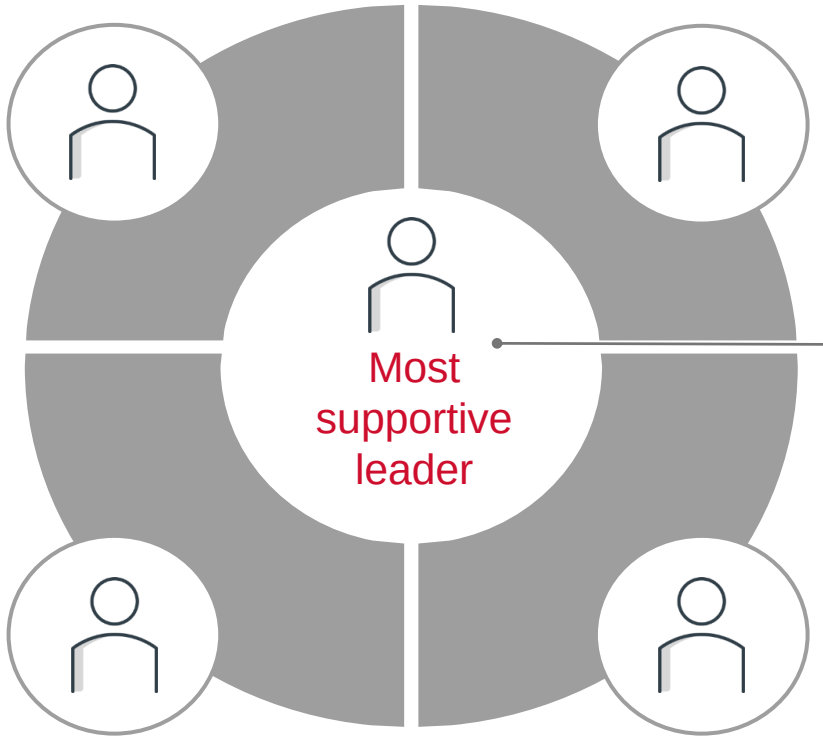
Don’t overlook your ‘positively passionate’ leaders

SPOTLIGHT

Benefits of positive contagion

- Positively influences peers who are on the fence about a change
- Increases empathy and cooperation within a group
- Improves group decision-making

Representative positive emotional contagion



Gets frontline clinicians on board by expressing enthusiasm

Source: Barsade SG, “The Ripple Effect: Emotional Contagion and Its Influence on Group Behavior,” Administrative Science Quarterly, 47, no. 4 (2002): 644-675; Talent Development Win Buy-in for Change (2018), Advisory Board.

Pre-wire the right leaders

Four types of leaders to consider for a pre-wire

1 Most impacted

- Has a personal stake in the decision
- Stands to lose something or will be the most excited for the change
- Will be asked to do something differently

2 Influential leaders

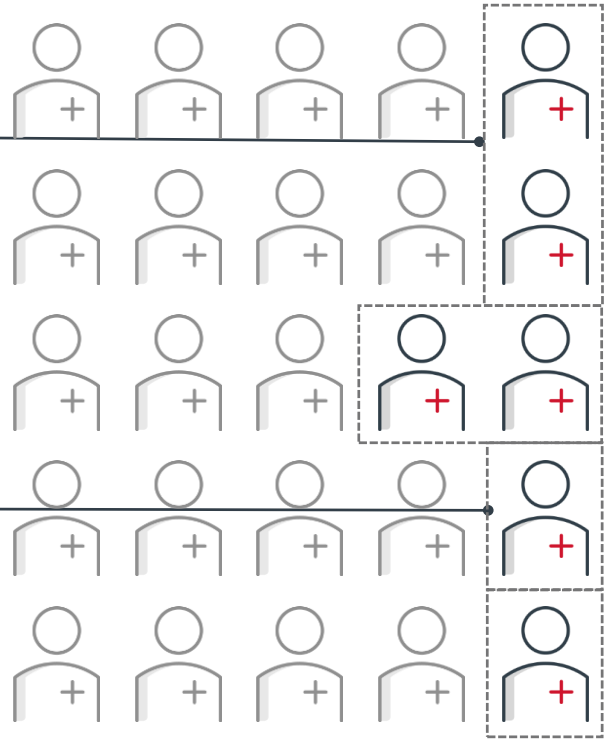
- Others look to them to inform their own reactions
- Has relevant knowledge or expertise

3 Biggest skeptics

- Often resists change
- Combative or negative in group meetings

4 Important no-shows

- Has valuable opinions, but can't make meeting



Talent Development Win Buy-in for Change (2018), Advisory Board.

Nursing Executive Center interviews and analysis.

Whom would you pre-wire?

1:1 pre-wire identification tool

Step one: Identify a patient flow initiative for which you need leadership input.

Identify a patient flow initiative which needs input

Step two: Brainstorm a list of individuals with whom you could have a pre-wire check-in to discuss the change. Refer to the checklist of people below to help you think of individuals who you might otherwise overlook.

List the leaders you want to pre-wire

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

Four types of leaders to pre-wire:

1 **Most impacted**
- Has a personal stake in the decision
- Stands to lose something or will be the most excited for the change
- Will be asked to do something differently

2 **Influential leaders**
- Others look to them to inform their own reactions
- Has relevant knowledge or expertise

3 **Biggest skeptics**
- Often resists change
- Combative or negative in group meetings

4 **Important no-shows**
- Cannot make the meeting
- Has a valuable opinion

Talent Development Win Buy-in for Change (2018), Advisory Board.

Plan your pre-wire

1:1 pre-wire planning guide

Step one: Identify one leader on your pre-wire list who you are not looking forward to approaching.

Identify a leader you're not looking forward to approaching for a pre-wire

Step two: Turn to a partner, and share some brief details about the specific change you're working on, and who you want to pre-wire. Then, talk through the following details with your partner to plan for the pre-wire and get your partner's feedback. After your partner has helped you plan a pre-wire, switch roles and help them plan one of theirs.

1. When will you have an opportunity to approach this leader?
2. How will you broach the topic?
3. How do you anticipate this leader will react?
4. What—if anything—does this leader stand to lose, given the change?
5. How do you think you will close the conversation, given the reaction you anticipate?

Walk through your pre-wire plan and get reactions from your partner

Talent Development Win Buy-in for Change (2018), Advisory Board.

Yield the floor—but manage the tone

Anatomy of an effective pre-wire check-in

Open the conversation
(10% of check-in)

"I wanted to spend a few minutes looping you into a change I'll be sharing with the broader group at next week's team meeting."

Avoid kicking off the conversation in a negative way, for example: "I don't think you'll like this, but…"

Give them a forum to react
(80% of check-in)

"I'd like to pause for a moment to hear any and all reactions you have."

Give them a tangible next step
(10% of check-in)

- **Leverage good ideas:** "Would you be willing to share what we've discussed so far?"
- **Channel criticism:** "I think you've made some really valid points—especially X. Can you share that with the group?"
- **Ask for an open mind:** "I'm asking you to suspend your disbelief during the meeting, and hear from others in the room."

APPENDIX

1:1 pre-wire check-in guide

Talent Development Win Buy-in for Change (2018), Advisory Board.

Nursing Executive Center interviews and analysis.

Doing right by leaders, staff

Benefits of pre-wire check-ins

To you

- Builds your credibility and rapport as a leader
- Helps you refine your language for group discussion
- Allows you to anticipate others' pushback and questions

To leaders

- Makes them feel valued, considered
- Gives them more time to process the change
- Increases the engagement of key influencers

To frontline staff

- Mitigates negative emotional contagion
- Allows frontline staff to offer new ideas
- Increases chances of staff buy-in

Talent Development Win Buy-in for Change (2018), Advisory Board.

Leadership development for emerging leaders and the frontline

Strategic focus on talent critical to success

Learning objectives of *Win Buy-In for Change*

1. Anticipate emotional barriers to change, including complaints, concerns, and perceived losses
2. Identify and solicit the types of staff input needed to advance change
3. Understand how to solicit input to build support for specific change initiatives and increase overall staff engagement

Additional course offerings

Advisory Board fellowship

We provide MBA-style leader development experience to equip high-potential leaders to confront current and imminent industry challenges

Frontline impact

We partner with leaders to translate frontline staff potential into clinical and operational performance gains

Leader development

We give leaders the training, tools, and mindset needed to successfully execute their organization's strategy as well as their individual goals

Leader development for nurses

We work with organizations to prepare nurses to thrive in leadership roles

Talent Development Win Buy-in for Change (2018), Advisory Board.

Nursing Executive Center interviews and analysis.

Leverage technology to accelerate decision-making

- Practice 8: Care traffic control center
- Practice 9: AI-driven command center

Section 5

A sea of missing information

Sample missing information

Where is the specialist consult?

Where are the lab results?

Is there an open bed in the right unit?

Have all prescriptions been written?

Is this patient being admitted?

What beds are available?

Where is the patient?

Have diagnostics been completed?

Has the bed been cleaned?

Have we completed required discharge preparation?

Is this patient ready for discharge?

Has transport been called yet?

Where is the EKG machine?

Has the SNF been contacted?

Has transportation for the patient been confirmed?

Has the patient been seen by a case manager?

Where is EVS?

How many beds are available on this unit?

Has the patient been seen by a specialist?

Has the discharge order been submitted?

Have the lab orders been submitted?

Have referrals been made?

Where is the discharge order?

Has the patient been transferred?

Has the patient's family been notified of discharge?

Has therapy seen this patient yet?

Abundance of patient flow technologies

Selection of new patient flow technologies

Operational management

- Electronic whiteboards
- Automated notifications
- Qventus
- Allscripts Patient Flow
- Cayder Patient Flow Manager
- Central Logic Core

Real-time care coordination

- TeleTracking
- Real-time location systems
- GE Agiletrac
- McKesson Performance Visibility

Capacity planning

- Epic EMR
- GE Healthcare Patient Care Capacity Management
- McKesson Capacity Planner
- MedModel

Source: 2014 How Hospitals Can Improve Care Processes with Patient Flow Systems, Global eHealth Executive Council, Advisory Board.

Leverage technology to accelerate decision-making

Technology assessment guide

Question 1:
What does it solve?

Question 2:
What are the minimum requirements?

Question 3:
What is the impact on clinician workflow?

Question 4:
How will you track impact?

Best practices

Practice 9: Care traffic control center

Implemented real-time location system infrastructure to:

- Centralize bed management
- Provide staff with a comprehensive overview of current state of the hospital
- Enable real-time decision making

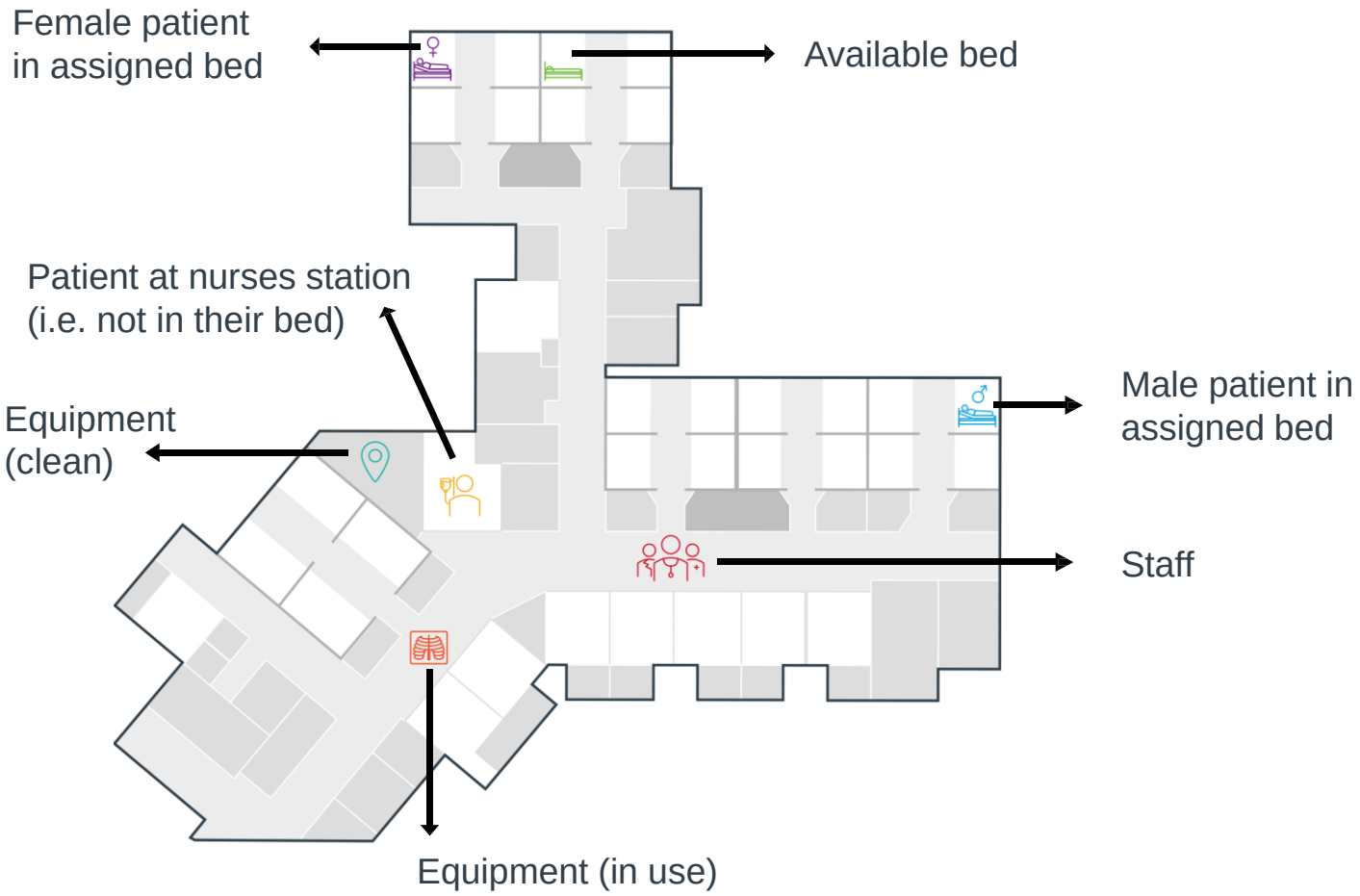
Practice 10: AI-driven command center

Applied artificial intelligence and machine learning to:

- Predict likelihood of patient admission
- Facilitate better, faster bed placement decision-making

A primer on real-time location systems (RTLS)

Excerpt of RTLS dashboard



Types of data collected by RTLS

Bed capacity

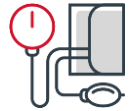
Bed status tracked; staff know which are open, clean

Patient location

Patients tracked as they receive care

Clinician location

Clinician location, movement monitored



Equipment location

Medical equipment tracked; clinicians know where it is, if it's clean, or in-use

Source: The Royal Wolverhampton NHS Trust, Wolverhampton, England, UK.

Network supports automatic data collection

How real-time location systems collect data

1
Staff, patients wear badges

Staff and patients wear tags as badges and wristbands, respectively; tags attached to beds and equipment

2
Sensors identify and pinpoint location

Infrared signal detectors receive radio frequency signals from badges to identify the individual or object (staff, patient, bed equipment) and track location

3
Location data populates dashboard

Data from tags populate in system dashboard to enable site-wide visibility of patients, staff, and assets

Source: The Royal Wolverhampton NHS Trust, Wolverhampton, England, UK.

Missing information slowing down operations

Examples of missing information at the Royal Wolverhampton NHS Trust

Current bed status

- No way for flow management team to track bed status
- Team had to walk the floors to try to monitor bed availability

Ancillary team availability

- No way to easily communicate with ancillary teams
- Clinicians manually called to schedule patient referrals, matching patient needs to available resources

Pending discharges

- No way for flow management team to track pending discharges
- Team had to make numerous calls to units to find out when patients were being discharged

Equipment location

- No way for clinicians to keep track of equipment
- Clinicians had to walk around or call other units to locate needed equipment

Source: The Royal Wolverhampton NHS Trust, Wolverhampton, England, UK.

The Royal Wolverhampton NHS Trust

Acute care provider composed of three hospitals and more than 20 community sites located in Wolverhampton, England, UK

- In 2015, implemented real-time location system (RTLS) to track equipment, patients, and staff. Developed and launched a care traffic control center, a centralized patient placement model that involved the re-design of patient flow team to respond to RTLS data and coordinate all patient placement within the Trust (elective and non-elective)
- The increased visibility, coupled with centralized bed management infrastructure, resulted in reduction in surgical cancellations, average bed turn times, breaches in the ED, and average length of stay in medical units

Source: The Royal Wolverhampton NHS Trust, Wolverhampton, England, UK.

Dedicated team translates data into action

Wolverhampton's requirements to make RTLS data actionable

Care traffic control center

Infrastructure

- RTLS technology
- IT system
- Physical space to house control center (either on- or off-site)

Centralized capacity team

- Lead patient flow nurse
- Patient flow coordinators
- Administrator
- Integrated health and social care manager
- Representatives from social work, and volunteer agencies to facilitate discharge
- Non-clinical, unit-based patient flow assistants

Source: The Royal Wolverhampton NHS Trust, Wolverhampton, England, UK.

Real-time data streamlines clinician workflow

Examples of improved clinician workflow

Streamlined bed management

- Real-time view of bed status in an easy-to-scan dashboard

Automated referrals

- Automatic daily list of referrals for physiotherapy, occupational therapy, social care
- Specialists can see their patients by unit

Early discharge planning

- Early access to confirmed and potential discharges
- Flow team and staff proactively pull forward discharge

Easy-to-find equipment

- Searchable system with equipment location and status
- Staff do not have to search for equipment

Source: The Royal Wolverhampton NHS Trust, Wolverhampton, England, UK.

Real-time data improves decision-making, eases capacity

Changes to patient flow metrics at the Royal Wolverhampton NHS Trust, 2014–17

1. Average length of stay.
2. From 220 minutes to 31 minutes.
3. Emergency department.
4. When a patient remains in the ED for more than 4 hours.

Source: The Royal Wolverhampton NHS Trust, Wolverhampton, England, UK.

Nursing Executive Center interviews and analysis.

Expanding beyond the hospital

Current and future state of Wolverhampton's care traffic control center

Royal Wolverhampton NHS Trust

Current state

- Bed management
- Discharge planning
- Automated patient referrals
- Equipment location

Future state

Regional expansion

Expansion of control center to include other health care organizations within region

Integration with EMS

Integration with local EMS to increase ambulances' visibility into hospital capacity

Community portal for general practitioners

Communication with referring GPs gives insight into acute care access

Source: The Royal Wolverhampton NHS Trust, Wolverhampton, England, UK.

What do we mean when we say ‘AI?’

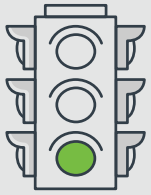
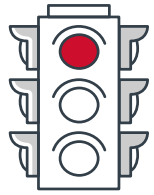
Artificial intelligence *noun.* The theory and development of computer systems able to perform tasks normally requiring human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages.

— Oxford English Dictionary

Source: “Artificial intelligence,” Lexico.com, https://www.lexico.com/en/definition/artificial_intelligence.

Many ways to leverage AI

AI applications for health care

	Patient flow	*Clinician support*	*Human replacement*
Description	Processing vast amounts of enterprise-wide information to mobilize and direct resources	Taking over recurrent and standardized tasks to support the clinical interaction	Assuming responsibilities and decisions traditionally owned by clinical staff
Impact on clinicians	LOW • Minimal change to existing workflow • Clinicians remain in control of all clinical decisions	MEDIUM • Specific changes to existing workflows • Clinician remains in control of all clinical decisions	HIGH • Development of entirely new workflows • Clinicians no longer in control of all care decisions
Ready for adoption?			

AI-based algorithms answer two critical questions

Data sources

- Reported symptoms
- Patient history
- ESI[1] score
- Vital signs

- Current occupancy
- Scheduled occupancy

Models

Propensity model

Built on 70,000 cases (7 months)

Optimization model

Built on 25,000 cases (2-3 months)

Questions answered

Should I admit this patient?

Where should I place this patient?

1. Emergency severity index.

Source: Hospital Israelita Albert Einstein, São Paulo, Brazil.

Case in brief

Hospital Israelita Albert Einstein

A multi-site hospital system in São Paulo, Brazil with 650-bed flagship hospital in Morumbi neighborhood; consistently ranked top private health care institution in Latin America

- Bed placement inefficiencies due to delays in bed assignment times and inappropriate unit placement
- Leveraged machine learning and artificial intelligence to embed prescriptive analytics tool that facilitates patient admission decision-making and reduces variation in admission decisions. Propensity score outlines likelihood of patient admission and optimization model recommends most appropriate placement for patient in the hospital
- Since adoption of AI-driven algorithm, Albert Einstein's bed placement has increased to 94% accuracy of patient being placed in the most appropriate unit

Source: Hospital Israelita Albert Einstein, São Paulo, Brazil.

Investment in machine learning required for success

Accenture-Albert Einstein partnership

Accenture inputs

- Experience developing algorithms and application of AI
- Solution design, build, optimization

How they supported implementation

- Completed a three-month deep dive into Albert Einstein's operations
- Provided on-site analytics team to train hospital IT staff

Albert Einstein inputs

- Eight years of experience in patient flow management
- Fully-implemented EMR
- Clinical database for benchmarking

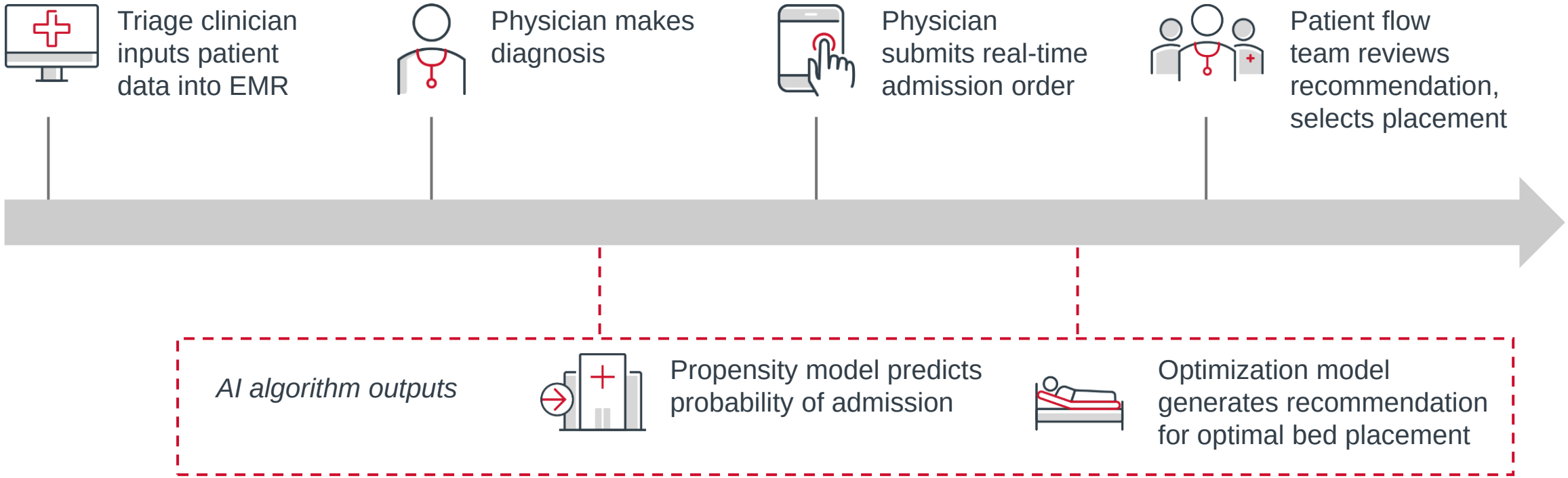
How they supported implementation

- Updated existing infrastructure, staffing for command center
- Clinician involvement in development and validation of the models
- Hired IT staff (two data scientists, one software development professional)

Source: Hospital Israelita Albert Einstein, São Paulo, Brazil.

AI recommends, clinicians confirm

AI-driven admissions process



Source: Hospital Israelita Albert Einstein, São Paulo, Brazil.

Improving accuracy, efficiency of decision-making

94% Bed placement accuracy[1]

18% Decrease in ED patients who left without being seen[2]

16 Months needed to realize return on investment

Algorithm exposes blind spots

I had two available beds in urology and two requests for urology patients came in. The algorithm assigned one patient to urology and the other patient to another location. I said, “That’s wrong! There are two beds available in urology.” What was the system doing?

Turns out we had two procedures with robots in urology, so it was reserving the beds. Without the system, it’s hard to be able to account for everything occurring in surgery.”

Tatiane Ramos Canero
HOSPITAL ISRAELITA ALBERT EINSTEIN

1. Defined as placement on the most clinically optimal unit; Up from 78%, 2017 to 2018.
2. 2017 to 2018.

Source: Hospital Israelita Albert Einstein, São Paulo, Brazil.

Executive cheat sheet for evaluating patient flow technology

Questions to consider

What does it solve?	What are the minimum requirements?	What is the impact on clinician workflow?	How will you track impact?
• What challenge are you trying to solve with this technology? • How big is the problem? • What does the technology not do? • Will solving this problem align with strategic priorities?	• What are the required upfront, ongoing resources and costs? • What existing resources (staff, infrastructure, budget, etc.) can you leverage? • What will you need to buy, build or partner to implement this technology?	• How will this technology improve or disrupt clinicians' workflow? • How easily will clinicians embrace the changes in workflow?	• What metrics do you already track? • What new metrics should you track? • What other quantifiable results will help you determine return on investment and effort?

Source: Hospital Israelita Albert Einstein, São Paulo, Brazil.

Five strategies to break through the throughput plateau

Think system-wide

1. **Centralize your approach to addressing bottlenecks**
2. **Create dedicated pathways for resource-intensive patient populations**

Meet clinicians where they are

3. **Lead with quality to cultivate frontline engagement**
4. **Anticipate emotional reactions to change**

Selectively harness new technology

5. **Leverage technology to accelerate decision-making**

Nursing can’t do it alone

Prior to the dyad model, flow was mostly a nursing responsibility. It was basically just nursing trying to figure out how to manage patients. There were opportunities to improve, but without complete collaboration of the wider care team, you just don’t have that much success.

Barbara Jacobs, VP Nursing and CNO

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