Cross-functional team Co-location: Improving Efficiency in a Dedicated Observation Unit

Sandra Rotman Centre for Health Sector Strategy
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Motivation and Context

- Improve flow, care for more patients, as efficiently as possible
- Context: Dedicated Observation Unit (DOU) July 2018
  - Observation Units treat emergency department (ED) patients
    - Too sick to be discharged home
    - Not sick enough for inpatient admission

With campus consolidation, it became critical for the Observation Unit to have efficient throughput

Time Period	Provider Coverage	# of M/S beds[4]	# OBS beds	OBS unit occupancy
2015 - 2016[1]	ED	258	12	~68%
2016 - 2017[2]	Hospitalist	258	12	~68%
2018 – 2019[3]	Hospitalist + FM	219	28	~83%

Changes to the DOU

Pre-July 2018

"Inclusion Criteria" to select pts for DOU

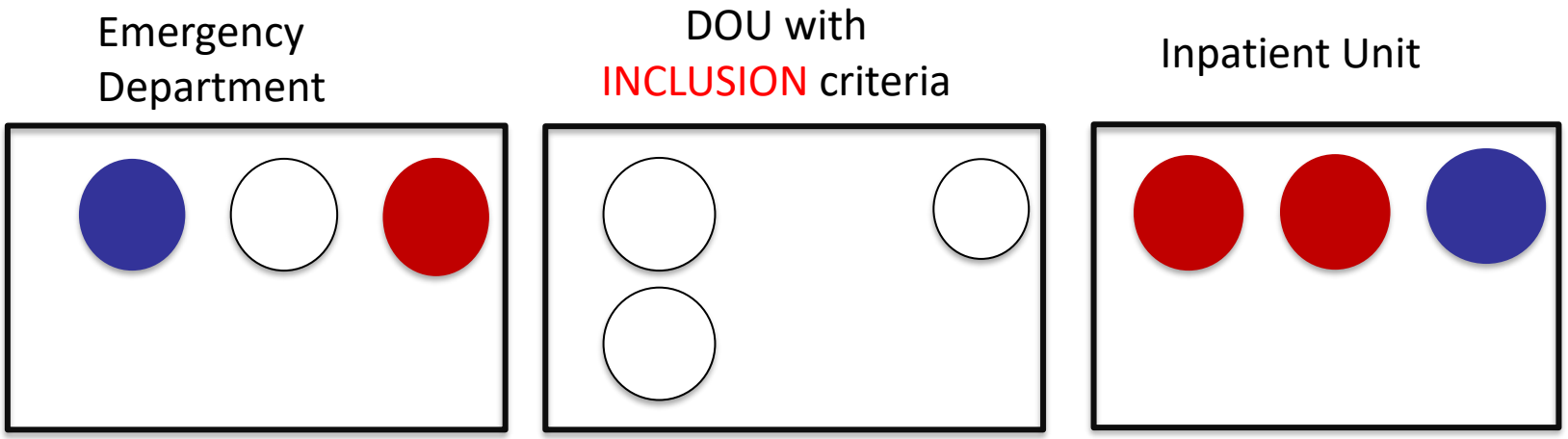
- CHEST PAIN EXAMPLE: History of chest pain, possibly of cardiac origin; Vital signs within acceptable range
- ECG without acute ischemic changes, ECG interpreted by ED Attending and compared to old ECG if available; Initial cardiac markers within the normal range; Resolving chest pain; Potential to discharge within 23 hours; Able to give consent

Post - July 2018

"Exclusion Criteria"

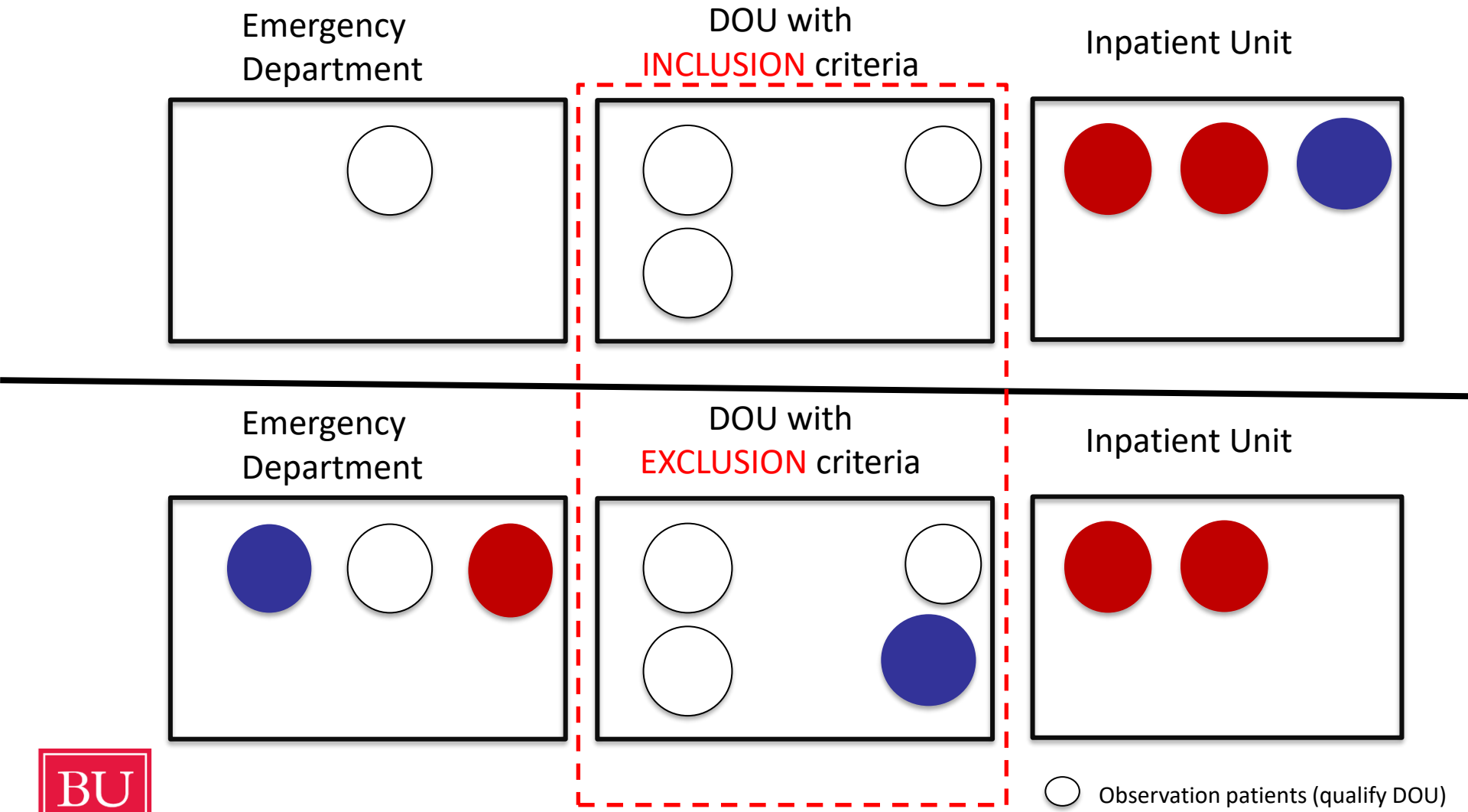
Actively psychotic	Suicidal	Homicidal
Total care (bed bound) and incontinent and/or require >1 assist for mobility	VRE, C. Diff with diarrhea, r/o for active TB, neutropenic	Excluded services: specialty surgery, geriatrics, hem/onc, transplant only
Peritoneal dialysis	Heart failure exacerbation needing Lasix gtt	Need for new 02 requirement post-initial treatment
Acute EtOH withdrawal requiring multiple dosing of benzos	COPD/asthma exacerbation ONLY if requiring non-invasive ventilation in ER	

Hypothesis 1 (Operational Cost)



Observation patients (qualify DOU)
Short stay patients in inpatient unit
Vulnerable patients in inpatient unit

Hypothesis 1 (Operational Cost)

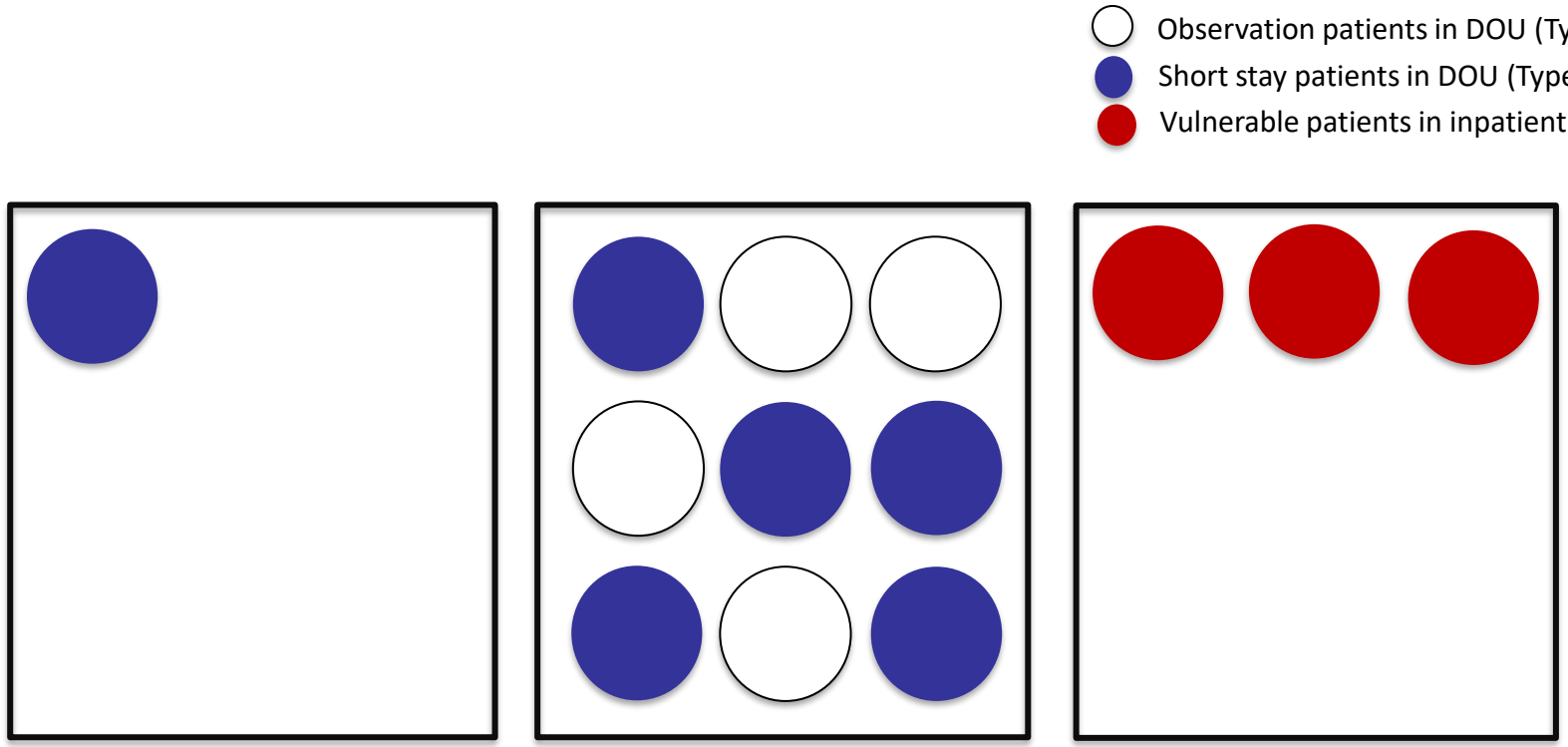


Hypothesis 1 (Operational Cost)

Observation patients treated in the DOU with exclusion criteria will have a longer LOS on average compared to observation patients treated in the DOU with inclusion criteria, controlling for patient severity.

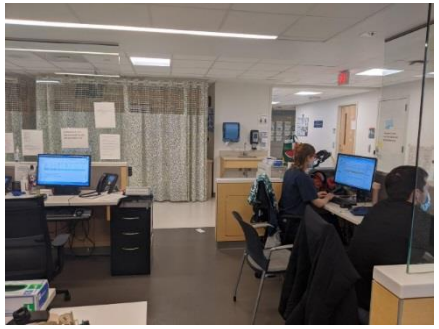
Hypothesis 2 (Efficiency Gain)

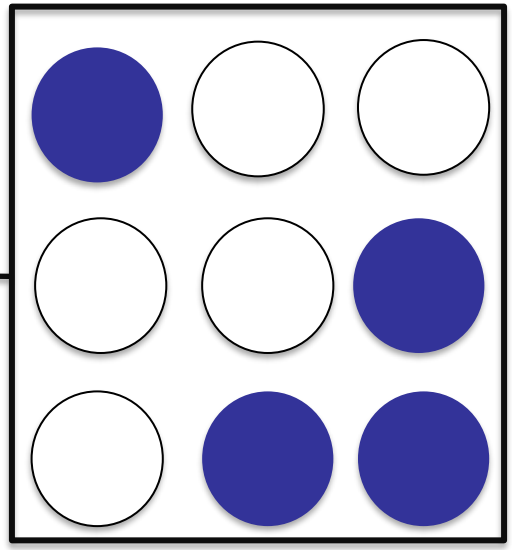
Observation patients treated in the DOU (on-service) with team co-location will have a shorter LOS on average compared to observation patients treated in the inpatient unit (off-service) without team co-location.



One Lever: Cross-Functional Team Location

DOU
Co-located MD, RN,
Case manager





DOU with exclusion criteria

Inpatient Unit

Nurses

Physicians

Case managers

Hypothesis 2 (Efficiency Gain)

Observation patients treated in the DOU with team co-location will have a shorter LOS on average compared to observation patients treated in the inpatient unit (off-service, without team co-location).

Data

- Context: Safety-net, Academic Medical Center in Massachusetts
- Population: Observation patients

H1: Operational cost analysis

- July 2013 to September 2019
- ~13,000 patient-visits
- Intervention date: July 2018
- DOU inclusion→45.62% (Jul 2013-Jun 2018)
- DOU exclusion→44.44% (Jul 2018-Sept 2019)
- ED→9.93%

H2: Efficiency gain analysis

- July 2018 to September 2019
- ~10,000 patient visits
- DOU exclusion→ 40.40%
- Inpatient unit→59.60%
  - Focus on Chest pain patients

Need to account for endogeneity where patients treated

	DOU vs. ED				DOU vs. Inpatient			
Variables	All Mean	All Std. Dev	ED (Control) Mean	DOU (Treated) Mean	All Mean	All Std.Dev	Inpt.(Control) Mean	DOU (Treated) Mean
Admission Occupancy (DOU)%	68.78	14.22	69.49	68.70	70.93	13.48	71.26	70.45
Admission Occupancy (ED)%	62.46	15.78	63.01	62.40	-	-	-	-
Admission Occupancy (Inpatient)%	-	-	-	-	90.51	4.21	90.53	90.49
Age	54.39	16.22	48.65	55.02	48.09	21.26	44.18	53.60
Gender (female) %	53.41	49.89	44.06	54.44	51.94	49.98	51.49	52.58
Insurance: Medicaid %	47.12	49.92	52.62	46.51	52.19	49.95	54.29	49.24
Medicare %	25.70	43.70	24.13	25.87	19.07	39.29	17.22	21.68
Uninsured %	5.63	23.05	9.23	5.23	10.36	30.48	9.85	11.08
Private %	8.76	28.27	3.62	9.32	-	-	-	-
Others %	12.80	33.40	10.41	13.06	19.07	39.28	19.82	18.00
Acuity level: Immediate %	0.24	4.91	0.44	0.22	0.60	7.71	0.96	0.09
Emergent %	51.88	49.97	34.46	53.80	58.72	49.24	53.04	66.73
Urgent %	44.87	49.74	51.44	44.15	29.00	45.38	27.30	31.39
Less urgent %	2.87	16.70	12.92	1.77	1.19	10.83	1.15	1.24
Non urgent %	0.13	3.6	0.74	0.07	0.45	6.70	0.72	0.07
Severity score	2.04	6.21	1.76	2.07	2.19	6.35	2.93	1.14
Post-Acute care %	10.17	30.23	25.46	8.49	82.86	37.69	77.51	90.40
Observation LOS (hours)	27.31	16.68	20.86	28.02	29.53	17.21	29.65	29.36
n	13,645		1,355	12,290	10,868		6,357	4,511

Standardized mean difference <=0.10 is evidence of covariate balance (Zhang et al. 2019)

H1 Results (Diff in Diff, inverse probability weights)

$$\ln(Observation\ LOS)_{ijt} = \beta_0 + \beta_1 Treated_{ij} + \beta_2 Post_t + \boldsymbol{\beta_3} Treated_{ij} \times Post_t + \theta_t + \alpha_j + X + \varepsilon_{ijt} \quad \text{eq.4}$$

Treated = 1 if DOU; Post = 1 if >July 2018

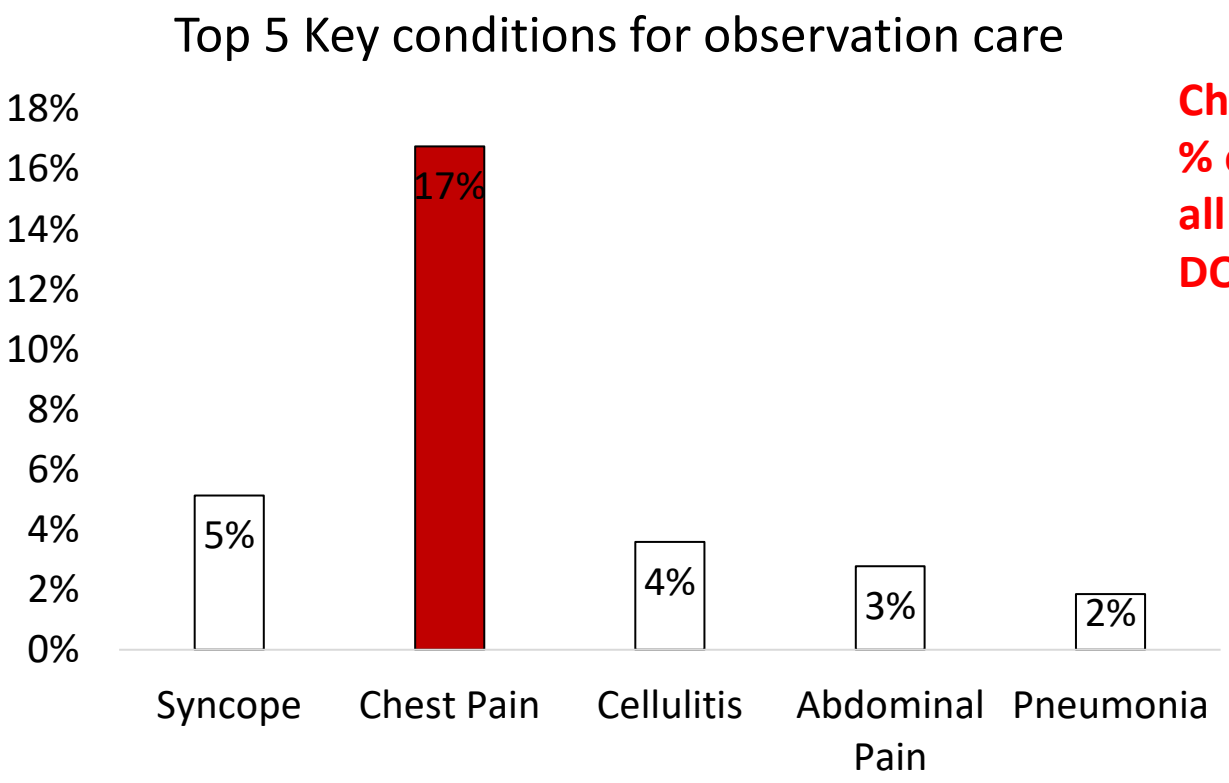
Time FE Physician RE Controls

Variables	(1) Logged Observation LOS	(2) Logged Observation LOS
Post	-0.257	-0.261
	(0.169)	(0.156)
Treated	0.064	0.064
	(0.087)	(0.079)
Post × Treated	0.178+	0.199*
	(0.106)	(0.100)
Controls	Yes	Yes
Time FE	Yes	Yes
Physician RE	No	Yes
n	10,236	10,236

∗p < 0.05; ∗∗p < 0.01; ∗∗∗p < 0.001. FE, fixed effects. Physician FE in model 1.
+p<0.10
Time FE includes day of week and month of year
Regression is IPTW weighted on sample within common support .

H1 Operational cost: Care in the DOU exclusion is associated with 19.9% increase in LOS
~ 5.4 hours

Test H2 using chest pain patients



Chest pain→ highest % of primary DRG of all patient visit to DOU

H2: Results

Physician RE
Time FE
Controls

$$\ln(Observation\ LOS)_{ijt} = \beta_0 + \beta_1 DOUOnService_{ijt} + \delta X + \theta_t + \alpha_j + \varepsilon_{ijt}$$

$$DOUOnService_{ijt} = \begin{cases} 1, & if\ patient - visit\ i\ received\ care\ in\ On - service\ in\ the\ DOU \\ 0, & otherwise\ (Off - service[Inpatient\ unit]) \end{cases}$$

Variables	(1) Logged Observation LOS (All)	(2) Logged Observation LOS (chest pain)	(3) Logged Observation LOS (chest pain)
DOU On-Service	-0.231	-0.062+	-0.063*
	(0.027)	(0.033)	(0.030)
Inverse Probability weight	Yes	Yes	Yes
Controls	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Physician RE	Yes	No	Yes
n	10,863	5,624	5,624

∗p < 0.05; ∗∗p < 0.01; ∗∗∗p < 0.001. FE, fixed effects. Physician FE in model 2.
+p<0.10
Time FE includes day of week and month of year
Regression is IPTW weighted on sample within common support .

Efficiency gain: Care in the DOU is associated with 6.3% decrease in LOS versus inpatient unit ~ 1.89 hours

Address Potential Endogeneity Using Instrumental Variables

- Instrumental variables (Z)
  - Number of admissions in DOU 1 hour prior to admission decision (count variable)
  - Midnight occupancy (continuous variable)
  - Observation to inpatient busyness ratio (continuous variable)

- Assumptions: Relevance and Exogeneity
  - Relevance condition: $IV\ is\ correlated\ with\ DOU$
    - IVs are associated with DOU

  - Exogeneity condition: $IV\ is\ uncorrelated\ with\ error\ term$
    - Account for prior unit congestion (Song et al. 2019, Kim et al. 2015)
      - Correlation between ED congestion (linear and squared) and IV is low (0.25, -0.02 and 0.21)
      - Correlation between IVs and other observable covariates is low (highest being 0.0747)

H2: Results with IV

Physician RE
Time FE
Controls

$$\widehat{DOUOnService}_{ijt} = \alpha_0 + \alpha_1 Z_{ijt} + \delta X + \theta_t + \alpha_j + e_{ijt} \quad \text{eq.4}$$

$$\ln(Observation\ LOS_{ijt}) = \alpha_0 + \alpha_1 \widehat{DOU}_{ijt} + \delta X + \theta_t + \alpha_j + \varepsilon_{ijt} \quad \text{eq.5}$$

Variables	Model 1 OLS Logged Observation LOS (chest pain)	Model 2 2SLS (1st stage) $\widehat{DOU}$ (chest pain)	Model 3 2SLS (2nd stage) Logged Observation LOS (chest pain)
Midnight occupancy in DOU		0.003* (0.001)	
Observation to inpatient busyness ratio		-0.282* (0.111)	
Number of admissions in DOU		0.049*** (0.004)	
DOU On-service	-0.042 (0.027)		-0.300* (0.154)
Controls	Yes	Yes	Yes
R-squared	0.0256	0.0108	0.0108
Observation	5,618	5,618	5,618

Efficiency gain: Care in the DOU associated with 30% decrease in LOS vs inpt ~ 9 hours

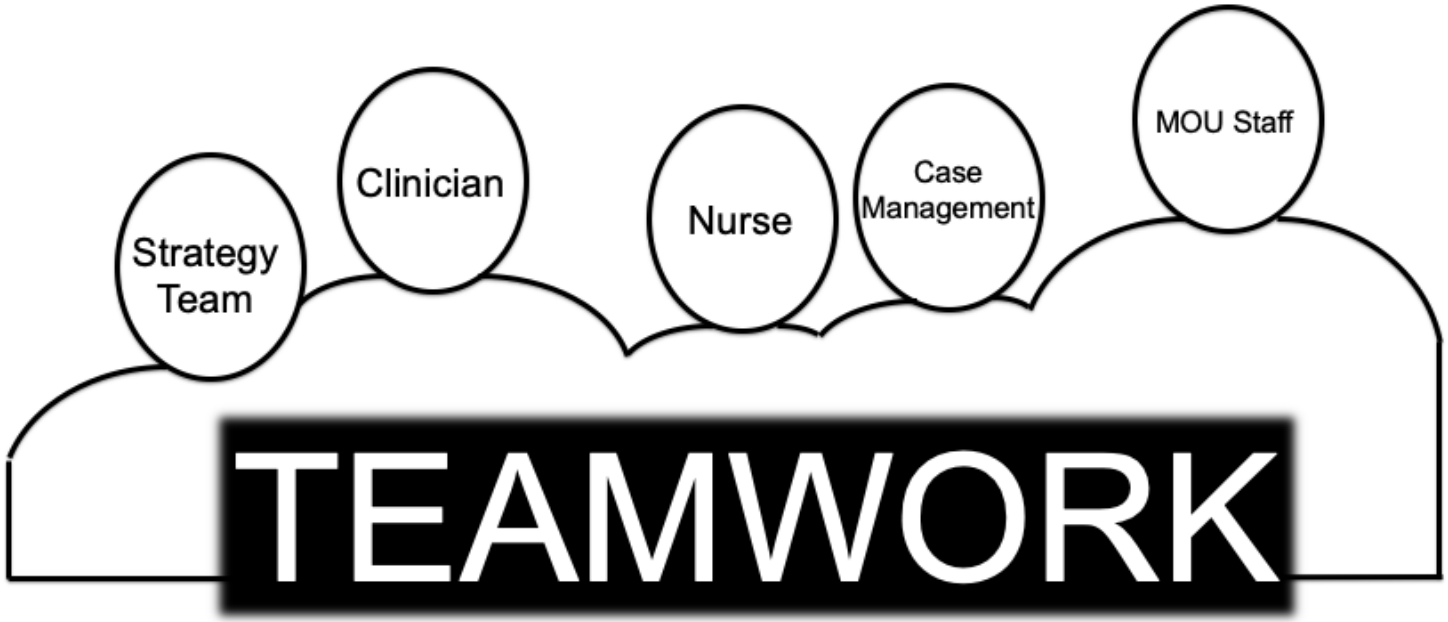
*p < 0.05; **p < 0.01; ***p < 0.001, +p<0.10 . Controls , Day of week FE, Month of year FE and physician RE. Robust standard error

Summary of results

- DOU exclusion operational cost
  - Effect from increase in demand and patient variability
  - LOS increases by 19.9%→~5.4 hours

- DOU exclusion efficiency gain
  - Effect from team co-location
  - Without accounting for selection bias→ small impact on LOS
  - After accounting for selection bias
    - LOS (for chest pain patients) decreases in DOU by 30%→ ~ 9 hours

Dedicated Observation Unit - Litmus Test for Success



Will this initiative...

1) Improve the care for our patients?
2) Improve the quality of life of our team?
3) Align with the larger goals of our hospital?

Dedicated Observation Unit
Factors contributing to success

A Shared Mission

*The core **mission** of our unit is to provide **timely and patient-centered** care. Our goal is to **effectively observe and treat patients within a 24-hour** period, ensuring either a safe **transition to the outpatient setting** or when necessary **admission** to the **hospital**.*

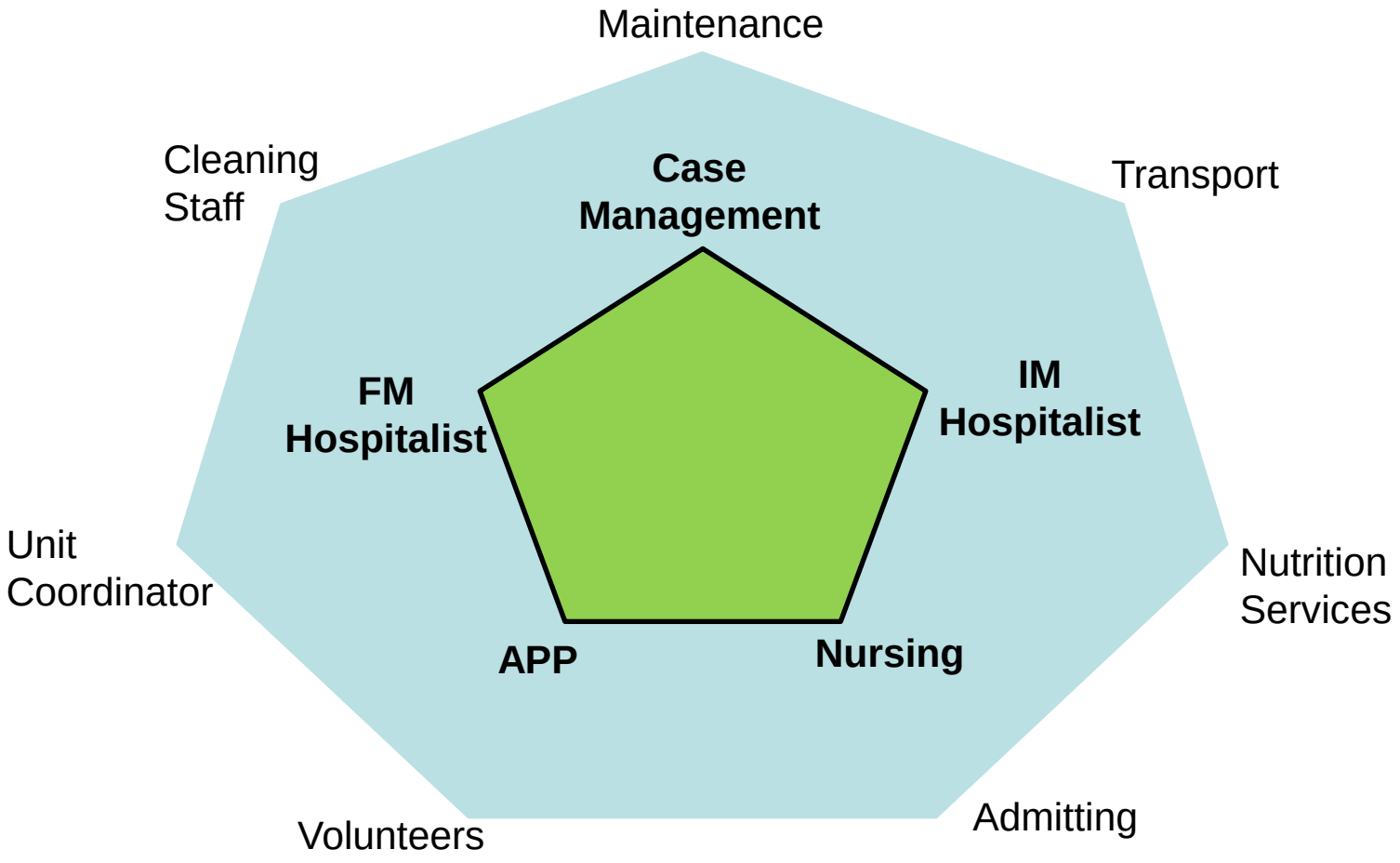
*Serving **patients** and meeting their needs is the **heart of our work**.*

Dedicated Observation Unit
Factors contributing to success

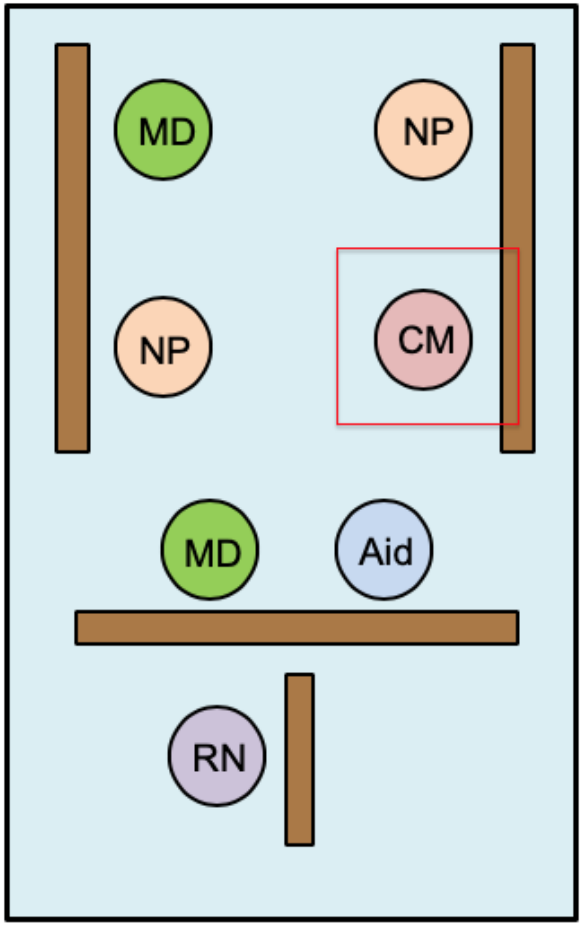
'A Standardized Approach'

- *Getting the RIGHT Team*
- *Placing the RIGHT Patient*
- *Providing the RIGHT Care*

Getting the RIGHT TEAM



Getting the **RIGHT TEAM**: **Integrated case management model**



WORKPLACE

- Case Manager is a **Team Leader**, providing a constant presence amidst rotating clinicians
- Engaged approach to triaging admissions
- Efficient discharge planning

Filling the unit with the 'Right patient' using the 'Right workflow'
Patient admission process - triage to actively 'pull in'

C. Filling the unit with the **RIGHT PATIENT**

→ Integrated Case Management Model

- If there is disagreement in disposition between ED and OBS unit care team, NPP is encouraged to go down to ED to see patient
  - E.g., borderline EtOH patient – NPP goes down to ED to perform CIWA

7:30a: OBS CM runs board and connects w/ NPP admitter on patients to take

↓

12:30p: OBS CM and ED CM run board and connect w/ NPP admitter on patients to take (OBS CM pages ED CM)

↓

3:30p: OBS CM and ED CM run board and connects w/ NPP admitter on patients to take (OBS CM pages ED CM)

↓

4:30p: *ED* CM runs board and connects with NPP admitter, who gives charge nurse a preview of upcoming patient assignments to inform staffing (needs to happen before 5p)

Dedicated observation unit: Providing the Right Care

1. **Focused Care**
2. Proactive Care
3. Collaborative Care
4. Transitional Care

Dedicated Observation Unit - Collaborative Care

- **Streamlining care with subspecialists**
  - **Cardiology:**
    - Expedited Stress testing
    - Chest pain evaluation(HEART score)
  - **Neurology:** Attending only early evaluation

Transitional Care : Partnering with Existing Resources

Volunteer program:

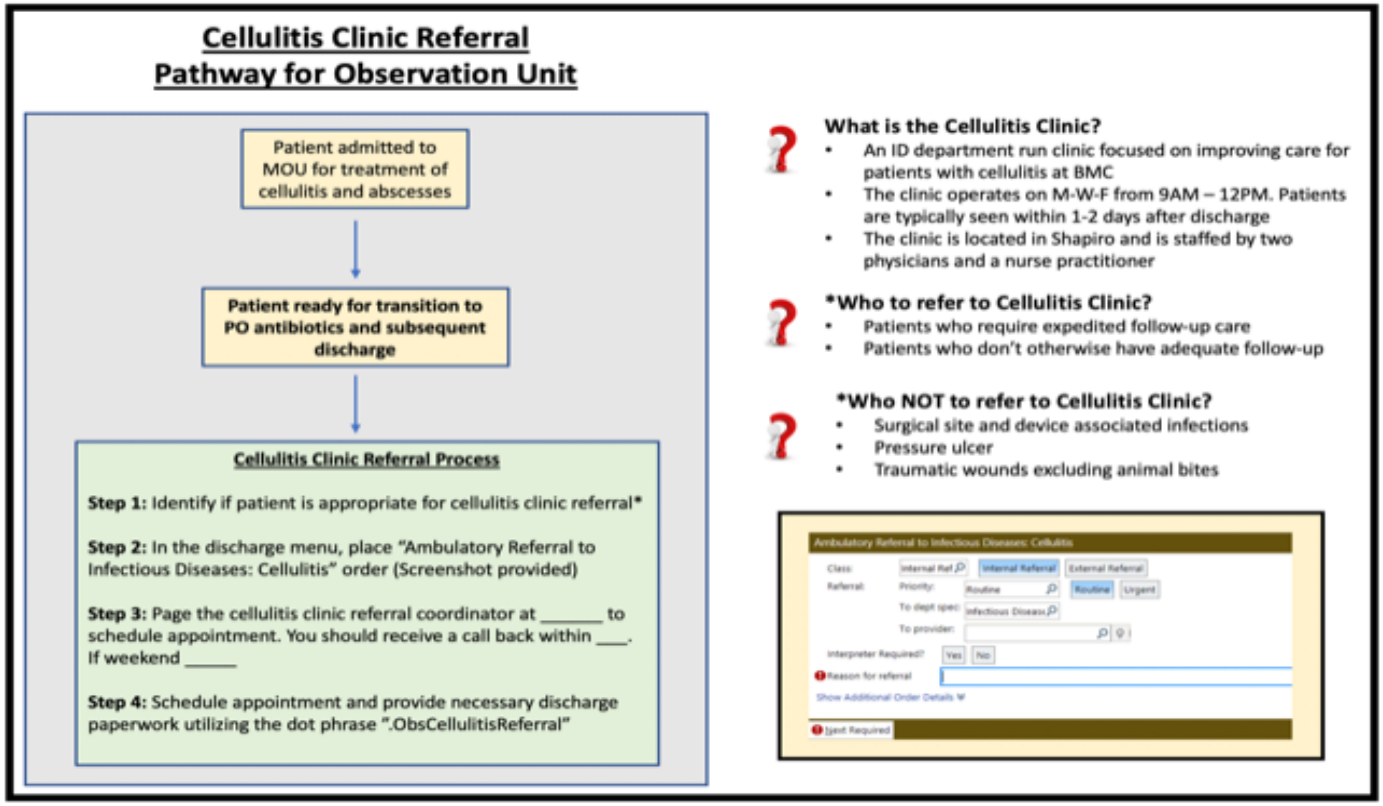
Negotiated follow-up appointments leads to

- more appointments made (65%)
- low no-show rate!(15%)

Transitional Care : Partnering with Existing Resources

Cellulitis Clinic:

Rapid follow-up in infectious disease clinic for patients with skin and soft tissue infections



Transitional Care : Partnering with Existing Resources

Project Trust:

Substance use outreach workers coordinate care for our patients

Project Trust Observation Unit PrEP/PEP Protocol for Persons Who Inject Drugs (PWID)

The Purpose: Project Trust will assist MOU providers with…

- Identifying patients eligible for PrEP/PEP
- Ordering necessary labs
- Project Trust NP will prescribe PrEP/PEP for patients and counsel patients
- Coordination of care following discharge

Step 1: Identify eligible and interested patients for PrEP/PEP
*See Figure 1- who is eligible for PrEP?

↓

Step 2: Place Project Trust Consult Order
- "PrEP/PEP assistance"

↓

Step 3: Order necessary labs
*See Figure 2

↓

Step 4: Project Trust NP will reach out to MOU care team between 9AM-10AM to…
A) Review case with provider
B) Discuss follow-up plan at PT clinic
C) Coordinate PrEP/PEP prescription
*Note – If you would like to coordinate PrEP/PEP for your patient with Project Trust from 10AM – 4PM, **PAGE *****

Figure. 1 -- Who is Eligible for PrEP?
Consider recommending PrEP for people who, in the past 6 months, have:
- Shared injection equipment
- Had a bacterial STI
- Had condomless sex with partners at risk of HIV or with unknown HIV status
- Exchanged sex for money, drugs or other goods
- A sexual or injection partner with HIV

Figure 2 -- What labs to order?
- PrEP labs
  - HIV
  - HBV Sab, Sag, HCV ab
  - Scr
  - STI testing: Syphilis IgG/IgM, HCV Ab, chlamydia + gonorrhea
- PEP labs
  - All of the above PLUS LFT's

Dedicated Observation Unit
Factors contributing to success

'A Strategic Commitment '

- *Absolute support from senior hospital leadership*
- *Building a high performance leadership team*
- *Common goals shared by ALL(providers and staff)*
- *Dialogue with critical partners on an ongoing basis*

Dedicated Observation Unit
Factors contributing to success

'A Strategic Commitment '

- **Engaging providers** in
  - revising staffing model and schedules
    - 'Admitter role'
      - example of innovating staffing model to optimize efficiency
    - 'Swing role'
      - example of flexibility of APPs to address team capacity constraints(both inpatient floor & observation unit)

‘Dedicated Observation Unit – Litmus test for success’

Evolving continuously to enhance patient experience

Re-imagining the look and feel of the unit

Patient satisfaction surveys and team-input drove initiatives to dramatically improve unit environment

- Light Dimmers to improve sleep
- Full nutrition service
- Optimized cleaning services
- Patient Welcome Flyer
- TV displays

Thanks to ALL our Providers and staff on the Observation unit
Teamwork truly makes the dream work