

Capacity Strain as a Staffing Model: Managing Resources to Support Value

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Disclosure Statement

I do not have a financial interest/arrangement or affiliation with any organization which could be perceived as a real or apparent conflict of interest in the context of the subject of this presentation

Objectives

- Define capacity strain
- Review current literature trends regarding capacity strain
- Identify elements of capacity strain
- Review examples of strain
- Highlight methods for managing strain to support value





Capacity Strain in Respiratory Care Services



Allocation of Care in Respiratory Care



Ethical Dilemmas Faced by Practitioners and Leaders



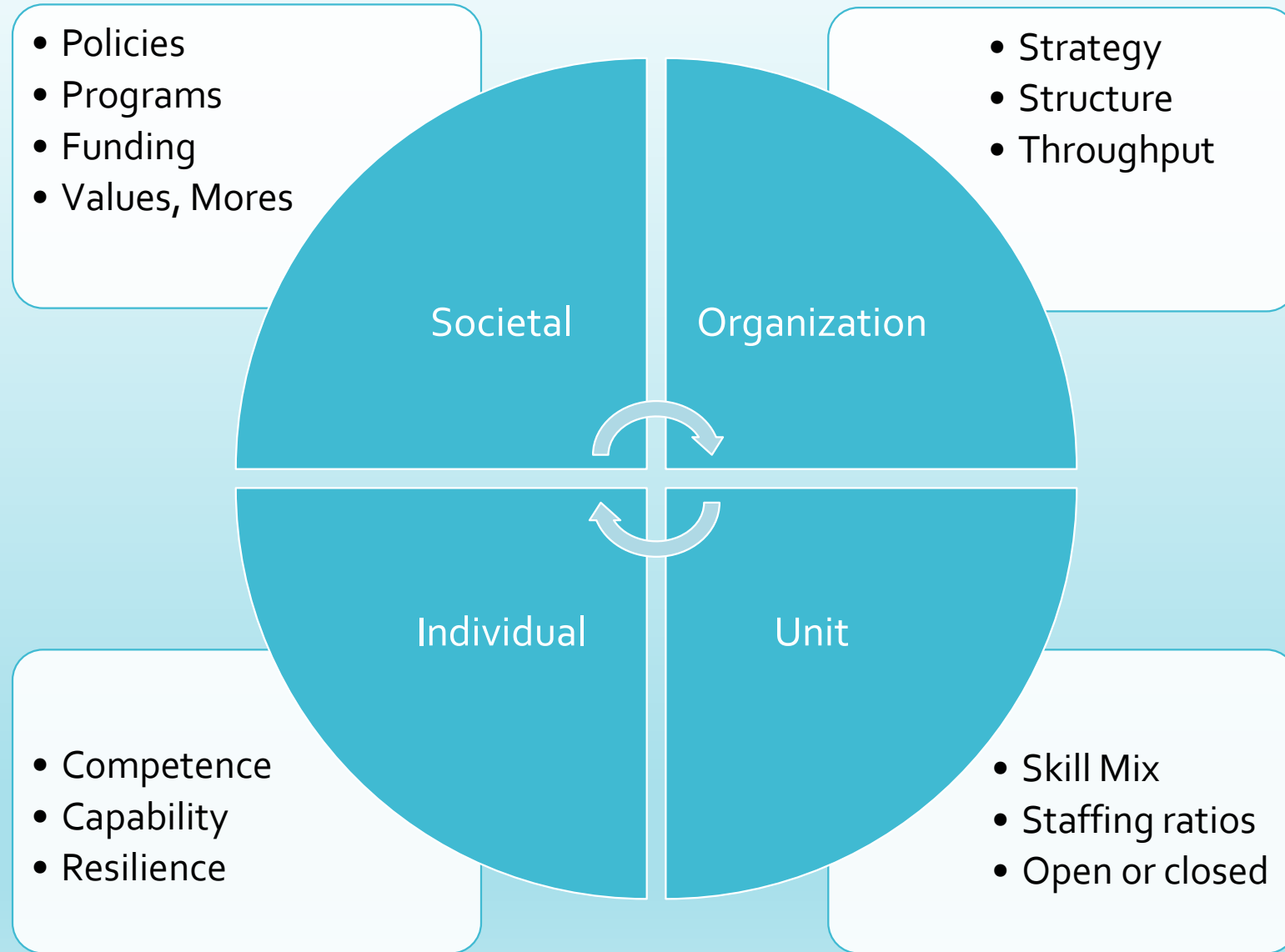
Rationing Respiratory Care Services

Capacity Strain Definition^{1,2,3}

- Excessive demand on strength, resources or abilities
- Limited capacity and the resulting problems of waiting times and throughput losses
- Effect of high patient census, acuity or turnover
- Any element of the care environment which affects function
- Distribution of scarce resources which necessarily entails withholding potentially beneficial treatments from some individuals

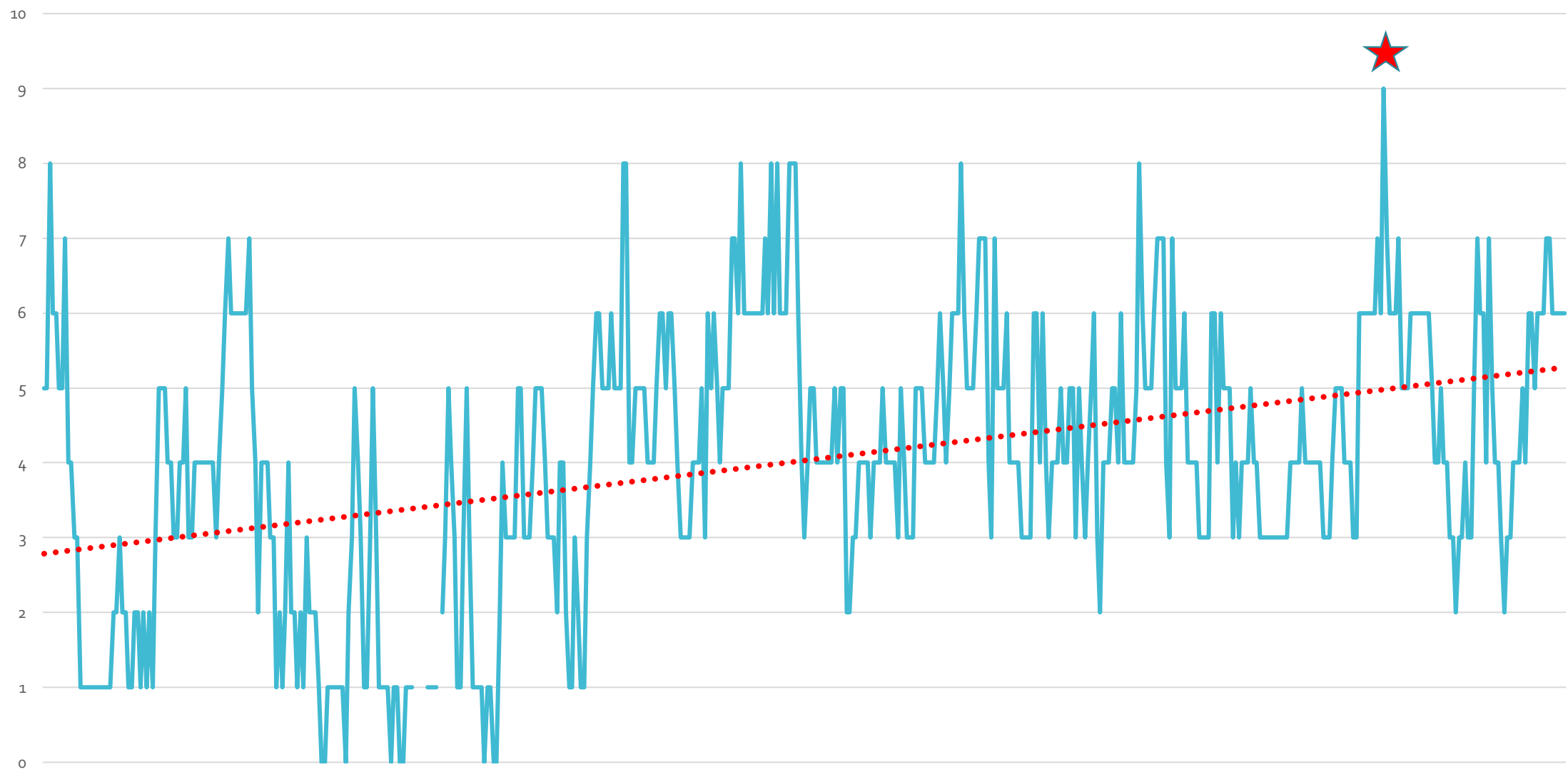
Elements of Capacity Strain^{7,8}

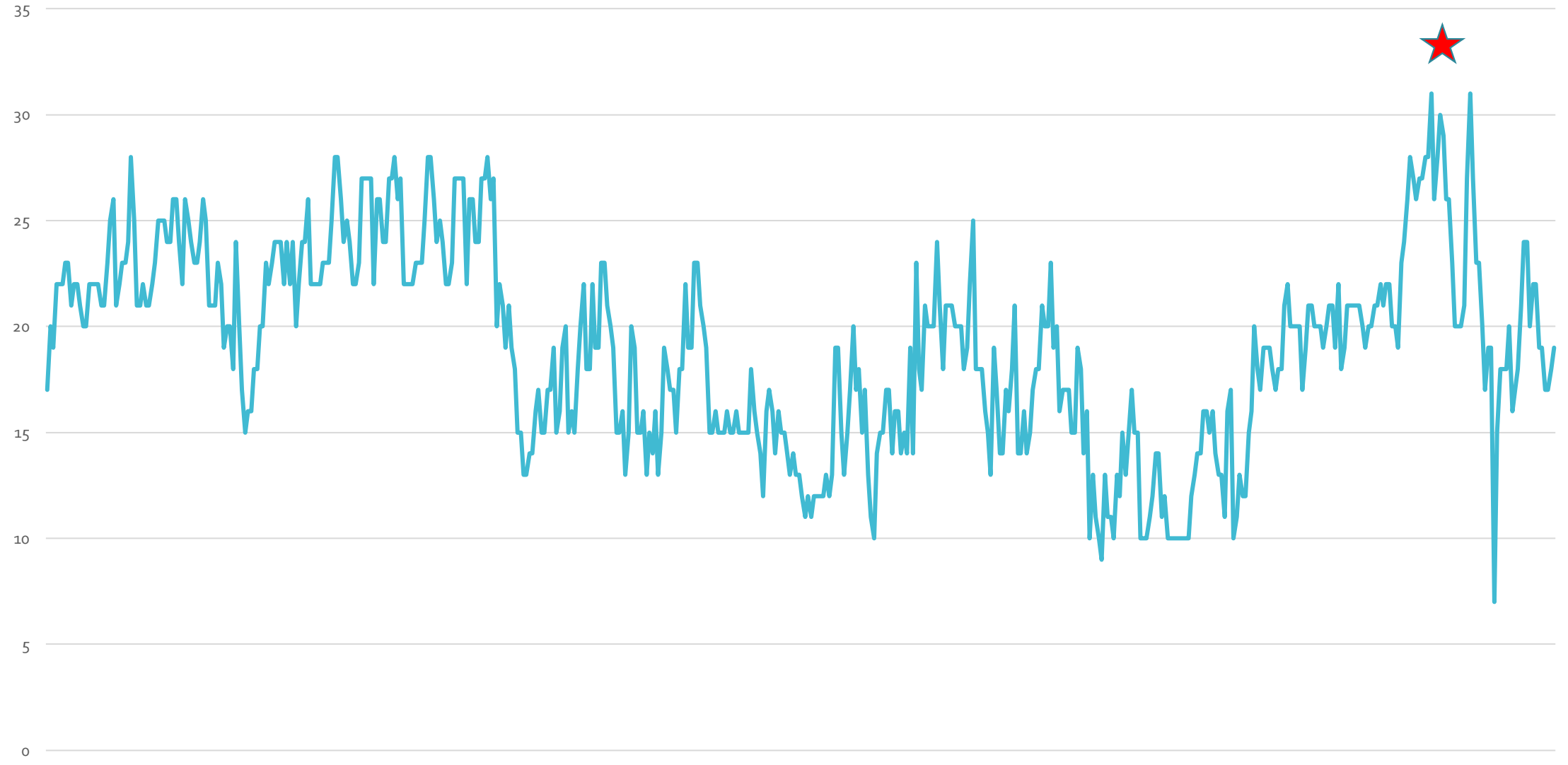
- Any element which strains resources:
 - Staffing levels
 - Coverage models (open, closed)
 - Patient admissions
 - Acuity, severity of illness
 - Length of stay, throughput
 - **Knowledge, skills and abilities
 - **Resilience of personnel and teams



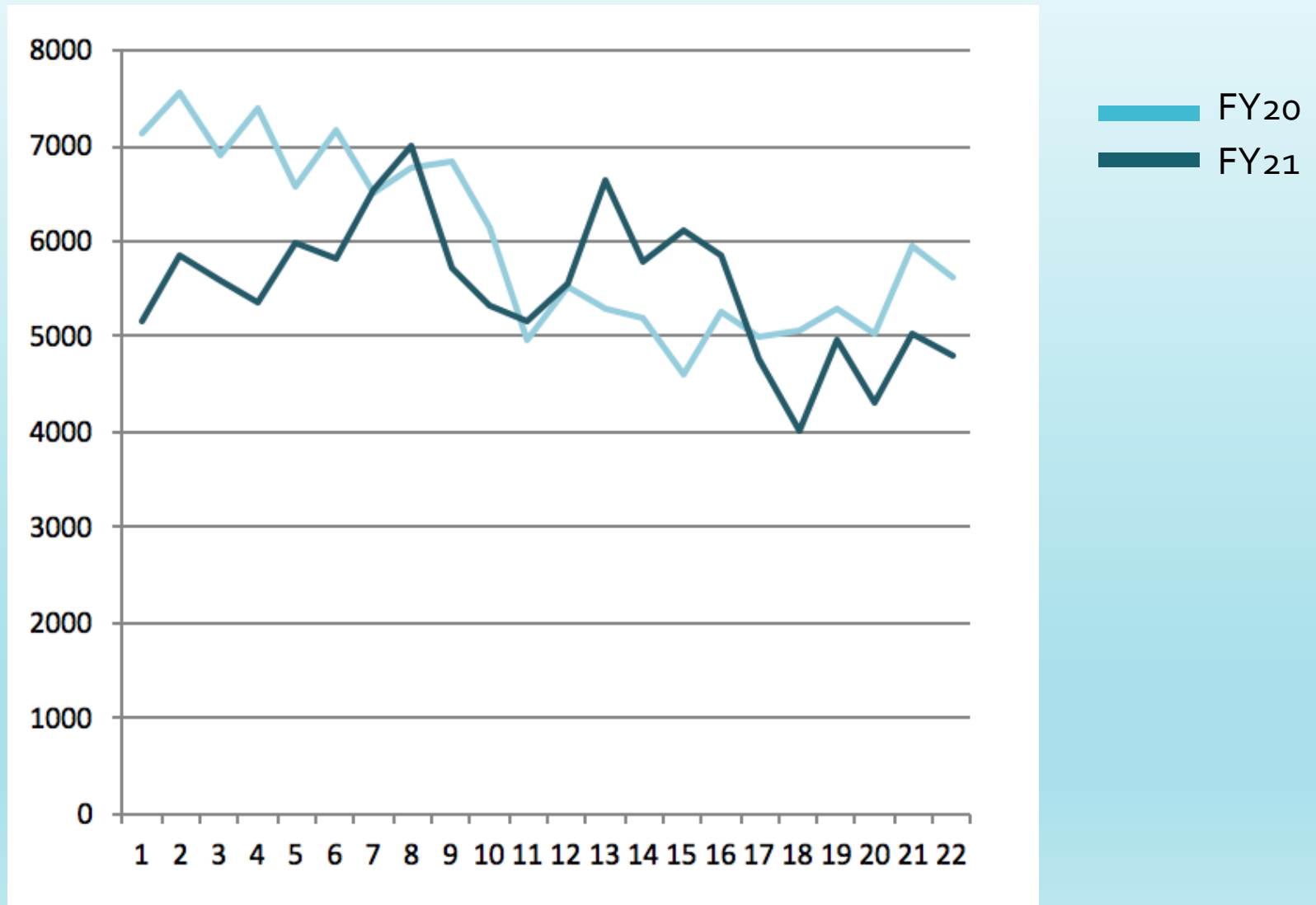
The Evidence^{1,4,5,6}

- Prolonged time to thrombolytic / antibiotic administration
- Worsened 90-day mortality, length of stay (LOS)
- Patient throughput times prolonged
- Reduced documentation time
- Reduced time spent with patients
- Decreased protocol adherence
- **Statistically significant increase in mortality in times of strain in 18 of 30 studies; 9 out of 12 ICU studies**
- **In developed countries, hospital capacity strain is associated with increased mortality and worsened health outcomes**

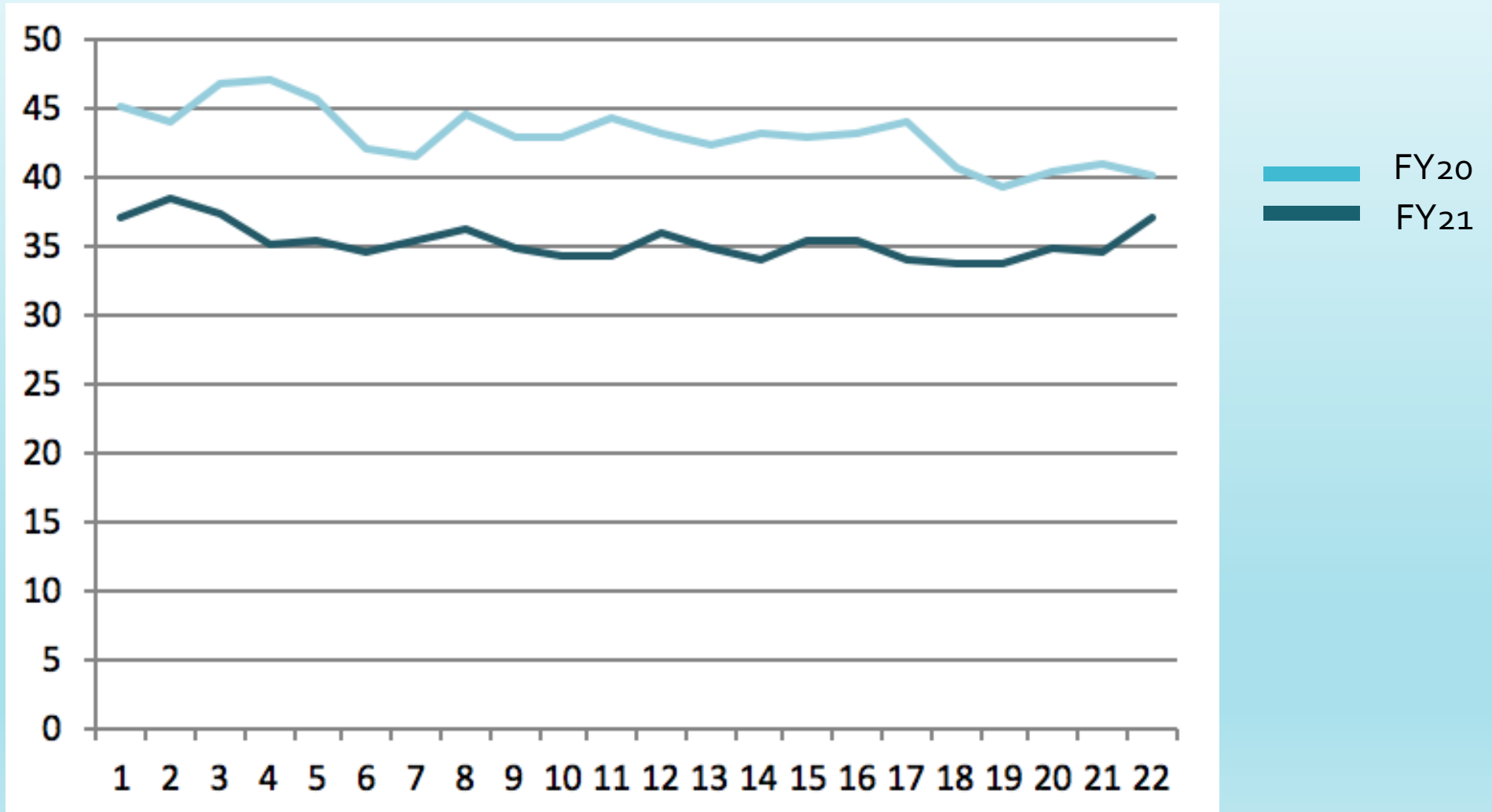




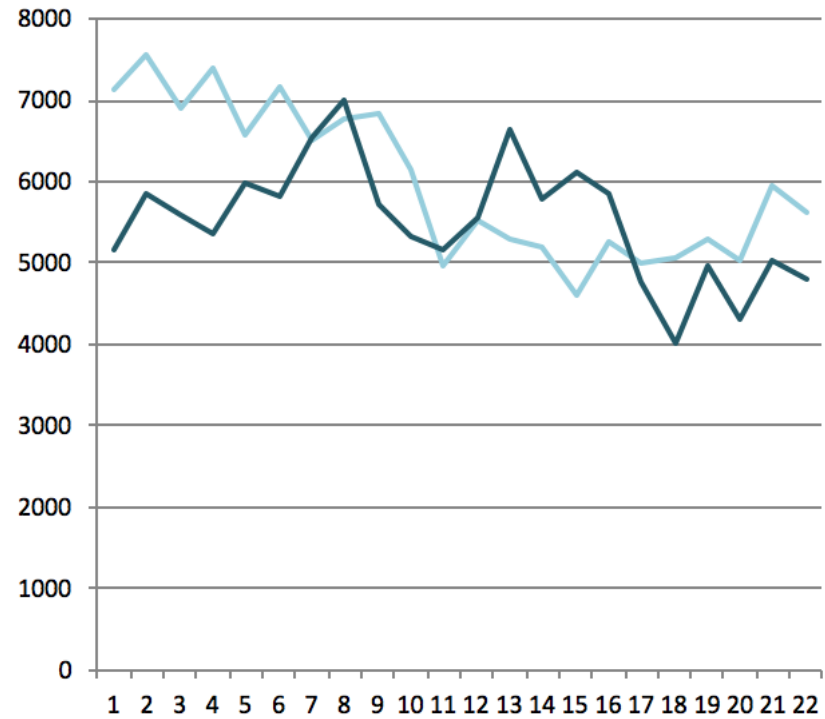
Work Volume



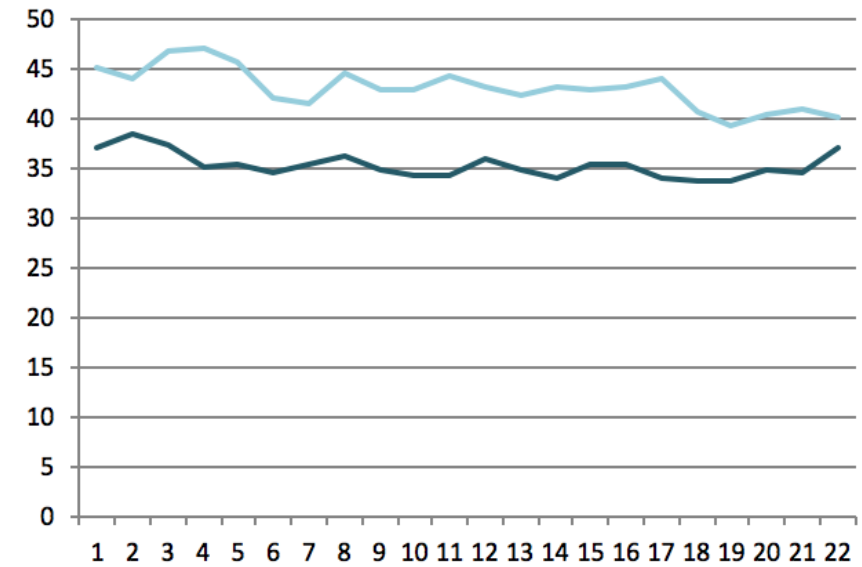
Staffing Levels



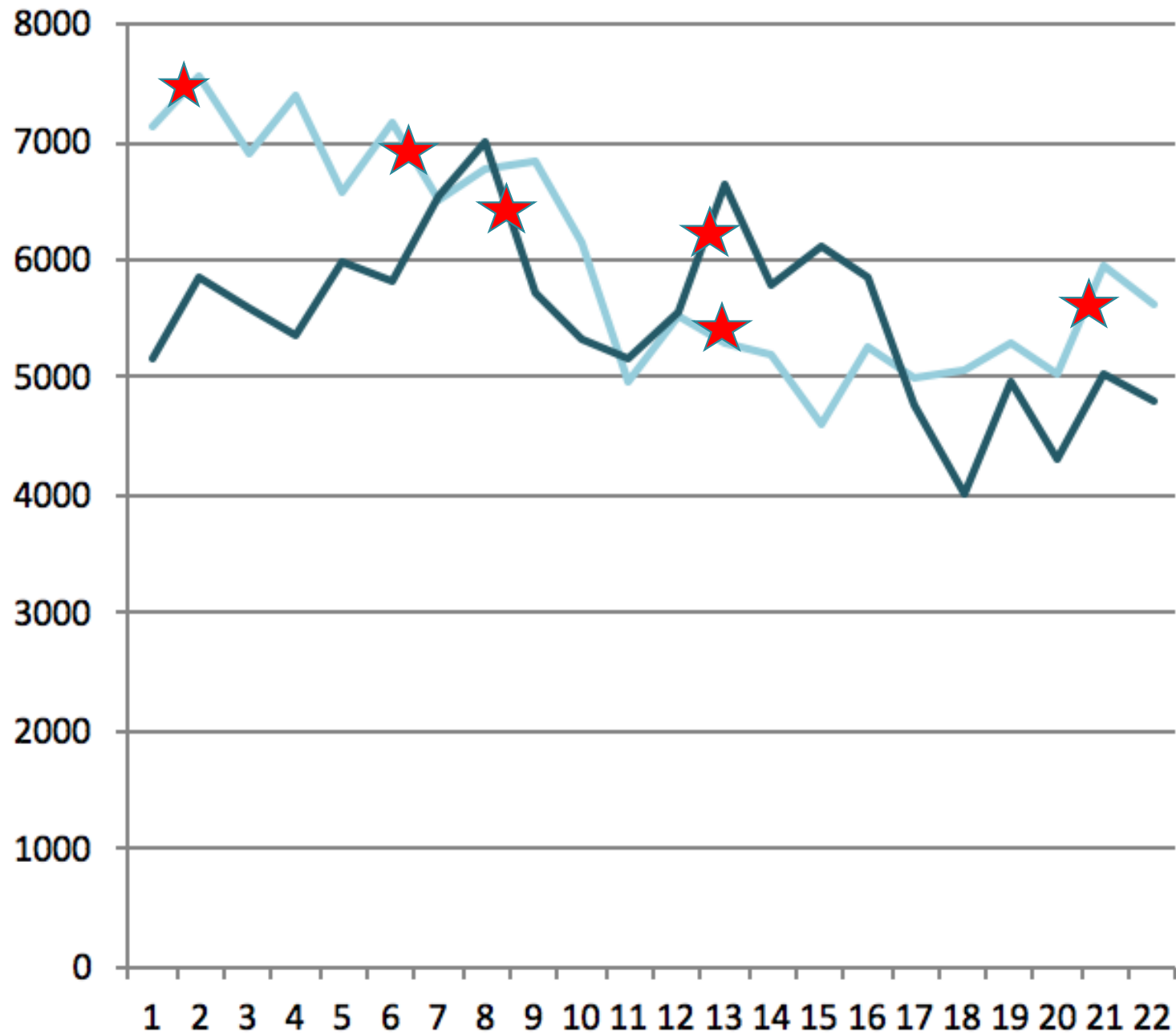
Work Volume



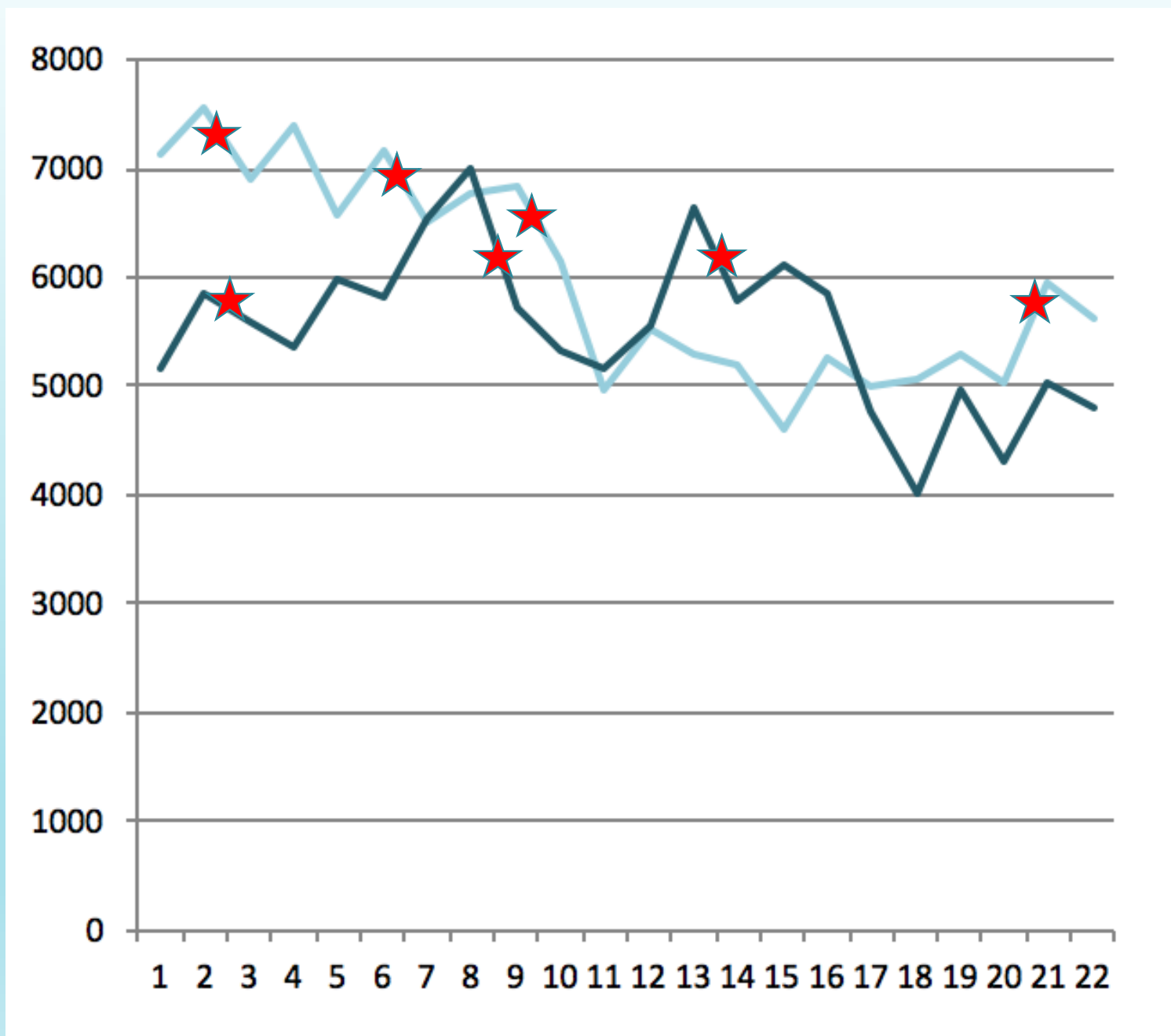
Staffing Levels



VAE



UE

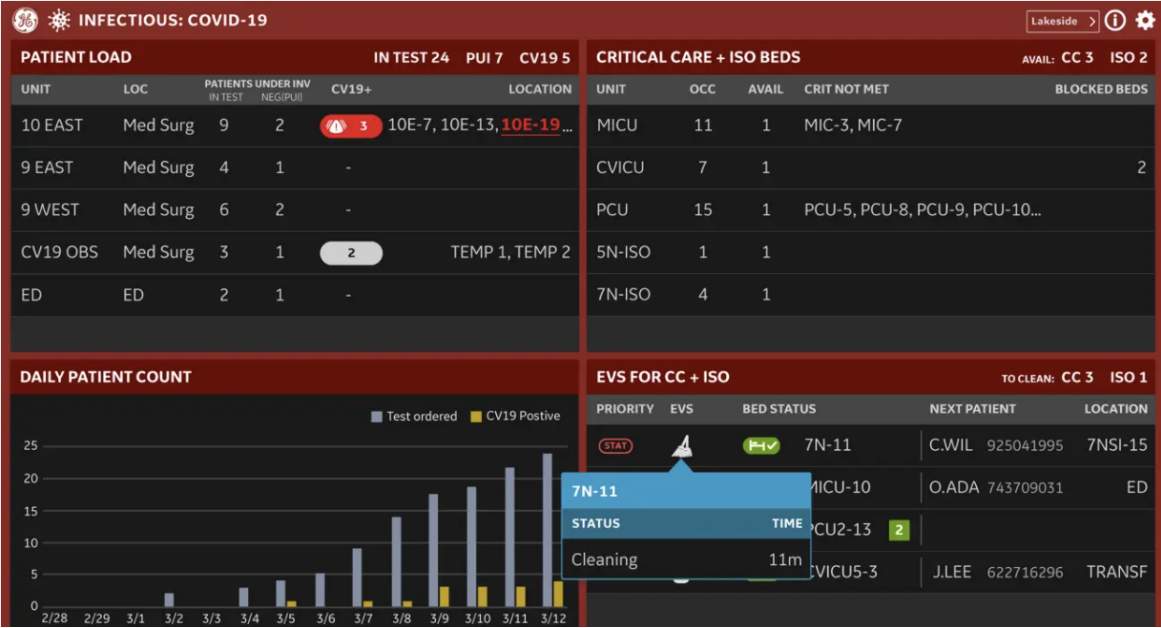


Capacity Strain during COVID

- Healthcare workers
- Ventilators/Durable Equipment
- Personal Protective Equipment
- Laboratory Testing
- Disposables
- Institutional Infrastructure

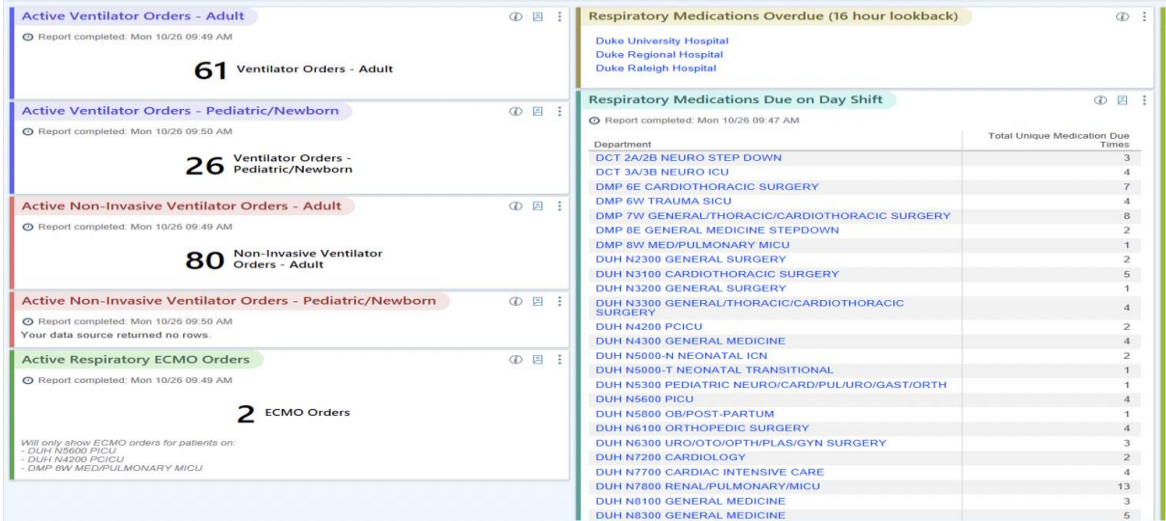
Capacity Strain Post-COVID

- Human Capital
- Knowledge
- Experience
- Disposables
- Medications
- Regional/National Infrastructure
- Emotional Quotient



Consultant Resource Tracking

Internal Tracking



7A

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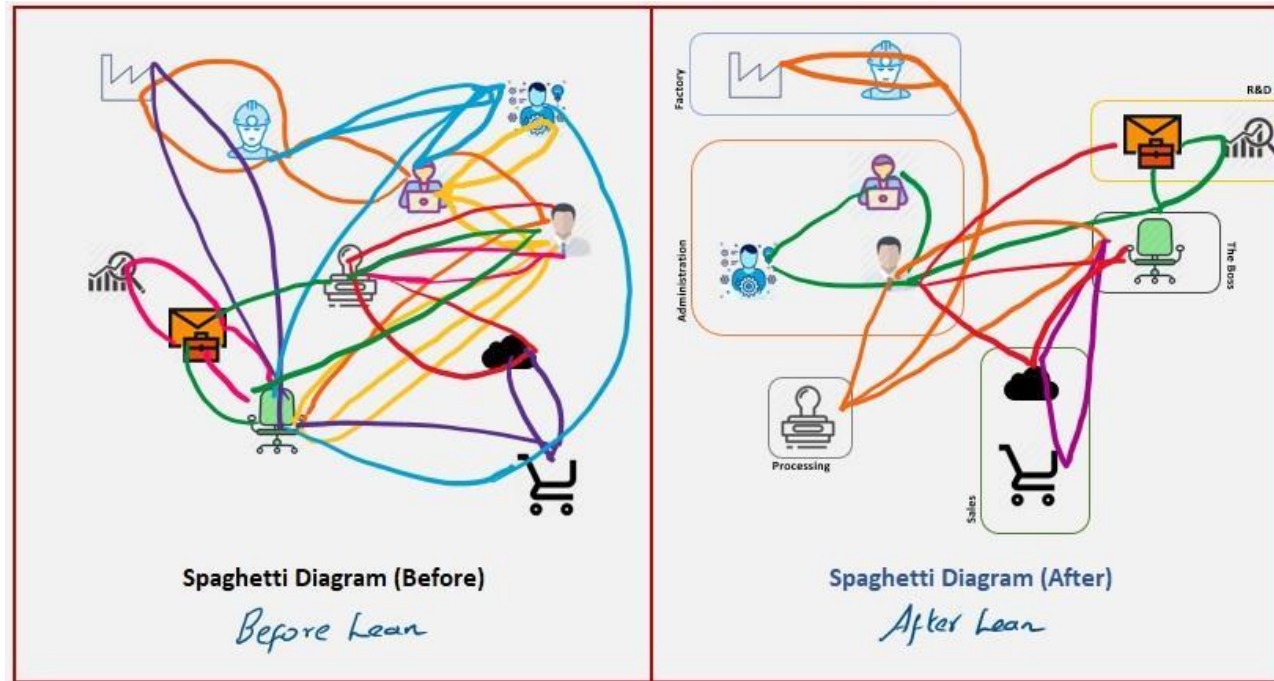
	Vent	Vent CPAP/ Bubble CPAP	Surf	Transport/C ath/OR	Vented Cases arriving before 1:00	Vented Cases arriving after 1:00	PRNs	HHN or IPV	Metered dose inhaler	CPT non CF	CPT CF	Floor or Home CPAP	Suction of patient not on a vent	Breathing Exercises / Spirom.	Non- aerosol O2	Trach / Aerosol / Vapo	Nitric Oxide or Heliox	Con't Neb	Asthma HMPOC/P atient Educ	Delivery	Other (Explain in Comments Section)	Total	
NNICU	9	9					1	5	1	11					5	2	3				3	107	NNICU
PICU	3				1	1	7	7	1	5			4		1		1					38	PICU
PCICU	6	1			1		3	13		7					1	1					6	59	PCICU
5SCN															5							1	5SCN
7A							3	3	1						4							6	7A
7B							3		2													3	7B
7C							1	2	1	3			1		2	2						7	7C
7E							3	17	7	6	6			2							1	39	7E
8D																						0	8D
8SCN		1						1		2					3							7	8SCN
Peds ED																					12	12	Peds ED
IOP																						0	IOP
Other																						0	Other

D	7A	7-11A or 3-7P	CH Counts	278
	Jim		RTs	7.00
	John		WLU / RT	38
	Sandy		WLU / RT GOAL	42 - 46
	Will		**Include CALL OFF and FLOAT info in COMMENTS section AND on list on Coordinator Desk**	
	Charles			
	Karen			
	Pat			
			Coordinator/Charge	
			Jerry	

Comments: NNICU: Vent change out to Astral/PS trials. PCICU: Planned airway exchange 11:30. PICU: Bedside biopsy with mod sedation 12N; Transport to MRI 2P



Infection Status	O2 Device	O2 Flow Rate (L/min)	FiO2 (%)	IPAP/EPAP/	SpO2/RR	PaO2	PaCO2	EWS Score	EWS Relative Risk	Code Status Text ▲	Diet Orders and Comments with Display Name
COVID-19, C Diff	Ventilator [10/26/20 0800]	—	40 [10/26/20 0400]	—	93 [10/26/20 1000] 14 [10/26/20 1000]	86	32	—	—	DN...	DIET NPO Except for: MEDS Effective Now...
COVID-19	High Flow High Humidity [10/26/20...	55 [10/26/20 0810]	45 [10/26/20 0810]	—	99 [10/26/20 0810] (I) 35 [10/26/20...	—	—	—	—	Not on file	Tube feeding modular - ProSource NoC...
COVID-19	Ventilator [10/26/20 0901]	—	(S) 55 [10/26/20 0901]	—	91 [10/26/20 1030] (I) 40 [10/26/20...	59	59	—	—	Prior	DIET NPO Except for: MEDS Effective Now...
COVID-19	Ventilator [10/26/20 1013]	—	28 [10/26/20 1013]	—	98 [10/26/20 1013] 11 [10/26/20 1030]	112	48	—	—	Not on file	DIET NPO Except for: MEDS Effective Now...
COVID-19	Nasal cannula [10/25/20 1806]	1.5 [10/25/20 1806]	—	—	97 [10/26/20 1021] 22 [10/26/20 1021]	—	—	●	—	FULL	Diet regular
COVID-19, C Diff	—	—	—	—	100 [10/26/20 0816] 16 [10/26/20 0816]	—	—	●	—	FULL	Diet regular
R/O COVID	Nasal cannula [10/26/20 1000]	3.5 [10/26/20 1000]	—	—	99 [10/26/20 1000] 19 [10/26/20 1000]	—	—	●	—	FULL	Diet regular
COVID-19, MRSA	Nasal cannula [10/26/20 1024]	2 [10/26/20 1024]	—	—	97 [10/26/20 1024] 14 [10/26/20 0800]	—	—	●	—	FULL	Diet regular Oral Supplements - Adult Ensure...
COVID-19	—	—	—	—	95 [10/26/20 0954] 20 [10/26/20 0954]	—	—	●	—	FULL	Diet 2 GM NA
COVID-19	Nasal cannula [10/25/20 1649]	2 [10/25/20 1649]	—	—	93 [10/26/20 0900] 20 [10/26/20 0900]	—	—	●	—	FULL	Diet regular Snacks Oral Supplement...
COVID-19	High Flow High Humidity [10/26/20...	40 [10/26/20 0922]	40 [10/26/20 0922]	—	96 [10/26/20 0922] 22 [10/26/20 0830]	—	—	●	—	FULL	—
COVID-19	—	—	—	—	98 [10/26/20 0400] 23 [10/26/20 0400]	—	—	●	—	FULL	Diet carbohydrate level 2 (60 gm/meal); L0 Thi...
COVID-19	High Flow High Humidity [10/26/20...	45 [10/26/20 1000]	60 [10/26/20 1000]	10 [10/25/20 2232] ...	93 [10/26/20 1000] 23 [10/26/20 1000]	47	26	—	—	DN...	Diet dysphagia NDD2 Mech Altered (Choppe...
COVID-19	Ventilator [10/26/20	—	35 [10/26/20	—	95 [10/26/20 1000]	—	—	—	—	FULL	DIET NPO Except for: MEDS Effective



Creates Ethical Dilemmas and Conflict for Practitioners

Daily Operational Huddle:

- RT patient census per unit
- ECMO Patients
- Ventilator orders
- Noninvasive
- Procedures
- Labs
- Long frequency meds
- Medications due
- Infection status
- OR cases
- Scheduled transports**
- Hyperbaric, Pentamidine in clinics
- Transfer Center vented patients
- Trachs in house
- Speech trials
- PT-Vent/ECMO ambulation
- Care conferences

Daily Operational Huddle

- To align personnel and other resources with work to assure team members are informed, present and prepared
- Creates a foundation to support collective agility
- Streamlines communication
- Predicts resource needs throughout the shift
- Drives detailed data regarding orderable and non-orderable activity over time
- Drives detailed data per unit over time
- Uncovers patterns in patient movement, RT patient admissions, RT patient discharges, RT patient LOS
- Beginning to drive data regarding acuity: High-flow use >1L/kg, static/increasing/decreasing status, etc.

Date & Time:	3/20/2023~	Infx	>1L/kg HF?	Therapy / Support	Last PRN	AWC RT or RN	ETT Due	Trach Due	**BLUE indicates when therapy or assessment is due**; Yellow indicates Albuterol Order (Shortage)																resp pts
Room	Name		HF?	Order			Airway	8	10	12	2	4	6	20	22	MN	2	4	6						
		PEDS SURGERY																							
PCICU																									
3B18																									
3B19																									
3B20	M																								
3B21	Se	Rhino																							
3B22	Ed		y	HFHHNC 2/21				HF																	
3B23	Bo		y	HFHHNC 6/21				HF																	
3B24																									
3B25	W	Adeno	y	VENT, Pulm BID,NO			3/20	V												TX					
3B26	M																								
3B27	La			VENT, Alb 2.5 TID (held), Pulm BID (held), NO, ECMO			3/22	V	E																
3B28	Al		y	HFHHNC 6/35				HF																	
3B29	W			VENT, ECMO, Alb IAT Q3prn	2/27		3/22	V	E																
3B30																									
3B31	Br																								
3B32	So			VENT, Trach, Pulmo BID				3/25	V											TX					
3B33	Ga			VENT, Alb 2.5 Q4prn, Alb 2.5 Q6, 3% Q6	2/19		3/21	V												TX					
3B34	Gr			Vent, NO			3/21	V																	
3B35	Ed	MDR grm-		VENT, NO, Trach, AWC prn, Pulmoz Q12, Epo, Pulm BID				3/24	V											TX					
3B36	W			VENT, Pulmo BID, 3% Q6prn, Alb IAT Q6prn				V												TX					
3B37	Brmley																								
4A																					11				

Date:	3/20/23		
All House Census	949	Total Vent Fleet	116
Children's and Neo Census	169	Total DUH Vents in Use	73
Total RCS Patients (AVG 73)	57	Adult Vents	52
Waiting in ED	0	Peds Vents	21
Waiting in Transfer Center	0	Total Beds Open	
Total Cases (for RT)	0	Peds Leader on Call W/E: Steve Hepditch	
PICU			
Resp Patients	6		
V/ECMO	0		
Vents other than ECMO Patients	3		
NIV	2		
High Flow (>1L/kg)	1		
Heated Humidified Cannula (<1L/Kg)	0		
Additional Patients on Therapy	0		
Trachs	1		
Cases	0		
Transports	0		
Bedside Procedures	0		
ETT Taping Due	0		
Trach Change Due	0		
MPIS	0		
Continuous Neb	0		
Beds Open at this time	0		
PCICU			
Resp Patients	11		
V/ECMO	2	3B29 on 2/19 0800	
Vents ther than ECMO Patients	6		
NIV	0		
High Flow (>1L/kg)	4		
Heated Humidified Cannula (<1L/Kg)	0		
Additional Patients on Therapy	0		
Trachs	2		
Cases	0		
Transports	0	3B33 3/21 trach, aneurysm repair, 3B23 Cath & OR 1300	
Bedside Procedures	0		
ETT Taping Due	0		
Trach Change Due	0		
Beds Open at this time	2		

Next Steps

- **Data***
 - Access: Real time and longitudinal trends
 - **Acuity scoring****
 - **Statistical significance**
 - **Threshold of harm**
- **Additional measures**
 - Key diagnosis LOS, Mortality Index, Case Mix Index, APACHE scoring, ICU readmissions
- **Prospective Cohort study**
 - Strain data versus outcome data
 - Organizational measures
 - **Unit measures***
 - **Individual measures***

Future Research

- Non-physician disciplines
- Clear definition and metrics
- Threshold versus continuous effects
- Variety of settings
- Outcome effects
- Interdepartmental, interpersonal, personal effects

Kohn, Halpern, & Kerlin (2016)

Erriksson, Stoner, Eden, Newgard, & Guise (2016)

EXIT

Leaders



Practitioners



Patients



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Leadership Course Sign Up



LinkedIn

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