Demand and Capacity in Triage

How do we meet variable demand with fixed resources?

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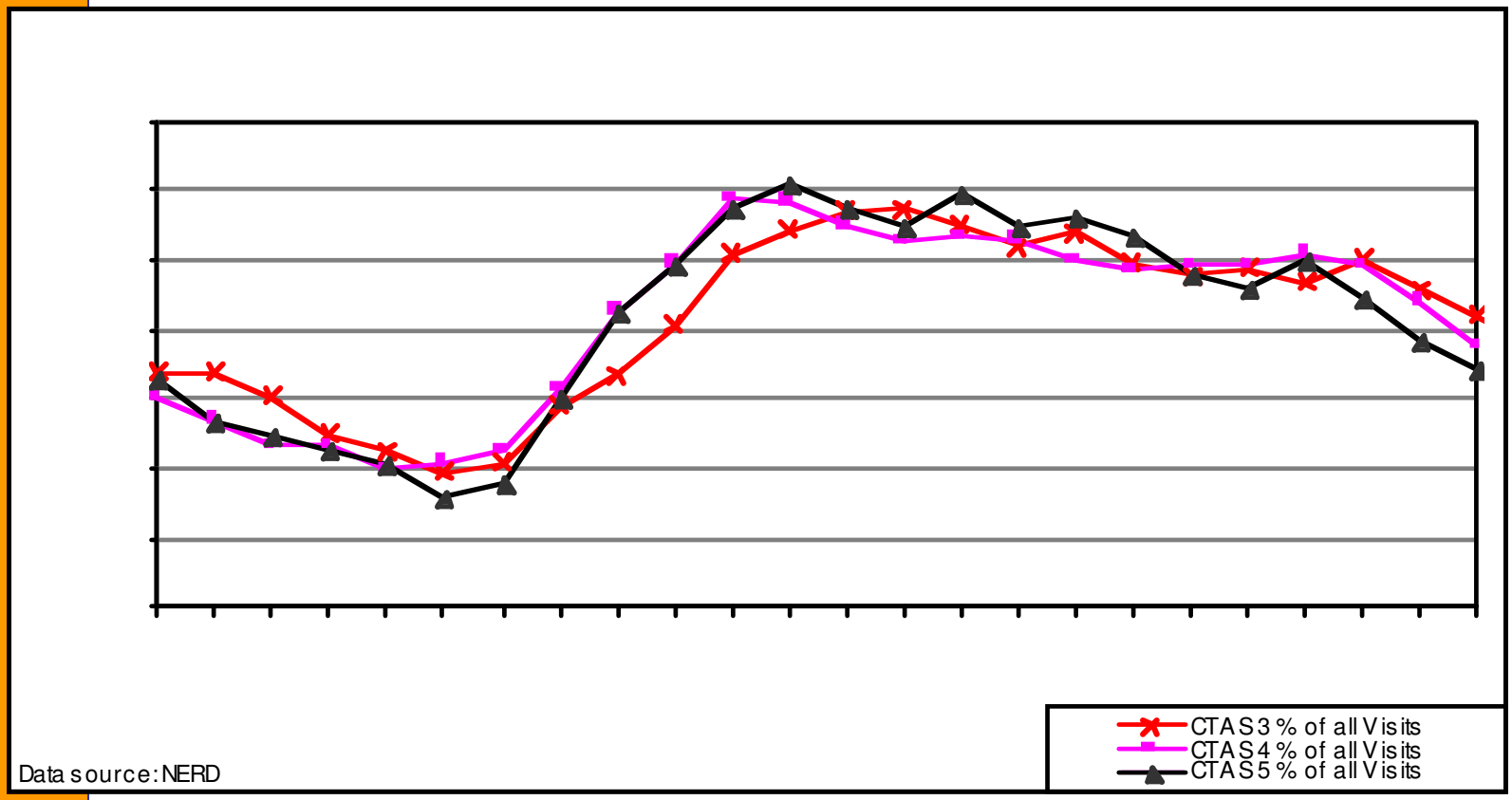
Overview

- Service capacity is a perishable commodity
- We need to understand the variability of both our demand + capacity
- What strategies can we use?
- We need to create reliable, resilient and flexible systems!

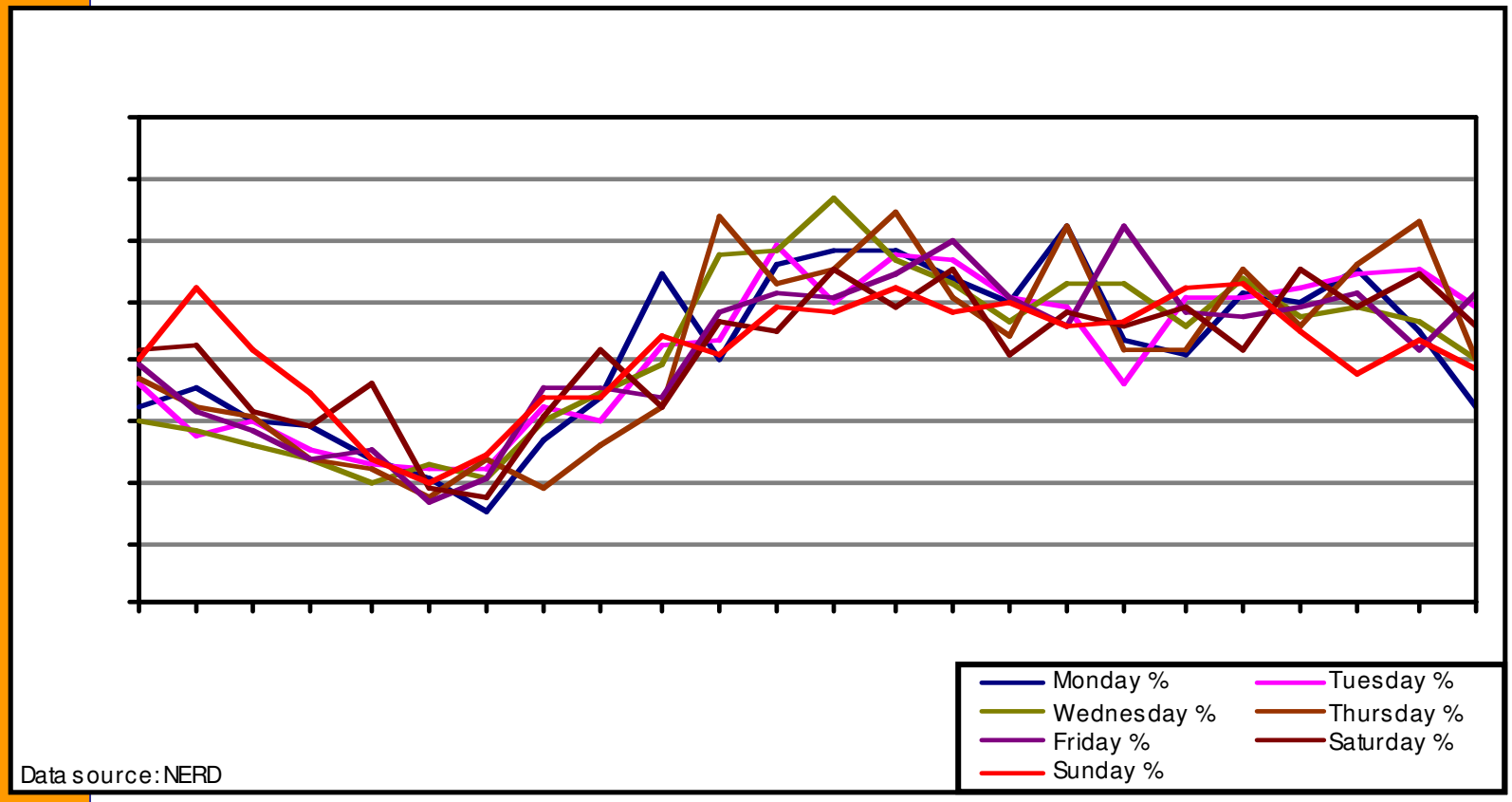
Poor reliability in health care

- Your survival following acute MI is dependent on the time of day and the day of the week!
  - JAMA August 2005

Can we forecast?



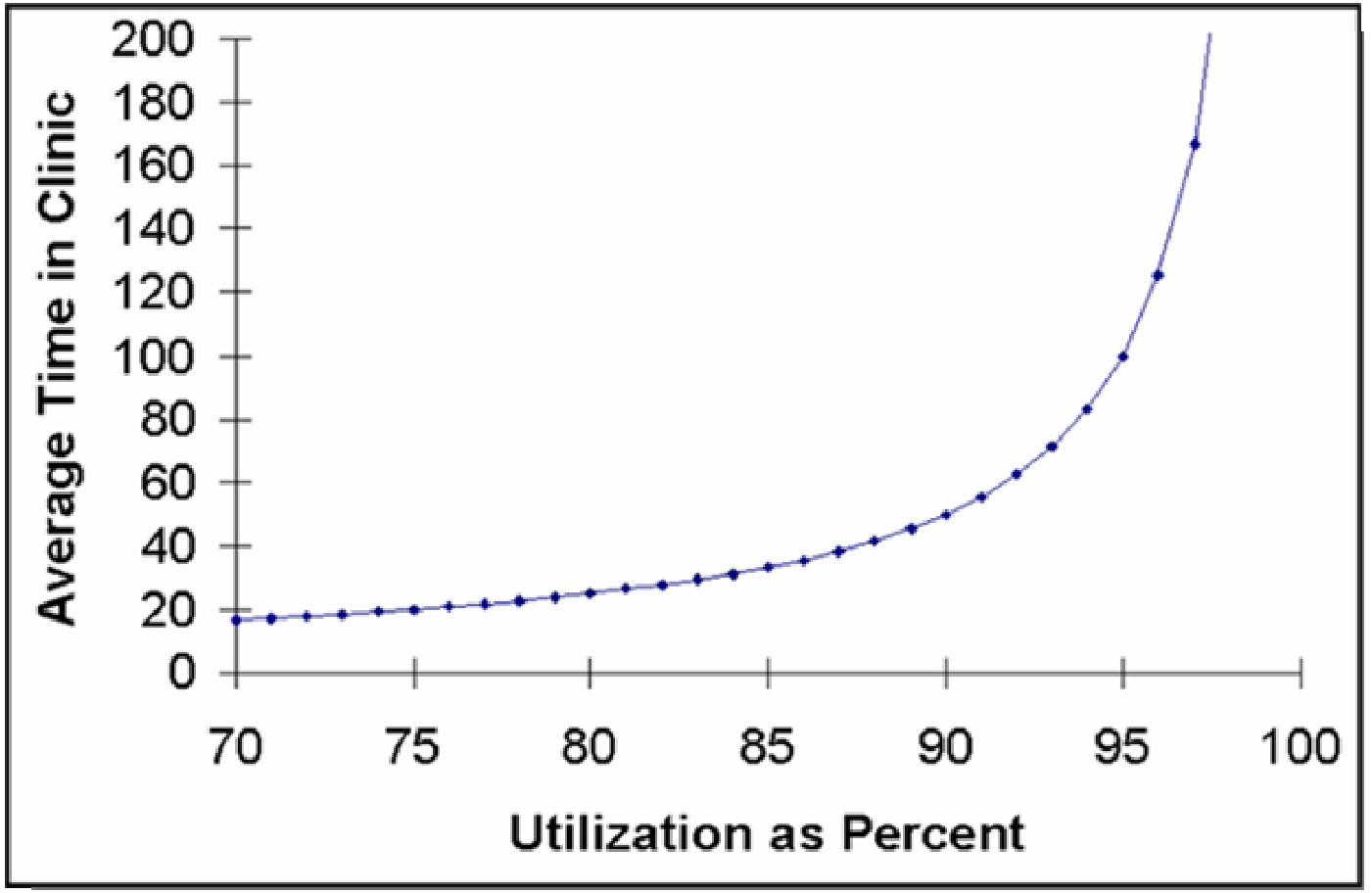
forecasting



Data source: NERD

variability

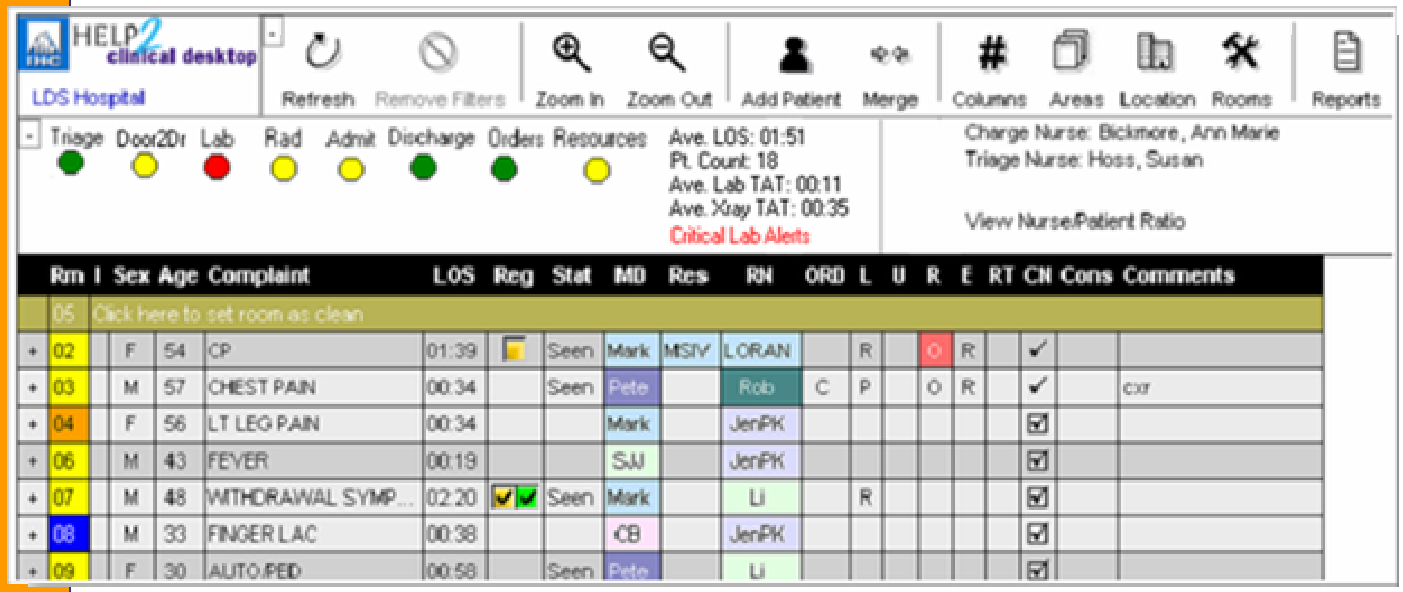
What queuing theory tell us..



Demand/capacity management

- Improve your ability to predict
- Shaping demand
- Optimize staffing resources
- Standardized process (less variation)
- Surge capacity plans

ED Dashboard

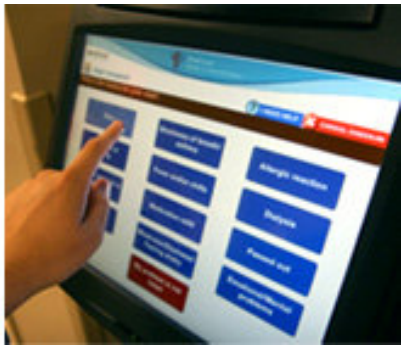


Can help with early warning and pre-emptive tactics but only with pre-defined triggers and responses in an integrated fashion.

Shaping Demand

- Can we smooth the demand at triage?
  - Scheduling return visits to non-peak hours
  - Relocate demand (triage bypass)
  - Promote self-service (self-reg. kiosks)

MediKiosk™



Optimize staffing resources

- Match staffing levels + schedules to volume as much as possible
- Back-up triage nurse with specific trigger levels
- Flexible staffing model / cross-train
- Use slack time to do supportive tasks (prepare supplies/equipment etc.)

Queuing models for triage

ED Volume	60,366	
% rescue squad arrivals	30%	
Measured average RN triage duration	7.0	min
Calculated average RN triage standard deviation	2.0	min
Measured average triage room duration	10.0	min
Calculated average triage room standard deviation	5.0	min
Average amount of time/hr triage rooms are not utiliz	5.0	min

Daily Data (Over 1 month)	**Sun**	**Mon**	**Tue**	**Wed**	**Thurs**	**Fri**	**Sat**
ED Volume	163	178	159	156	164	167	167
Triage Volume	114	125	111	109	115	117	117
Please Mark "High" or "low" Volume Days	Low	High	high	Low	Low	Low	Low

Low Volume Days	**12mn-1a**	**1a-2a**	**2a-3a**	**3a-4a**	**4a-5a**	**5a-6a**	**6a-7a**
Average ED Volume	5.40	4.85	4.51	3.87	3.40	3.05	3.38
Average Triage Volume	3.78	3.40	3.16	2.71	2.38	2.13	2.36
Triage Nurses	1	1	1	1	1	1	1
Nurse Utilization	44%	40%	37%	32%	28%	25%	28%
Triage Beds/Bays	1	1	1	1	1	1	1
Bed Utilization	76%	68%	63%	54%	48%	43%	47%
Goal Staffing Calculated based on 80% Utilization	1	1	1	1	1	1	1
Goal bed/bays Calculated based on 80% Utilization	1	1	1	1	1	1	1

7a-8a	**8a-9a**	**9a-10a**	**10a-11a**	**11a-12n**	**12n-1p**	**1p-2p**	**2p-3p**
4.82	6.22	7.55	9.08	9.38	9.50	9.07	9.21
3.38	4.35	5.28	6.36	6.57	6.65	6.35	6.44
1	1	1	1	1	1	1	1
39%	51%	62%	74%	77%	78%	74%	75%
1	1	1	1	1	1	1	1
68%	87%	106%	127%	131%	133%	127%	129%
1	1	1	1	1	1	1	1
1	2	2	2	2	2	2	2

Standardize best practice

- Streamline process: remove waste + redundancy
- Standardize: algorithm/protocols, standard operating procedures
- Monitor (data) + control
- Decreasing process variation improves flow

Surge Plan: Triage contingencies

Green: ≤3 pts @ triage	**Triage RN protocols in operation**
Yellow: >3 pts @ triage	**60-90 second triage**
	Defer Triage RN protocols
	ER Tech /LPN to triage
	Volunteers hand out intake form
Red 8+ pts @ triage	**Float nurse or CNL to triage**
	WR SWAT
	EMS triage

Flow

- Remember that flow is a system property!
- Need to think of the entire flow.
- Do not “fix” triage in isolation.