Homework 4

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(a) Compute process capacity if the batch size is 10 units.

$$\text{CAPACITY} = \frac{\text{Batch size}}{\text{Setup time + (Batch size x time per unit)}}$$

$$= \frac{10}{30 + (10 * 3)} = \frac{10}{60} = \textbf{10 Units per Hour}$$

(b) What batch size would you recommend for a process manager who wants to maximize flow rate but is also concerned about average flow time,

- when the demand rate is 7.5 units per hour?
- when the demand rate is 20 units per hour

Demand Rate = 7.5 Units/Hr

$$\text{Target Flow Rate} = \text{MIN}(7.5,15) = 7.5 = \text{7.5 Units per Hour}$$

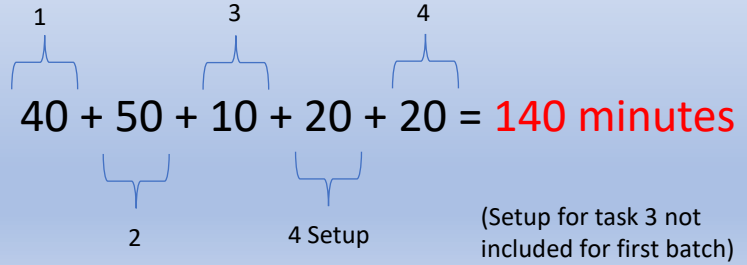
$$\text{Reco. Batch Size} = \frac{\text{TFR * Setup Time}}{\text{1 - (TFR * Time Per Unit)}} = \frac{7.5*(30/60)}{1-(7.5*3/60)} = \textbf{6 Units}$$

Demand Rate = 20 Units/Hr

$$\text{Target Flow Rate} = \text{MIN}(20,15) = 15 = \text{15 Units per Hour}$$

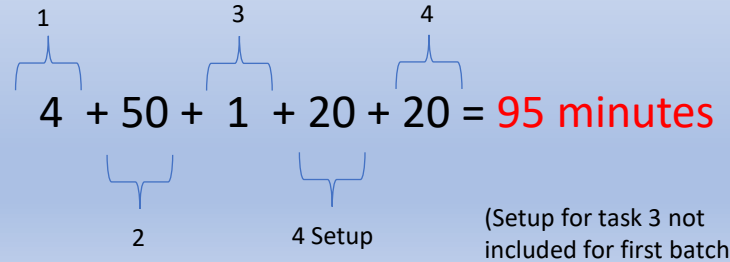
$$\text{Reco. Batch Size} = \frac{\text{TFR * Setup Time}}{\text{1 - (TFR * Time Per Unit)}} = \frac{15*(30/60)}{1-(15*3/60)} = \textbf{30 Units}$$

(C) Using the current production batch size of 10 units, how long would it take to produce a batch starting with an empty system (where no setup has been done yet)? Assume that all the units in the batch have to stay together (no smaller transfer batches allowed) when transferred to either Bob or Chloe, who then processes the entire batch (the batch cannot be divided among the two workers). Also all the units have to stay together when transferred from either Bob or Chloe to Dorothee



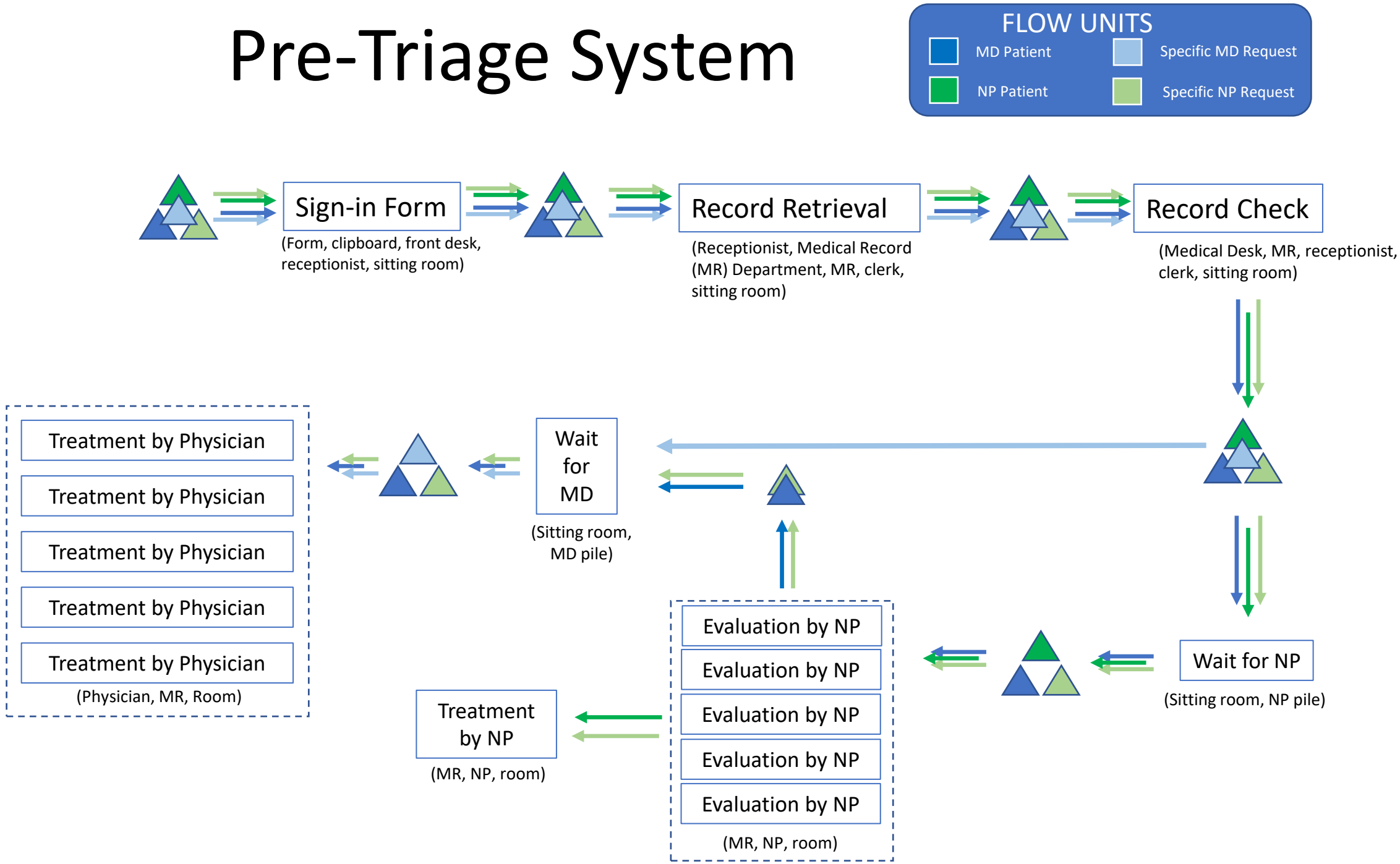
(Setup for task 3 not included for first batch)

(D) Using the current production batch size of 10 units, how long would it take to produce a batch starting with an empty system (where no setup has been done yet)? Assume that the units in the batch do **not** have to stay together; specifically, units are transferred to Bob or Chloe, the moment they are done with task 1 and either Bob and Chloe starts processing as early as possible. Assume that either Bob or Chloe processes the entire batch (the batch cannot be divided among the two workers). Similarly, units are transferred to Dorothee as soon as they are done with task 2. Dorothee then does task 3 on the entire batch before switching to doing task 4 on the entire batch

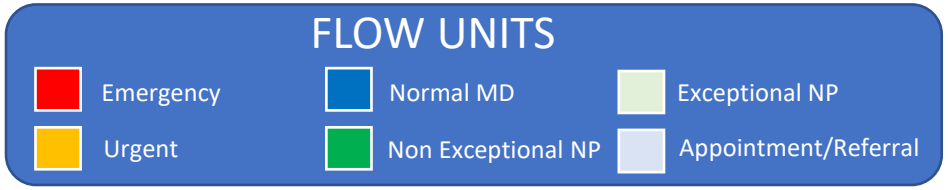


(Setup for task 3 not included for first batch)

Pre-Triage System



Triage System



Sign-in Form
(AVF Form, clipboard, check-in desk, receptionist)

Emergency "Check"
(AVF Form, receptionist check-in desk)

Record Retrieval
(MR office, MR, clerk, sitting room)

Record Check
(AVF, MR, clerk, sitting room)

Wait for Triage
(Sitting room, Triage pile)

Triage
(MR, room, Triage Coordinator 1)

Triage
(MR, room, Triage Coordinator 2)

Appointment or referral made
(Triage Coordinator, MR, Room, scheduling tool)

Emergency for MD

Urgent for MD

Wait for MD
(Sitting room, MD pile)

Treated by MD
Treated by MD
Treated by MD
Treated by MD
Treated by MD
(Physician, MR, Room)

Sign off by MD
(Physician, MR, NP)

Wait for NP
Wait for NP
(Sitting room, NP pile)

Treated by NP
Treated by NP
Treated by NP
Treated by NP
(MR, NP, room)

	Teatment By Np		Teatment By Physician		Teatment By Requested Np		Teatment By Requested MD	
	Pre Triage	Triage	Pre Triage	Triage	Pre Triage	Triage	Pre Triage	Triage
Initial Processing								
Sign In/AVF Form	2	2	2	2	2	2	2	2
Record Retrieval	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5
Record Check	5	5	5	5	5	5	5	5
Wait for Triage	-	4.2	-	4.2	-	4.2	-	4.2
Traige	-	3.5	-	3.5	-	3.5	-	3.5
Patients Treated by NP								
Wait for NP	7.5 19.5	6.7	7.5 19.5	-				
Treatment by NP	32.8	32.8	10	-				
Patietns Treated by MD								
Wait for MD			10	25.2				
Treatment by MD			19.4	19.4				
Patients Specific NP								
Wait for specific NP					24.5	33.8		
Treatment by NP					32.8	32.8		
Patients Specific MD								
Wait for specific MD							24.5	33.8
Treatment by MD							19.4	19.4
TOTAL VISIT TIME	55.8 67.8	62.7	62.4 74.4	67.8	72.8	89.8	59.4	76.4

Triage Result ⇔ ⇔ ↓ ↓

Exhibit 6 Percentage of Patients Treated by Various Providers

	Pre-Triage	Triage
Patients treated by nurse practitioner	40%	28%[a]
Patients treated by physician	41%	48%[b]
Patients treated by specifically requested physician or nurse practitioner	19%	24%

[a]Total percentage of patients treated by nurse practitioner: 33%, including specifically requested nurse practitioners.

[b]Total percentage of patients treated by physician: 67%, including specifically requested physicians.

Two things jump out:
1. The average time per visit either increased or stayed the same for each flow unit type
2. The number of patients who requested a specific NP or MD increased

You cannot expect the Triage to result in an improvement if each of the flow unit measurements remains the same or worsens without a significant change in distribution. This would require a shift from specifically requesting physicians or nurses. But as Exhibit 6 shows, there was an increase in these requests, compounding the visit times for flow units.

Therefore, the resource allocation in the Triage system was not efficient and didn't help in improving the process flow. The triage system was not successful in improving the delivery of medical care at UHS: Walk-In Clinic