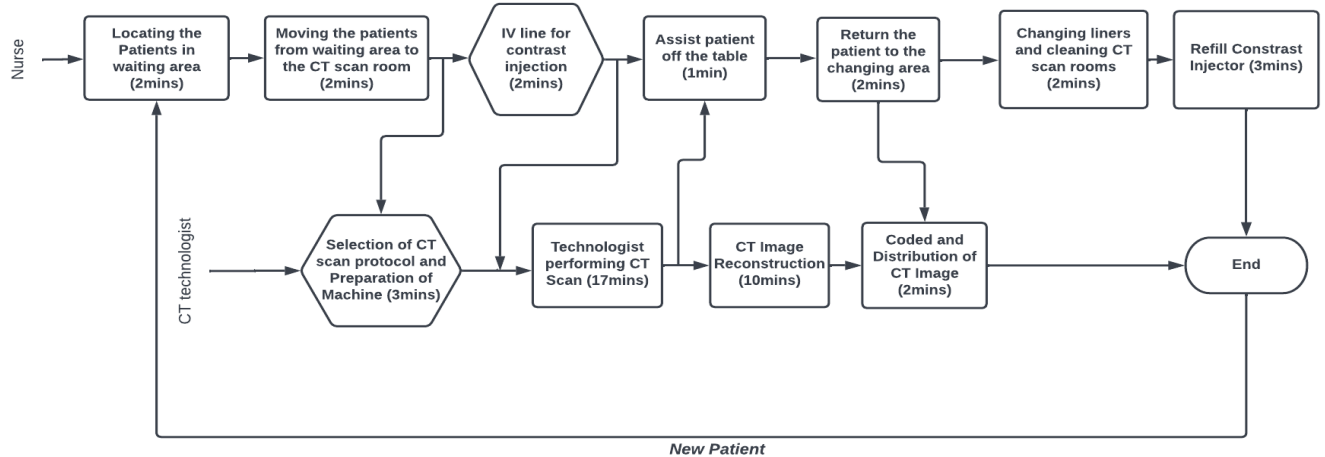


IDS 506 - Health Info Mgmt. Analytics

CASE STUDY 1 - Body Scans and Bottlenecks

I. Draw the process flow map for original CT scan process.

Figure 1.1: Original CT Scan Process Flow

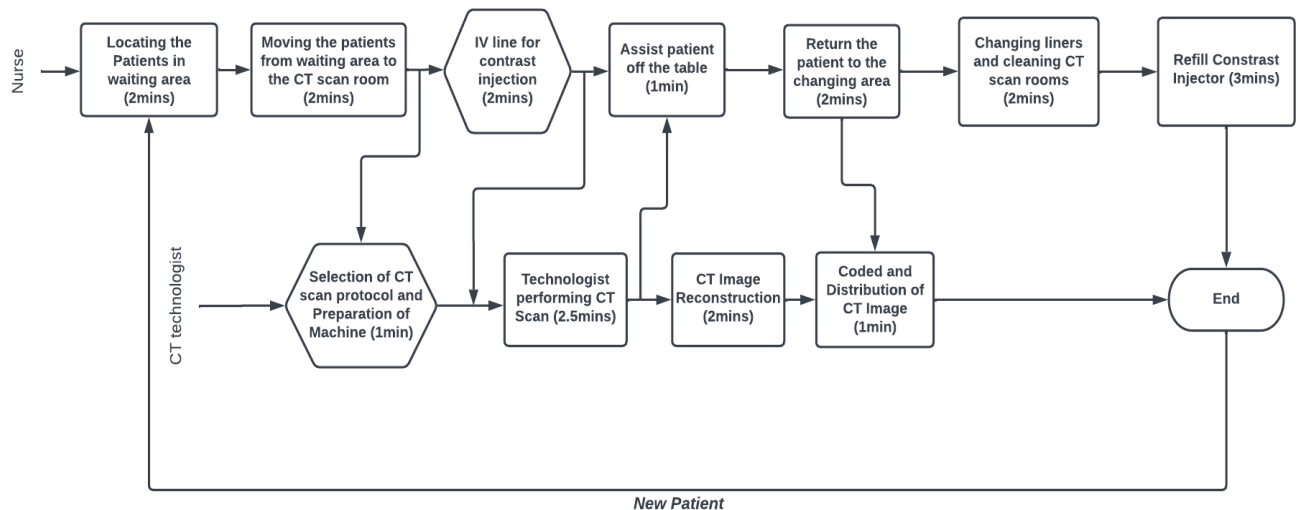


II. Hospital leaders felt new scanners represented a good ROI. What factors will you consider when calculating differences in revenues by new scanners vs old units?

Factors that need to be taking into consideration:

- Scanning time / activity time or throughput time
- Expenses including employee expenses, hourly expense (including operating expenses and supplies costs)
- Hourly revenue
- Hourly Margin

Figure 1.2 - Current CT Scan Process Flow



Capacity Evaluation Calculations

Original Process Flow Map (Figure 1.1)

Capacity for the nurse: $60/14 = 4.3$ scan/hour

Capacity for the technologist: $60/32 = 1.875$ scan/hour (process capacity)

The department has 6 CT Scanners

Each CT Scanner capacity = $55000/6$ scans = 9167 scans

Number of opening hours = 9167 scans per year / 1.875 scans per hour = 4889 hours

Revenue of 1 CT scanner per year = $1.875 * \$500 = \937.5

Cost of 1 CT scanner per year = $1.875 * \$50 + \$50 + \$35 = \178.75

Hourly Margin of a CT scanner per year = $\$937.5 - \$178.75 = \$758.75$

Current Process Flow Map (Figure 1.2)

Capacity for the nurse: $60/14 = 4.3$ scan/hour

Capacity for the technologist: $60/6.5 = 9.23$ scan/hour (process capacity)

The department has 6 CT Scanners

Each CT Scanner capacity = $55000/6$ scans = 9167 scans

Number of opening hours = 9167 scans per year / 4.3 scans per hour = 2132 hours

Revenue of 1 CT scanner per year = $4.3 * \$500 = \2150

Cost of 1 CT scanner per year = $4.3 * \$50 + \$50 + \$35 = \300

Hourly Margin of a CT scanner per year = $\$2150 - \$300 = \$1850$ (max profit)

CT Scan Profit and Cost Calculations

Revenue = $\$500$ / scanner

Expenses include:

- Technologist: \$35/hour
- Nurse: \$50/hour
- Supplies: \$50/scan

Original Process with 3 new scanners

Throughput time = 32 minutes

CT Scan Operating Time = $(8*60)/32 = 15$ scans per 8 hour shift

Revenue = $500*3*15 = 22500\$$

Expenses:

- Technologists: $35*8*3 = 840\$$
- Nurses: $50*8*3 = 1200\$$
- Supplies: $50*15*3 = 2250\$$

Total Profit = 18210\$

Current Process with 3 new scanners

Throughput time = 16.5 minutes

CT Scan Operating Time = $(8*60)/16.5 = 29.09$ scans per 8 hour shift

Revenue = $500*3*29.09 = 43635 \$$

Expenses:

- Technologists: $35*8*3 = 840\$$
- Nurses: $50*8*3 = 1200\$$
- Supplies: $50*29.09*3 = 4363.5\$$

Total Profit = 37231.5\$

Therefore, **increased profit** = $37231.5 - 18210 = 19021.5\$$

III. If original process flows remained in place after new CT scanners were installed, what level of scanning throughput could the hospital achieve? What hourly margins would result from using new scanners with all other processes unchanged? How do these margins compare with using old scanners?

Current Process Flow Map (Figure 1.2)

Throughput time = 16.5 minutes

Scanning throughput = $60/16.5 = 3.64$ patients/hour for one machine

For 3 machines $3.64*3 = 10$ patients/hour

Hourly margins (New scanner)

Scanning throughput = $60/16.5 = 3.64$ patients/hour for one machine

Each patient scan = 500\$

Per machine revenue = $500*3.64 = 1820$

Per hour by nurse and tech = 85\$

Cost of supplies = $50*3.64 = 182$

Hourly margin= $1820-85-182=1553\$$

For 3 machines= $1553*3=4659\$$

Original Process Flow Map (Figure 1.1)

Throughput time =32 minutes

Scanning throughput= $60/32=1.875$ patients/hour for one machine

For 6 machines= $1.875*6=11.25$ patients/hour

Each patient scan =500\$

Per machine revenue= $500*1.875=937.5$

Per hour by nurse and tech=85\$

Cost of supplies= $50*1.875=93.75$

Hourly margin= $937.5-85-93.75=758.75\$$

For 6 machines= $758.75*6=4552.5$

For 3 machines= $758.75*3=2276.25$

Improvement= $(4659-4552.5)*100/4552.5=2.3\%$

Recommendation:

If we use 3 old and 3 new machines

For 3 original machines(single detector)= $758.75*3=2276.25$

For 3 current machines(Multi Detector)= $1553*3=4659\$$

Hourly margin for 3 new and 3 old = $4659+2276.75= \$6935.75$

Improvement= $(6935.75-4552.5)*100/4552.5=52.35\%$