

"Handwritten Analysis"

* Research Article :

→ Neoadjuvant therapy versus upfront surgery for potentially resectable pancreatic cancer : A markov decision analysis.

* Aim : To compare efficacy of traditional surgery first (SF) and neoadjuvant (NAT) pathways by using Markov chain model and Markov Cohort analysis.

* Methods used :

1. Intention to treat basis
2. Advanced markov chain model.
3. Markov Cohort analysis.
 - a) one-way deterministic Analysis.
 - b) Two-way deterministic Analysis.
4. Probabilistic Sensitivity Analysis.
5. Statistical analysis.

① "Intention-to-treat analysis"

→ Method: Simple markov decision model.

→ Based on baseline transition probabilities:-

showed that,

SF pathway → 23.72 months (18.51 QALM)
NAT pathway → 20.22 months (16.26 QALM)

→ Result: SF treatment pathway is Superior than NAT treatment pathway

② Statistical Analysis

→ Survival time is based on time for diagnosis.

→ formula for weighted estimate of median survival is:

$$mp = \left(\sum_{i=1}^K \frac{w_i}{m_i} \right)$$

example

let's say we have one case study having,

- Total no. of patients = 41
- Study patients = 20
- Total survival months = 13.4

$$\text{Now, weights} = \frac{\text{Total patients}}{\text{study patients}} = \frac{41}{20} = 2.05$$

- Case study type = CRT + surgery

$$\begin{aligned} \rightarrow \text{SPM referring to one case study} &= \frac{\text{weights}}{\text{survival months}} \\ &= \frac{2.05}{13.4} \\ &= 0.152985 \end{aligned}$$

- As above we will calculate for each case studies and do the final summation, that will give us weighted estimate median survival time.

- For different treatments we will calculate separately.

③ Probabilistic Sensitivity Analysis

- Monte Carlo simulation.

- Result : SF Give a mean survival time = 19.72 month
: NAT " " " " = 17.62 month

- Superior treatment : SF > NAT

4. Markov Cohort Analysis

a. "One-way deterministic analysis"

→ It gives the effect on the overall results of the model by varying the parameter of each variable individually.

* presection SF	QALM SF	QALM NAT
0	1.46	16.29
0.094	3.06	16.29
0.188	4.66	16.29
⋮	⋮	⋮
0.846	15.88	16.29
0.94	17.48	16.29

→ Note: QALM for NAT is constant

* presection NAT	QALM SF	QALM NAT
0.26	17.48	15.04
0.304	17.48	15.40
0.348	17.48	15.77
⋮	⋮	⋮
0.48	17.48	16.87
0.568	17.48	17.60

→ Note: QALM for SF is constant.

* Result: NAT will be the superior treatment if,
 $p_{\text{resectionSF}} < 0.94$ (or)
 $p_{\text{resectionNAT}} > 0.568$

(b) "two-way deterministic analysis."

- This analysis demonstrated that treatment superiority depended on receiving multimodal treatment.
- In our article NAT is the superior treatment than SF by the given references and data.

(c) Special case:

- when in markov cohort analysis, all treatment modalities were received,

(I) NAT → 29.87 (QALM) } R_0 Resection
 SF → 24.86 (QALM)

(II) NAT → 29.87 (QALM) } R_1 Resection.
 SF → 20.72 (QALM)

(III) NAT → 7.22 (QALM) } Exploratory Laparoscopy.
 SF → 6.97 (QALM)