Which trial design best suites an experimental medication to treat Cystic Fibrosis

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2221BQOM 2521 SEC1010 DECISN MAKING COMPLEX ENVRNMNT

Background

- New medication therapy is being studied as a treatment for patients with Cystic Fibrosis
- What is Cystic Fibrosis[1]
  - Genetic Disease
  - Fewer than 200,000 cases a year
  - Causes damage to lungs and other organ systems
- Want to choose a trial that best shows the benefits of the medication for the CF population
- Want to design a study that has the most impact and produces the most relevant data

1. Mayo Foundation for Medical Education and Research. (2020, March 14). *Cystic fibrosis*. Mayo Clinic. Retrieved October 17, 2021, from https://www.mayoclinic.org/diseases-conditions/cystic-fibrosis/symptoms-causes/syc-20353700.

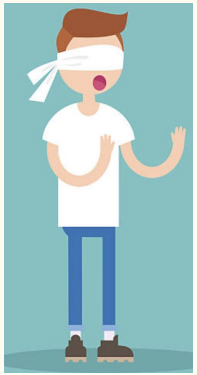
The Decision Maker

UPMC Division of Pulmonary Medicine

The Decision

- What trial design to use
- Types of trials:
  1. Double Blind Randomized Control Trial
  2. Case Control
  3. Longitudinal Cohort

Double Blind Randomized Control Trial[2]



- Patient blinded
- Doctor blinded
- Improves reliability
- Prevent bias
- Could be used in this case to gain more FDA approvals for the medication for different age groups.

2. What is a double blind study?: Premier health. Home. (n.d.). Retrieved October 17, 2021, from https://www.premierhealth.com/faq/what-is-a-double-blind-study-.

Case Control[3]

- Observational Study
- Two different groups
- Study outcomes of interest
- Measure the effectiveness of the medication in CF patients with the same baseline lung function but different genotypes of the disease.

3. NIH. (n.d.). *NCI Dictionary of Cancer terms*. National Cancer Institute. Retrieved October 17, 2021, from https://www.cancer.gov/publications/dictionaries/cancer-terms/def/case-control-study.

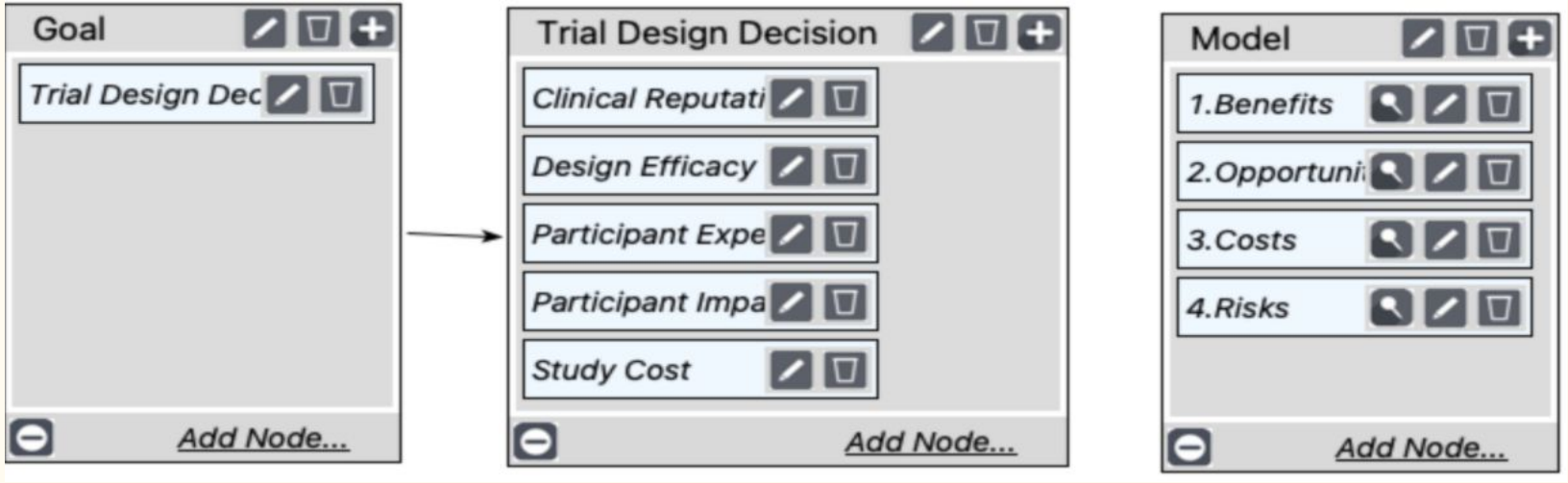
Longitudinal Cohort[4]

- Studies large groups overtime
- Alike except one differing characteristic
- Use this type of study to see the impacts of the medication overtime on differing severities of disease with same genotype

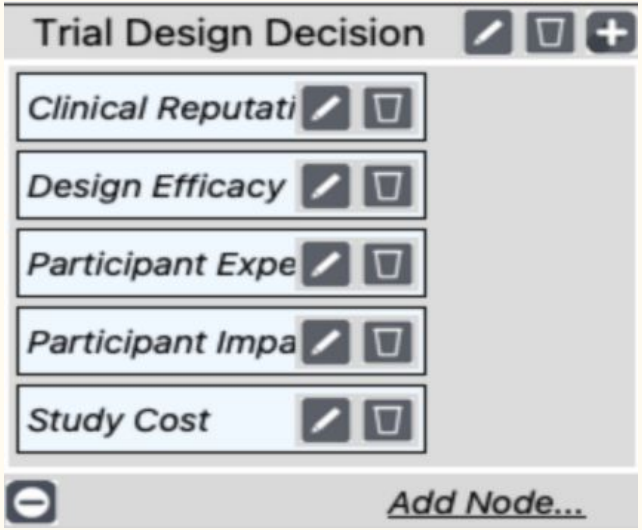
4. NIH. (n.d.). *NCI Dictionary of Cancer terms*. National Cancer Institute. Retrieved October 17, 2021, from https://www.cancer.gov/publications/dictionaries/cancer-terms/def/longitudinal-cohort-study.

Study design

- BOCR Model



Strategic Criteria



Strategic Criteria	
Clinical Reputation	8%
Design Efficacy	57%
Participant Experience	20%
Participant Impact	12%
Study Cost	4%

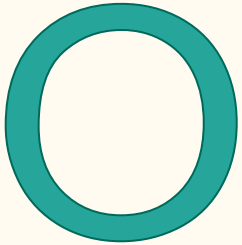
Model Outline

Benefits	**Opportunities**	**Costs**	**Risks**
Biases	Comparability	Compliance	Duration
Comparability	Data Quality	Follow-Up	Funding
Funding		Biases	Compliance

Benefits Subnets

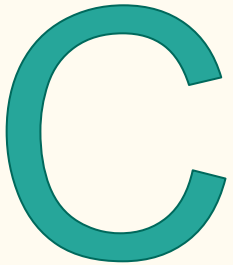
1. Biases
    a. Participant Knowledge
    b. Placebo Effect
    c. Researcher Influence.
    d. Researcher Knowledge
2. Comparability
    a. Data Quality
    b. Existing Trial Similarities
    c. Trial Criteria/Population.
3. Funding
    a. Companies Preference
    b. Grant Types
    c. Resource Allocation

Opportunities Subnet



1. Comparability
    a. Clinical Outcomes
    b. Future Publications
    c. Reproducibility
    d. Reputation of Center
2. Data Quantity
    a. Population Forecasting
    b. Predictability of Future Results
    c. Study Power

Costs Subnet

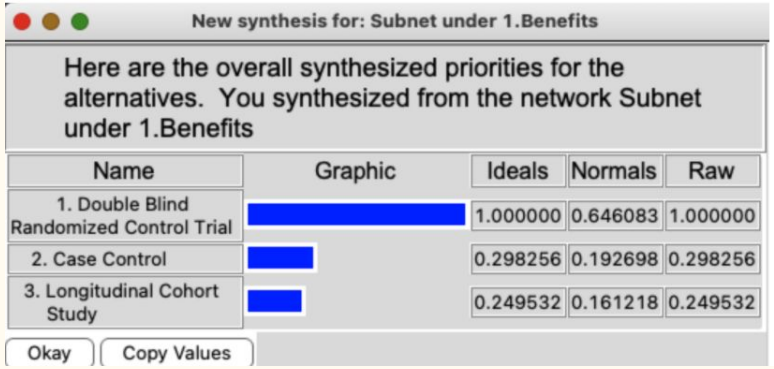


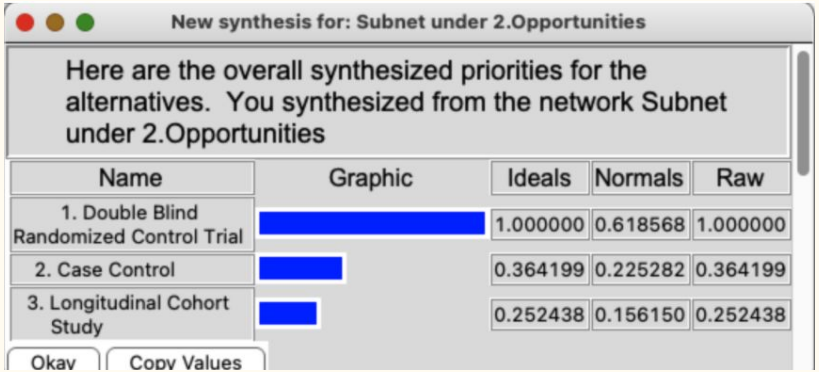
1. Biases
    a. Data Quality
    b. Impact of Results
    c. Participant Perceived Outcomes
2. Compliance
    a. Distribution
    b. Legal Implications
    c. Manufacturer Stipulation
3. Follow-Up
    a. Number of Visits
    b. Patient Appointment Compliance
    c. Retention Rates
    d. Side Effects

Risks Subnet

1. Compliance
    a. FDA Approval
    b. Medication Efficacy
2. Duration
    a. Add on Phases
    b. Data Cleaning
    c. Data Relevance
    d. Participant Fallout
    e. Side Effects
3. Funding
    a. Company Funding
    b. Company Resource Allocation
    c. Funding Terms

Results


New synthesis for: Subnet under 1.Benefits
Here are the overall synthesized priorities for the alternatives. You synthesized from the network Subnet under 1.Benefits
Name
Graphic
Ideals
Normals
Raw
1. Double Blind Randomized Control Trial
1.000000
0.646083
1.000000
2. Case Control
0.298256
0.192698
0.298256
3. Longitudinal Cohort Study
0.249532
0.161218
0.249532
Okay
Copy Values


New synthesis for: Subnet under 2.Opportunities
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Name
Graphic
Ideals
Normals
Raw
1. Double Blind Randomized Control Trial
1.000000
0.618568
1.000000
2. Case Control
0.364199
0.225282
0.364199
3. Longitudinal Cohort Study
0.252438
0.156150
0.252438
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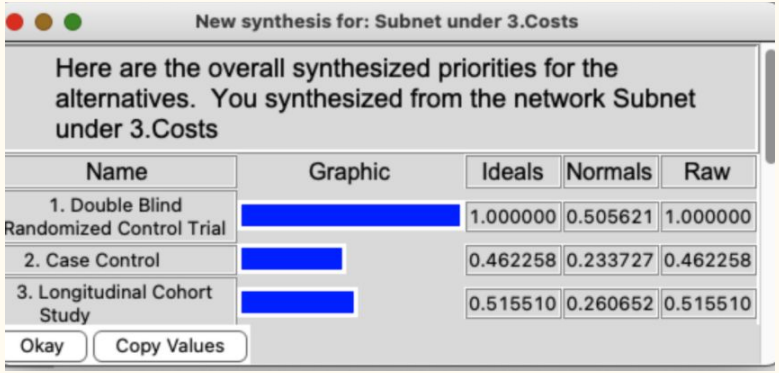
New synthesis for: Subnet under 3.Costs
Here are the overall synthesized priorities for the alternatives. You synthesized from the network Subnet under 3.Costs
Name
Graphic
Ideals
Normals
Raw
1. Double Blind Randomized Control Trial
1.000000
0.505621
1.000000
2. Case Control
0.462258
0.233727
0.462258
3. Longitudinal Cohort Study
0.515510
0.260652
0.515510
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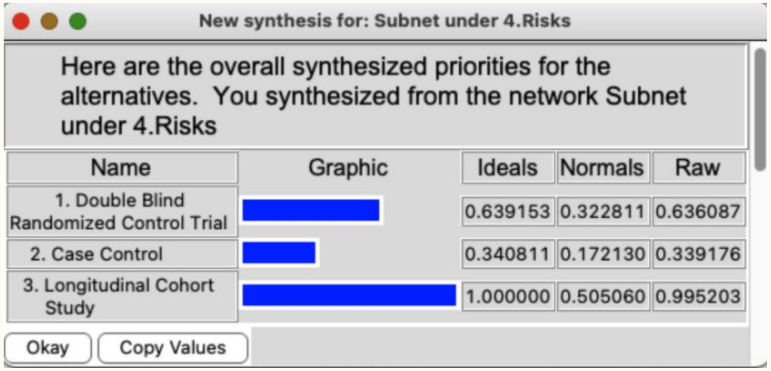

New synthesis for: Subnet under 4.Risks
Here are the overall synthesized priorities for the alternatives. You synthesized from the network Subnet under 4.Risks
Name
Graphic
Ideals
Normals
Raw
1. Double Blind Randomized Control Trial
0.639153
0.322811
0.636087
2. Case Control
0.340811
0.172130
0.339176
3. Longitudinal Cohort Study
1.000000
0.505060
0.995203
Okay
Copy Values

BOCR Analysis of Results

	Benefits				The most beneficial trial design is Double Blind Randomized Control Trial
	Biases	Comparability	Funding		
	26%	64%	10%		
1. Double Blind Randomized Control Trial	60%	72%	46%	65%	
2. Case Control	20%	19%	19%	19%	
3. Longitudinal Cohort Study	20%	9%	35%	16%	

	Opportunities			The most opportunistic trial design is the Double Blind Randomized Control Trial
	Comparability	Data Quantity		
	80%	20%		
1. Double Blind Randomized Control Trial	67%	47%	62%	
2. Case Control	20%	30%	23%	
3. Longitudinal Cohort Study	13%	22%	16%	

	Costs				The most costly is the Double Blind Randomized Control Trial
	Biases	Compliance	Follow-Up		
	40%	40%	20%		
1. Double Blind Randomized Control Trial	49%	56%	46%	62%	
2. Case Control	24%	20%	27%	23%	
3. Longitudinal Cohort Study	27%	24%	28%	16%	

	Risks				The most risky is the Longitudinal Cohort Study
	Compliance	Duration	Funding		
	26%	10%	64%		
1. Double Blind Randomized Control Trial	31%	42%	31%	32%	
2. Case Control	29%	19%	10%	17%	
3. Longitudinal Cohort Study	41%	40%	59%	51%	

Ratings Model

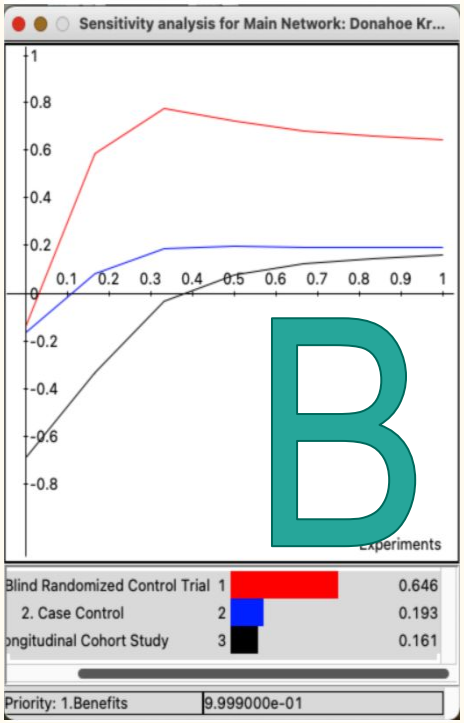
Alternatives	Priorities	Totals	Clinical Reputation (0.0771)	Design Efficacy (0.5676)	Participant Experi... (0.1986)	Participant Impact (0.1190)	Study Cost (0.0376)
1.Benefits	0.3384	0.8051	Medium	Excellent	Average	Above Average	Hi
2.Opportunities	0.2655	0.6317	High	Above Average	Average	Above Average	Hi
3.Costs	0.1740	0.4140	Low	Average	Above Average	Average	Hi
4.Risks	0.2221	0.5285	High	Average	Excellent	Above Average	Med

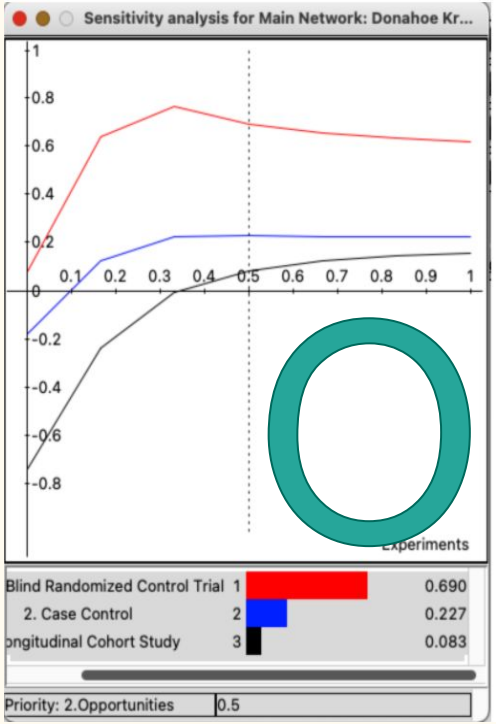
Long and Short Term Best Option

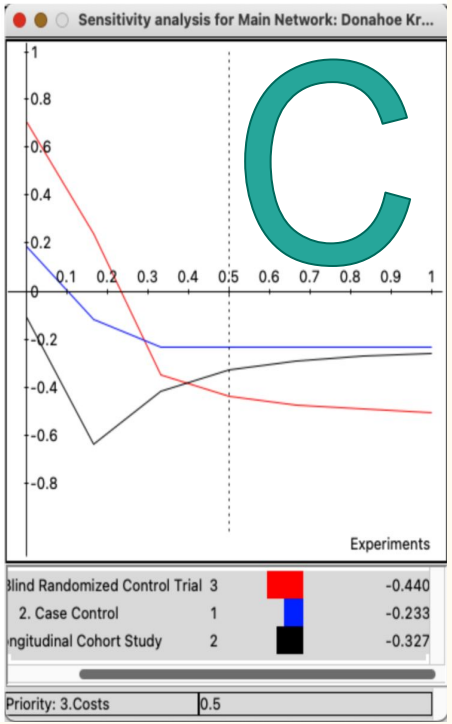
Long Term Results	
Name	Normals
1. Double Blind Randomized Control Trial	59%
2. Case Control	9%
3. Longitudinal Cohort Study	-33%

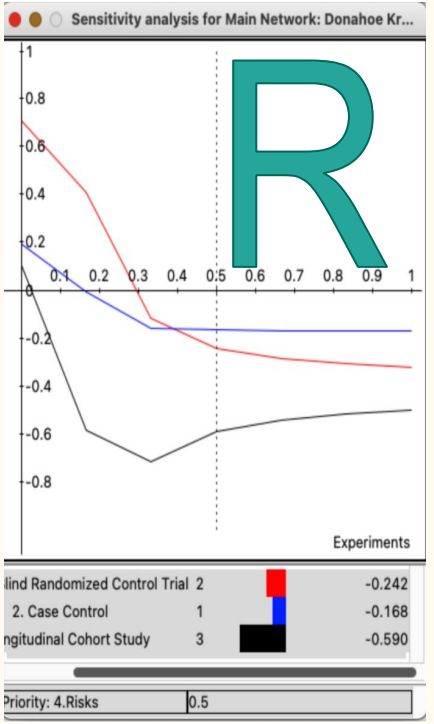
Short Term Results	
Name	Normals
1. Double Blind Randomized Control Trial	66%
2. Case Control	29%
3. Longitudinal Cohort Study	5%

Sensitivity Analysis



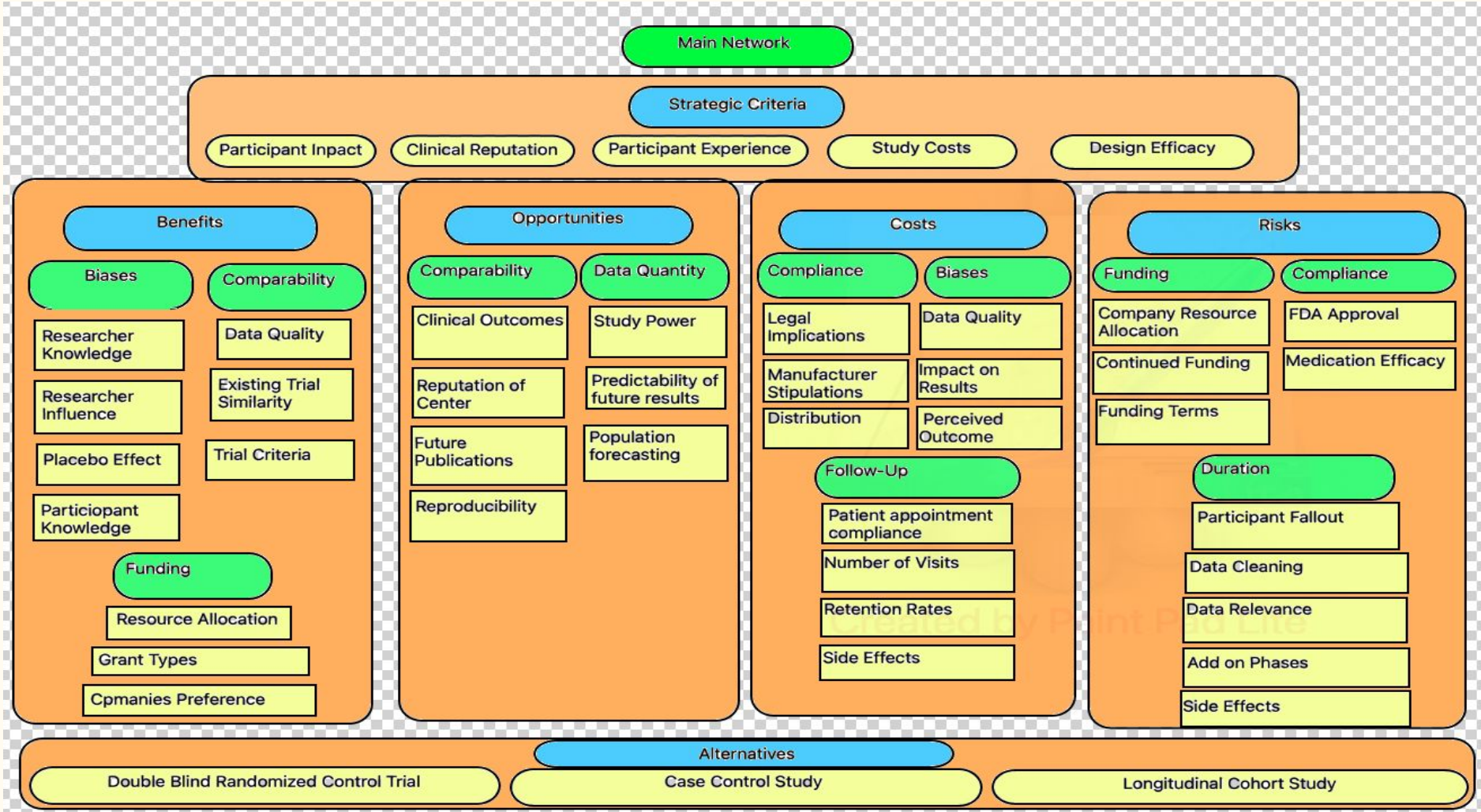






Final Thoughts

- Model building helps with decision organization
- Allows for distinct weights to be assigned to comparisons
- Chose the “Gold Standard” of trials as best option for us based on criteria evaluated- Double Blind Randomized Control Trial
- Outlined a decision we felt comfortable defending based on our analysis
- Beneficial future analysis tool for complex decisions
- Relevant based on perspective of institution
    - Drug company would have different criteria and goals in mind
    - Patients would also have different criteria and opinion


Main Network
Strategic Criteria
Participant Inpact
Clinical Reputation
Participant Experience
Study Costs
Design Efficacy
Benefits
Biases
Researcher Knowledge
Researcher Influence
Placebo Effect
Particiopant Knowledge
Comparability
Data Quality
Existing Trial Similarity
Trial Criteria
Funding
Resource Allocation
Grant Types
Cpmanies Preference
Opportunities
Comparability
Clinical Outcomes
Reputation of Center
Future Publications
Reproducibility
Data Quantity
Study Power
Predictability of future results
Population forecasting
Costs
Compliance
Legal Implications
Manufacturer Stipulations
Distribution
Biases
Data Quality
Impact on Results
Perceived Outcome
Follow-Up
Patient appointment compliance
Number of Visits
Retention Rates
Side Effects
Risks
Funding
Company Resource Allocation
Continued Funding
Funding Terms
Compliance
FDA Approval
Medication Efficacy
Duration
Participant Fallout
Data Cleaning
Data Relevance
Add on Phases
Side Effects
Alternatives
Double Blind Randomized Control Trial
Case Control Study
Longitudinal Cohort Study

Questions?