



Bayesian Elicitation for Rare Diseases Trials

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| Overview

- Targeted review of Bayesian/Frequentist rare disease/small population trials reviewing
- 2 trials performed with Bayesian elicitation
 - Reanalysis of frequentist trial in Bayesian framework
 - Preparation of a primary trial analysis

I Targeted Review results

- 6% of reviewed trials used Bayesian methods.
- Frequentist trials used sensible alphas and betas in trial setup
 - However, they struggled to reach their required sample sizes so missed their standardized effects
 - Did not utilize methods to overcome (rerandomization, longitudinal/crossover/n-of-1 studies/stratification)
- Bayesian methods utilised historic data and expert elicitation to reduce needed sample size

e.g. Hampson: effective sample size increase of 17 patients in 1 arm and 48 patients in the other (increases of 85% and 240% respectively)

Trial	# Participants	# Needed if frequentist
Stunnenberg (2018)	31 (23 once, 4 twice)	120
Hampson (2015)	40	1000
Wheatley (2011)	600	1900

| The APRICOT trial

Anakinra for Pustular psoriasis: Response In a Controlled Trial



- **Population:** Adults (aged 18 and over) with a diagnosis of Palmo-Plantar Pustulosis (PPP)
- **Intervention:** Anakinra: 100mg/0.67ml daily, self-administered, sub-cutaneous injection
- **'Comparison'** Non-active comparator: Placebo injection (0.67ml vehicle)
- **Outcome:** (decided after Stage 1) change in PPPASI score after 8 weeks



Restricted sample size (n=64)

| The TREAT trial

Treating severe paediatric asthma; a randomised controlled trial of mepolizumab and omalizumab



- **Population:** Children and adolescents aged 6-17 years with severe therapy resistant asthma (STRA)
- **Intervention:** Mepolizumab: 40mg (6-11yrs) or 100mg (≥ 12 yrs) every 4 weeks
- **'Comparison'** Omalizumab: 75 to 600mg ever 2-4 weeks (n=75)
- **Outcome:** Number of asthma attacks (exacerbations) over 52 weeks (defined as > 3 day course of high dose oral steroids)



Comparison: Non-inferiority trial

Restricted sample size (n=150)

Elicitation Sessions

APRICOT	TREAT
Defining assumed reduction in PPPASI score	Defining assumed difference in change between Omalizumab and Mepolizumab
2 linked analyses (assumed average baseline, assumed reduction in score)	2 linked analyses (assumed average improvement for Omalizumab, assumed difference in change between Omalizumab and Mepolizumab)
Prior to final Analysis	Before recruitment
10 clinicians invited (5 took part fully)	8 clinicians invited (all took part)
1 day (morning training, rest of day eliciting)	2 half days (first half day of training followed by half day next day of elicitation)

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