

Agent-Based Simulation for Neovascular AMD Treatment Planning

Optimizing Anti-VEGF Therapy Protocols in the NHS

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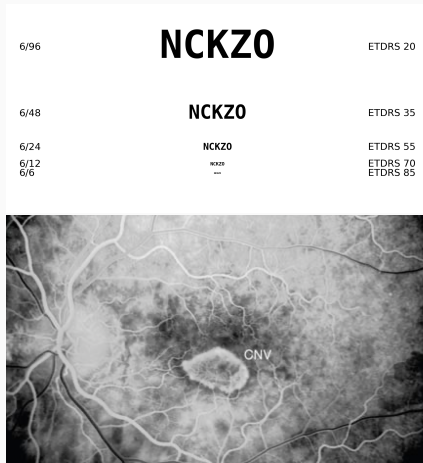
Acknowledgments

- Health Service Modelling Associates (HSMA) team
- Finance Director and IT Director
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Understanding Neovascular AMD

What is Neovascular AMD (NAMD)?

- Leading cause of central vision loss
- Cannot read or recognize faces
- Leads to legal blindness if untreated
- Affects quality of life severely



Disease Process:

- Aging eye environment
- Increased VEGF (Vascular Endothelial Growth Factor)
- Abnormal blood vessel growth
- Leakage, fibrosis, and bleeding

VEGF?

VEGF is like fertiliser for blood vessels. Anti-VEGF is something that removes the fertiliser.

As VEGF keeps being made we have to keep removing it.

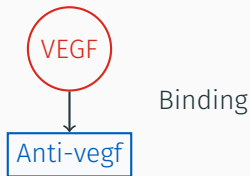
Revolutionary Treatment: Anti-VEGF Therapy

How it works:

- Antibodies or similar molecules bind to VEGF
- Remove growth factor from eye
- Stop abnormal vessel growth

The Challenge:

- Molecules cleared over time
- Requires repeated injections
- Optimal frequency unknown



Why Patients Stop Treatment

- **Mortality:** Elderly population (average age 80+)
- **Frailty:** Too unwell to attend monthly appointments
- **Treatment failure:** Vision deteriorates despite therapy
- **NHS capacity:** Limited appointment availability

Discontinuation Rates

- Year 1: 10-15% stop treatment
- Year 2: Additional 10-15%
- By Year 5: Only 50-60% still on treatment

Critical Question: How do we optimise treatment for those who remain?

The Cost Challenge

NHS Annual Treatment Costs

Treatment Area	Annual NHS Spend	Annual Patient Numbers
Wet AMD (Anti-VEGF)	£600-800 million	40,000 new, 200,000 continuing
Cataract Surgery	£320-480 million	400,000
Hip Replacement	£500-700 million	100,000

Cost per QALY

- Cataract surgery: £1,964 per QALY (exceptional value)
- Hip replacement: £2,128 per QALY (strong value)
- Wet AMD: £58,047 per QALY (3x NICE threshold)

Current Anti-VEGF Drug Costs (2024 list prices)

- Aflibercept (Eylea): £816 a dose, generic soon maybe £400
- Patients need 7-10 injections year 1, then 4-6/year ongoing