Cost-Effectiveness of Screening for Hydroxychloroquine Retinopathy

Poster
EE71

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Introduction

Background

- Hydroxychloroquine (HCQ) is a drug used to treat auto-immune diseases such as lupus erythematosus (SLE) and Rheumatoid Arthritis (RA).
- HCQ can induce retinopathy, which may result in vision loss. It is recommended that patients on long-term HCQ treatment are screened annually using Spectral Domain- Optical Coherence Tomography (SD-OCT) and Humphrey visual field analyzer (HFA) [1]. For low risk patients (dose <5 mg/kg/day) screening starts after 5 years of use and for high risk patients (dose >5 mg/kg/day) it starts from baseline [2].
- Although screening is effective, it is also costly and the risk for HCQ retinopathy differs depending on dosage [3].

Objective

- To analyse the cost-effectiveness of screening for HCQ retinopathy in the Netherlands.

Methods

Model summary

- Markov model of patients treated with HCQ and at risk for retinopathy (Figure 1) .
  - Cost-effectiveness from a Dutch societal perspective with a Life-time time horizon (Willingness-to-Pay of €20,000).
  - Cycle length of 1 year, in line with the screening frequency.
  - Costs discounted with 4% and effects with 1.5%.
  - If retinopathy progressed undetected for over three years, it was assumed that a patient developed vision loss (LogMAR: 0.3, Snellen 20/40).
  - Cost-effectiveness was determined for: the general population, patients receiving <4 mg/kg HCQ, 4-5 mg/kg HCQ, and ≥5 mg/kg HCQ [2].
  - The current screening guideline was compared with screening after 5 years, screening after 10 years, screening after 15 years, and screening with solely an SD-OCT.

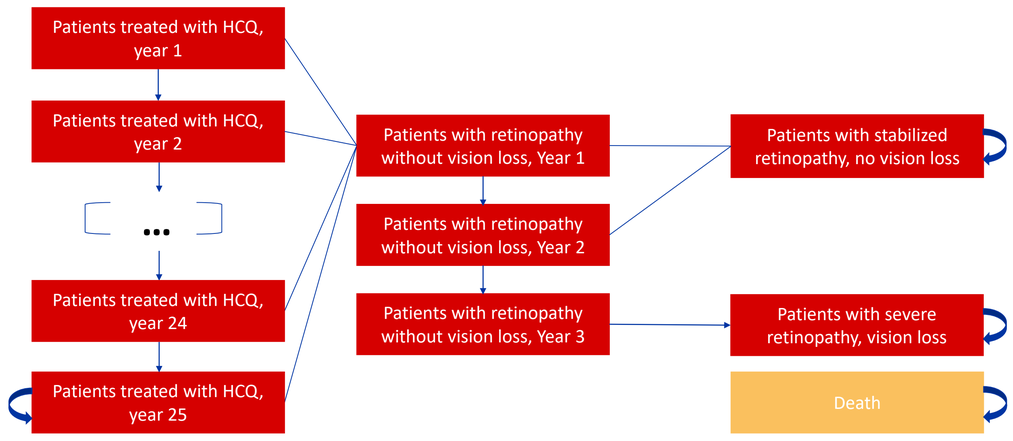


Figure 1. Model structure

Model inputs

- Both medical costs (i.e., screening, vision aids) and societal costs (i.e., productivity losses, travel costs, and informal care) were included.
- Transition probabilities were based on the yearly risk for HCQ retinopathy and sensitivity of screening [1,3].
- Quality of Life was based on patient's vision and age [4].

Sensitivity analyses

- A probabilistic sensitivity analysis and deterministic sensitivity were performed to influence of parameters and establish the robustness of the model.

Conclusions

Although screening is effective, later initiating of screening based on the dosage of the patient and use of solely an SD-OCT will help improve cost-effectiveness

Interpretation

- Screening helps to prevent development of retinopathy, and therefore, improves patient's quality of life and medical and societal costs associated with vision loss.
- However, later initiating of screening based on dosage of patients does not lead to significantly more cases of HCQ retinopathy and saves medical costs in the form of outpatient screening visits and societal costs in the form of productivity losses due to screening time.

Advice

- **For patients receiving <4 mg/kg HCQ: start screening after 15 years of use**
- **For patients receiving 4-5 mg/kg HCQ: start screening after 10 years of use**
- **For patients receiving ≥5 mg/kg HCQ: start screening after 10 years of use**
- **Use of solely an SD-OCT**

To achieve the most optimal screening regimen it is important to explore more screening regimens (e.g., biyearly screening, later initiation with solely an SD-OCT).

Results

Outcomes for general population (Table 1)

- Compared to no screening, the current screening regimen saved costs while gaining QALYs (€5,406 and 0.45 per patient in the general population)
- Starting screening after 10 years was more cost-effective than the current screening schedule (i.e., saving €632 while lowering QALYs by 0.01)
- The use of solely an SD-OCT saved €421 per patient and lowered QALYs by 0.02

Outcomes for sub-populations

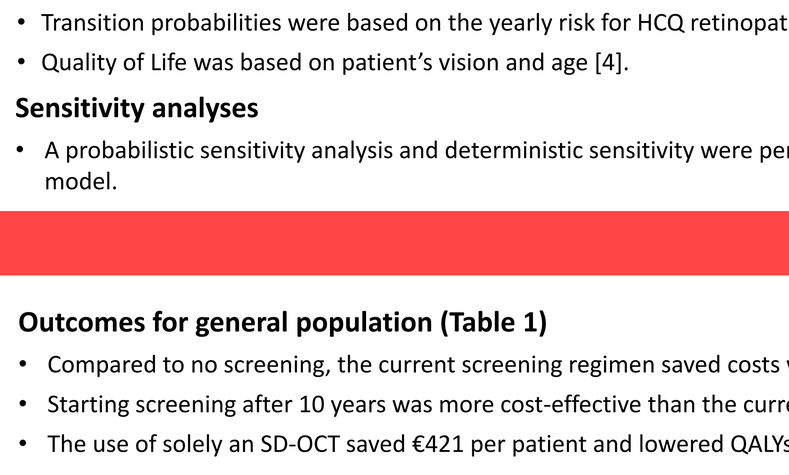
- In a patient receiving <4 mg/kg, it was more cost-effective to start screening after 15 years instead of after 5 years (i.e., saving €1,206 while lowering QALYs by 0.008) (Table 1).
- In a patient receiving 4-5 mg/kg or 5mg/kg it was more cost-effective to start screening after 10 years instead of after 5 years or from baseline (saving €758 with no impact on QALYs and saving €1,104 while lowering QALYs by 0.01, respectively) (Table 1).

Sensitivity analyses (performed for general population)

- The probabilistic sensitivity analysis suggested model robustness and found a lower and upper bound for incremental costs of €-15,099 and €5,192, with a mean of -€4,719. The lower and upper bound of the incremental QALYs were 0.02 and 1.33, with a mean of 0.41 (Figure 3).
- The deterministic sensitivity analysis showed that the age of patients at model initiation had most influence on the outcomes (Figure 2).
  - Screening from an older age was less cost-saving and led to lower incremental QALYs
- For all distributed parameters apart from age, screening was cost-saving and improved Quality of Life (Figure 2).

Table 1. Outcomes for general population (per patient over a life-time)

Comparator	Incremental costs	Incremental QALYs	ICER
Outcomes for general population			
No screening	€-5,406	0.45	Dominant
Screening starts after 10 years	€632	0.01	€92,110
Screening starts after 15 years	€-291	0.08	Dominant
Solely an OCT	€421	0.01	€36,407
Outcomes for patients receiving <4mg/kg			
Screening starts after 15 years	€1,206	0.008	€148,073
Outcomes for patients receiving 4-5mg/kg			
Screening starts after 10 years	€758	0.00	N/A
Outcomes for patients receiving ≥5mg/kg			
Screening starts after 10 years	€1,104	0.02	€78,220



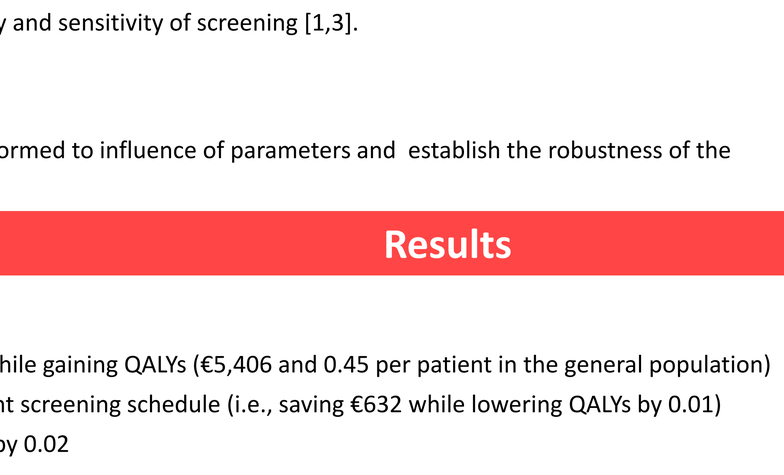


Figure 2. Tornado diagrams presenting the six most influential parameters (Lower bound = 2.5% CI, Upper bound 97.5% CI)

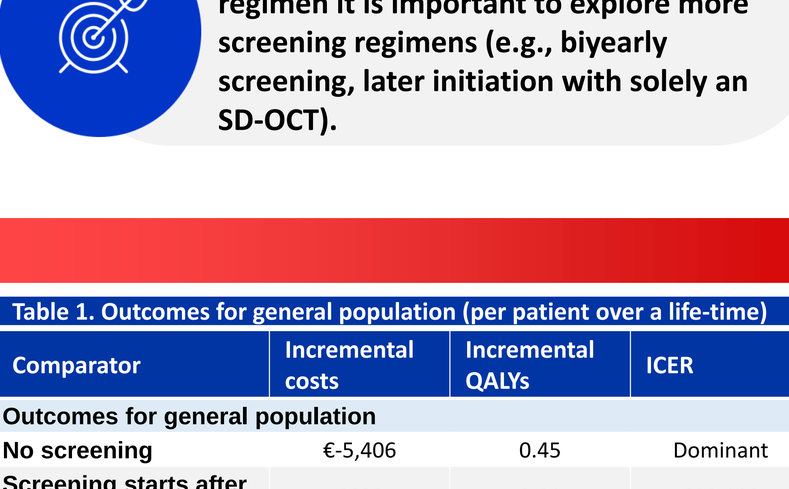


Figure 3. Cost-effectiveness plane (general population, comparator: no screening)

Disclosures

There were no affiliations with or involvement in any organisation or entity with finical or non-financial interests in the subjects discussed in this poster.

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