UTILIZING GENERATIVE AI TECHNOLOGY FOR COMPREHENSIVE HTA REPORT ANALYSIS

HTA240

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KEY FINDINGS

Generative AI presents significant advantages in the HTA review process by delivering rapid insights into treatment efficacy, safety, cost-effectiveness, and critiques.

By leveraging this technology in ValueGen.AI, HTA processes can be greatly streamlined, particularly for market access strategies that require comprehensive and concise summaries of complex reports.

BACKGROUND

- Navigating Health Technology Assessment (HTA) reports is a resource-intensive yet vital process for pharmaceutical market access.
- Generative AI offers potential in automating HTA review processes, enhancing efficiency by summarizing key information and supporting data-driven decision-making

OBJECTIVE

Our objective was to assess the capabilities of Generative AI in efficiently extracting and synthesizing information from HTA reports.

METHODS

We analyzed UK NICE HTA reports on hepatocellular carcinoma (HCC) treatments focusing on safety, efficacy, cost-effectiveness, and critiques.

- **Reports Analyzed:** NICE appraisals from the past 5 years, including:
  - **TA849:** Cabozantinib for advanced HCC post-sorafenib1
  - **TA666:** Atezolizumab plus Bevacizumab for advanced or unresectable HCC2
  - **TA555:** Regorafenib for advanced HCC post-sorafenib3
- **Generative AI Platform:** Utilized ValueGen.AI4, a GPT-4 based platform utilizing multi-agent pipelines with LangChain5 and OpenAI6 libraries to synthesize critiques from clinical and cost perspectives
- **Data Extraction:** Programming language Python was used for large language model interactions to extract safety profiles, endpoints, and economic data from the reports.
- **Data Validation:** Validated key findings through human-in-the-loop review process to ensure accuracy and relevance.

RESULTS

The generative AI demonstrated its capacity to navigate and summarize HTA reports effectively. Specifically, it accurately extracted the safety profiles (Table 1), efficacy endpoints (Table 2), cost-effectiveness (Table 3) and key critiques (Table 4) insights from the reports.

Table 1. *AI-extracted Safety Profiles*

Drug	Common Adverse Events	Serious Adverse Events	Discontinuation Rate Due to AEs
Cabozantinib	Diarrhea, palmar-plantar erythrodysesthesia, hypertension	Higher toxicity profile; dose modifications often needed	Higher than Regorafenib
Atezolizumab + Bevacizumab	Diarrhea, fatigue, elevated liver enzymes, hypertension	Deterioration in physical health, hepatic failure	Moderate
Regorafenib	Physical health decline, ascites, hepatic failure	High hypophosphatemia rates; manageable with dose adjustments	25%

RESULTS (cont.)

Table 2. *AI-extracted Efficacy Endpoints*

Drug	Primary Endpoint	Secondary Endpoints
Cabozantinib	OS	PFS, ORR
Atezolizumab + Bevacizumab	OS, PFS	ORR, DCR, TTP
Regorafenib	OS	PFS, TTP, ORR, DCR

Notes. OS: Overall Survival, PFS: Progression-Free Survival, ORR: Objective response rate, TTP: Time-to-progression, DCR: Disease control rate

Table 3. *AI-extracted Cost Effectiveness Summary*

Drug	Pricing	Modeling Approach	Cost-Effectiveness
Cabozantinib	£5,143 for a 30-tablet pack; £629 for diarrhea management; £638 for hypertension management	Partitioned survival model: progression-free, progressed disease, death; Supported by NHS resource estimates	Cost-effective compared to Regorafenib; High probability of net benefit at £30,000 per QALY
Atezolizumab + Bevacizumab	£3,807.69 per 20-ml vial of Atezolizumab; £242.66 per 4-ml vial of Bevacizumab	Differentiated pre- and post-progression; Incorporates grade 3+ adverse events and proximity to death indicators	Strong cost-effectiveness relative to sorafenib; Uncertainties due to indirect treatment comparisons for lenvatinib
Regorafenib	Confidential PAS discount reducing cost from £66,250 to £44,296-£51,760	Markov model: pre-progression, progression, and death; Captures clinical progress, cost, and utility values	High ICER ratios compared to Best Supportive Care; Recommendations limited to patients with high tolerance

Table 4. *AI-extracted Key Critiques*

Drug	Key Critiques
Cabozantinib	• **Toxicity Concerns**: Higher toxicity than Regorafenib; dose modifications frequently needed. • **Comparative Efficacy**: Limited head-to-head data; reliance on indirect comparisons raised generalizability issues. • **Uncertainty in Clinical Effectiveness**: Real-world application may vary from clinical trial outcomes due to patient variability.
Atezolizumab + Bevacizumab	• **Indirect Comparisons**: Fractional polynomial network meta-analysis (NMA) showed greater uncertainty; limited direct comparison data with lenvatinib. • **Survival Model Assumptions**: Exponential function fit poorly to clinical data, with concerns over mortality hazard assumptions. • **Generalizability**: Results were seen as potentially less applicable in real-world NHS settings versus controlled clinical trials.
Regorafenib	• **Patient Selection**: High toxicity limited its recommendation to patients with good tolerance to sorafenib, reducing broad applicability. • **Efficacy Uncertainty**: Efficacy and safety outcomes were uncertain for subgroups not represented in clinical trials, such as patients with Child-Pugh grade B liver impairment. • **Cost Concerns**: High ICERs raised questions about value for money in Best Supportive

REFERENCES

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