ceel.ai

AI, BRANDS, AND MEDICATION:

HOW LLMS ARE SHAPING HEALTHCARE VISIBILITY

From Visibility to Liability? How to Stay in Control in AI-Driven Conversations

NEW REALITY

HOW AI ANSWERS ARE REDEFINING HEALTHCARE INFORMATION

New Reality

Large Language Models (LLMs) like ChatGPT, Gemini, and Claude are transforming how patients, doctors, and caregivers access health information. Products and brands no longer compete on search results — they appear (or vanish) inside AI-generated answers.

Why It Matters

The shift brings new challenges for pharma companies:

- LLMs favor generic names over branded products.
- Dosage, risk, and treatment recommendations vary between models.
- The EU AI Act and other regulations demand active monitoring of AI outputs.

Urgent Need for Action

Pharma companies must act now:

- Track how products appear across LLMs.
- Strengthen brand visibility in trusted medical sources.
- Build AI compliance workflows to detect and correct misinformation early.

We show how pharma companies can regain control — with a structured, actionable approach to LLM visibility and compliance.

HOW LANGUAGE MODELS ARE RESHAPING SEARCH, KNOWLEDGE, AND CHOICE

Massive Adoption Across the Globe

LLMs like ChatGPT, Gemini, and Claude are no longer niche tools. ChatGPT alone sees over **800 million weekly active users,** and **Gemini** recently hit **350 million monthly users** – a clear sign that generative AI is part of daily digital routines.

ChatGPT deepseek Meta Claude

Gemini perplexity Grok

From Search to Answers

The way people seek information is changing fast. Instead of browsing ranked links, users now expect **direct, conversational answers**. This shift from search to response brings convenience – but also new challenges around transparency and consistency.

AI Replaces Traditional Interfaces

LLMs are becoming the interface. From **symptom checkers** to **shopping advice,** AI agents are taking over everyday tasks once handled by human interaction or traditional search – often embedded directly into apps, browsers, or voice tools.

HEALTHCARE'S AI MOMENT: RISKS, REACH, AND RESPONSIBILITY

Healthcare is uniquely sensitive

Side effects, uncertainty, and individualized patient needs make precision critical. Mistakes or vague outputs aren't just inconvenient — they can be dangerous.

LLMs behave differently across borders

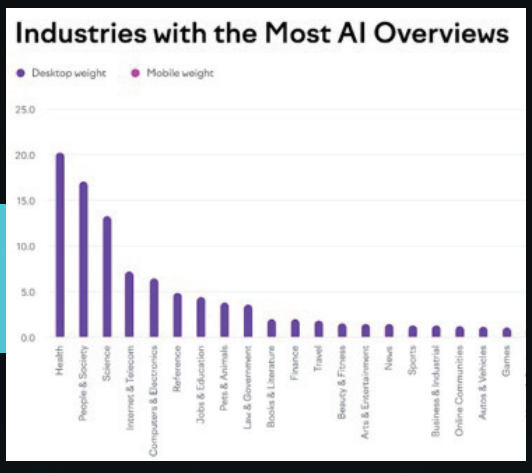
Cultural norms and regulations — like direct-to-consumer marketing in the U.S. — shape the way LLMs respond. The same question can lead to very different outputs depending on country and context.

Early signals show high exposure

Health-related answers are everywhere: From AI Overviews in search results to LLM apps and chatbots. And they're often ranked or displayed without medical oversight.

LLMs are already passing medical exams

In Germany, GPT-4 recently passed the written national medical licensing exam — proving that these systems are not just generalists, but capable of engaging in high-stakes domains like medicine.



AI AT THE FRONTLINE OF CARE
HOW PATIENTS AND HCPs ARE USING LANGUAGE MODELS IN REAL MEDICAL SITUATIONS

Patients

Drug Recommendation & Second Opinion

→ "What's the best treatment for moderate psoriasis?" / "Is there an alternative to what my doctor prescribed?"

Patients use LLMs to explore suggestions or challenge prescriptions – often expecting clear, confident answers.

Drug Comparison

→ "Ozempic vs. Mounjaro – which is better for weight loss?"

LLMs are used to compare medications by effect, side effects, and safety – but may skip brand context or nuances.

Dosage Clarity

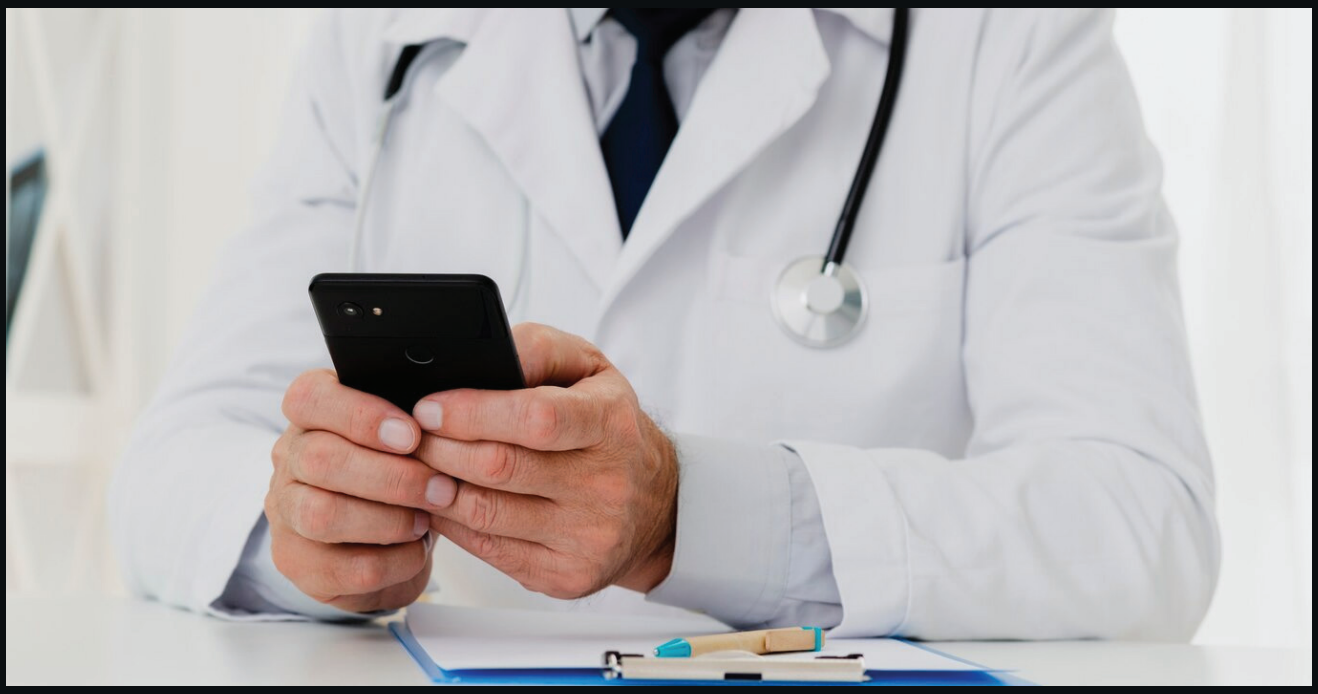
→ "What does 'take on an empty stomach' mean?

Vague or generic answers can lead to misuse and medical risk.

Cost-Effective Alternatives

→ "Is there a cheaper alternative to Eliquis?

Patients search for savings – but often without understanding therapeutic differences.



HCPs (Health Care Professionals)

Treatment Validation

→ Real-time prompts during ward rounds or case discussions

LLMs assist clinicians with evidence-based comparisons and best-practice recommendations.

Drug Safety & Interactions

→ "Can I prescribe this alongside XYZ?

Doctors use LLMs to quickly cross-check compatibility.

Medical Communication

→ Drafting summaries or explanations for patient

Saves time and helps translate complex terms into everyday language.

TRUST, VISIBILITY, ACCURACY, CONTROL – THE NEW PHARMA MANDATE IN THE AGE OF AI

Pharma

Brand Visibility

→ Is the substance named, or your product?

Most LLMs default to generics – product mentions often vanish.

How to influence visibility?

→ LLMs prioritize trusted, high-signal sources – strategic content placement, schema markup & third-party citations are key.

Message Accuracy

→ Are your indications, dosage forms, and positioning reflected correctly?

Unverified outputs can lead to patient confusion and compliance risks.

Regulatory Alignment

→ Do LLMs reflect EMA/FDA-approved information?

LLMs require proactive governance to prevent misinformation.

(Under EU AI Act, high-risk categories may require continuous monitoring and risk mitigation.)

OUR SOLUTION:
FROM PROMPT TO INSIGHT

We've developed a specialized prompt engine that reflects how real users – like patients or doctors – actually ask questions. By controlling tone, lengths, structure, and wording, we reveal how LLMs respond and deliver actionable insights for pharma.

1

Prompt Simulation

We create hundreds of real-life prompts based on patient and HCP scenarios

2

Multi-Model Testing

We run each prompt across multiple LLMs (also open-source models, fine-tuned medical models)

3

Input/Output Monitoring

We analyze recommendations, product mentions, dosage, and inconsistencies

4

Insight Delivery

We deliver actionable reports for visibility, compliance, and strategy.

Built for: Medical Affairs, Compliance, and Marketing

“WHAT HAPPENS WHEN A PATIENT ASKS FOR HELP?”

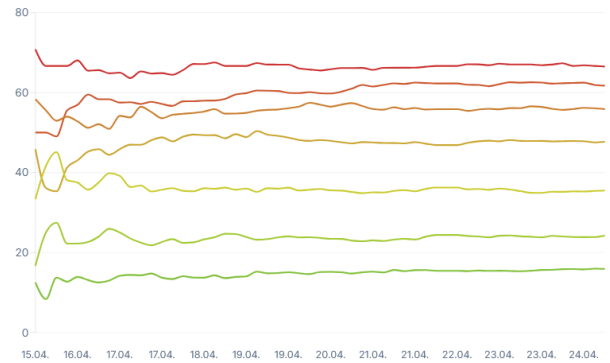
INSIGHTS GENERATED WITH OUR LLMV INTELLIGENCE TOOL.

Patient: male
Country:

Looks for: treatment for moderate to severe psoriasis

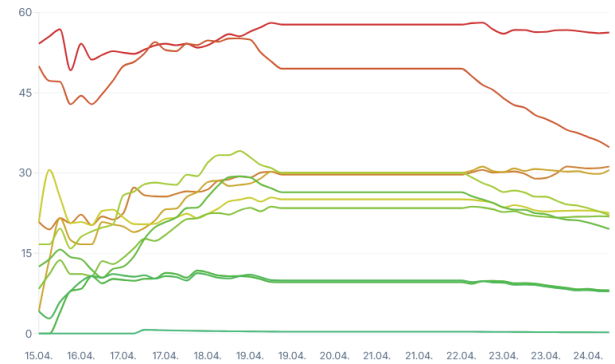
n: 3000 **prompts**

ChatGPT



Rank	Name	Share	Change
1	Clobetasol Propionate	66.5%	-6.1%
2	Methotrexate	61.7%	+23.5%
3	Calcipotriene	55.9%	-4.2%
4	Adalimumab	47.7%	+4.0%
5	Humira	35.5%	+6.5%
6	Enbrel	24.2%	+45.4%
7	Ustekinumab	15.9%	+27.2%

perplexity

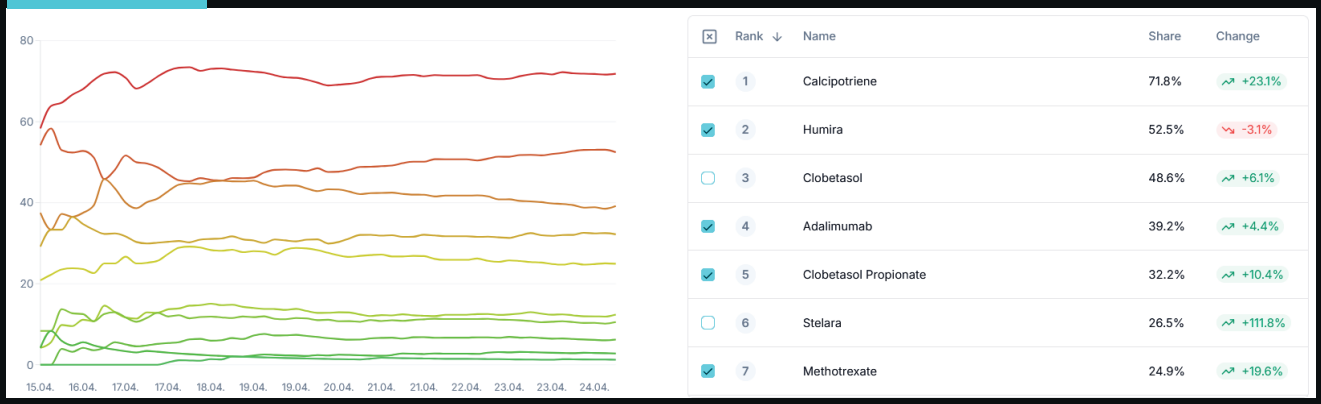


Rank	Name	Share	Change
1	Methotrexate	56.3%	+3.9%
2	Etanercept	34.8%	-30.4%
3	Calcipotriene	31.2%	+49.8%
4	Cyclosporine	30.6%	+633.8%
5	Secukinumab	22.5%	+8.0%
6	Adalimumab	22.1%	+32.5%
7	Ixekizumab	21.9%	+162.4%

Gemini

Rank	Name	Share	Change
1	Humira	82.9%	-0.6%
2	Clobetasol Propionate	68.8%	-13.1%
3	Stelara	47.7%	+4.0%
4	Methotrexate	46.3%	-20.6%
5	Calcipotriene	46.1%	+10.7%
6	Cosentyx	17.7%	+42.0%
7	Otezla	17.0%	+1.9%

deepseek



Rank	Name	Share	Change
1	Calcipotriene	71.8%	+23.1%
2	Humira	52.5%	-3.1%
3	Clobetasol	48.6%	+6.1%
4	Adalimumab	39.2%	+4.4%
5	Clobetasol Propionate	32.2%	+10.4%
6	Stelara	26.5%	+111.8%
7	Methotrexate	24.9%	+19.6%

- Different models, different recommendations – each LLM suggests different substances or medications, despite identical prompts.

→ **Action:** Test and track prompts to uncover visibility gaps and product mentions.

- Fluctuating early results – initial outputs vary before stabilizing over time.

→ **Action:** Monitor trends over time to detect risks and guide strategy.

Patient: male
Country:

Looks for: treatment for moderate to severe psoriasis

n: 3000 **prompts**

ChatGPT

Keywords

The model reported following keywords.

Rank	Name	Mentions
1	topical treatments	522
2	biologics	431
3	systemic medications	410
4	stress management	308
5	inflammation	280
6	triggers	230
7	topical	221

Sources

The model reported following URLs are the source for the recommendations.

Rank	Name	Mentions
1	https://www.psoriasis.org	411
2	https://www.ncbi.nlm.nih.gov	331
3	https://www.psoriasis.org/	300
4	https://www.mayoclinic.org	142
5	https://www.healthline.com	112
6	https://www.ncbi.nlm.nih.gov/	110
7	https://www.aad.org/public/diseases/psoriasis/treatment	96

perplexity

Keywords

The model reported following keywords.

Rank	Name	Mentions
1	phototherapy	240
2	biologics	177
3	inflammation	165
4	stress management	112
5	skin cell growth	104
6	Biologics	100
7	systemic medications	95

Sources

The model reported following URLs are the source for the recommendations.

Rank	Name	Mentions
1	https://www.mayoclinic.org/diseases-conditions/psoriasis/diagnosis-treat...	376
2	https://www.nhs.uk/conditions/psoriasis/treatment/	305
3	https://www.webmd.com/skin-problems-and-treatments/psoriasis/severe-...	228
4	https://www.healthline.com/health/psoriasis/psoriasis-stages-of-treatment-2	102
5	https://www.webmd.com/skin-problems-and-treatments/psoriasis/research	99
6	https://www.aad.org/public/diseases/psoriasis/treatment/treatment	96
7	https://pmc.ncbi.nlm.nih.gov/articles/PMC5713395/	89

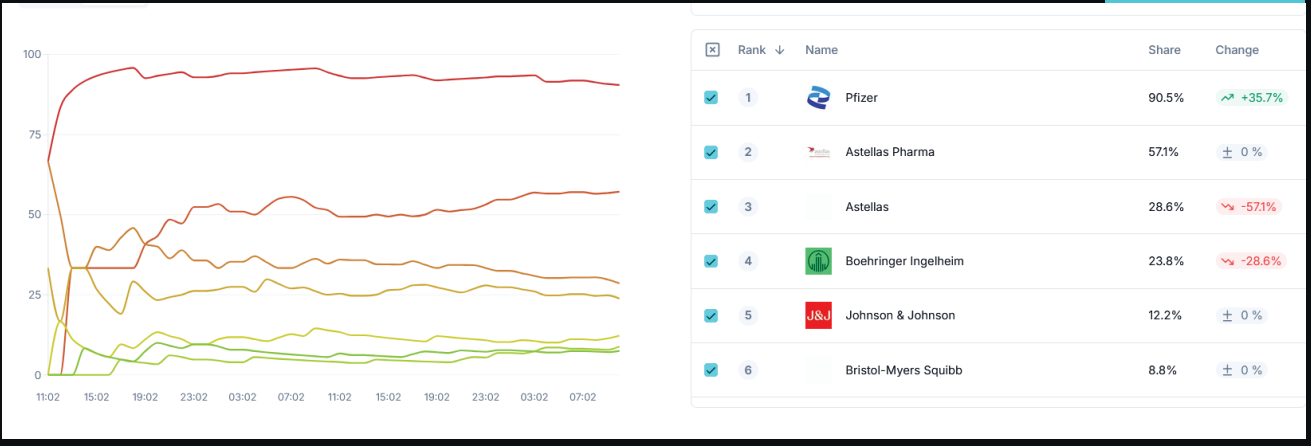
- **LLMs prioritize trusted sources like Mayo Clinic or WebMD –** corporate sites rarely count.

→ **Action:** Focus content and PR on high-signal, clinically relevant ecosystems.

- **Keywords steer outputs –** phrasing shapes hierarchy, substance, and tone.

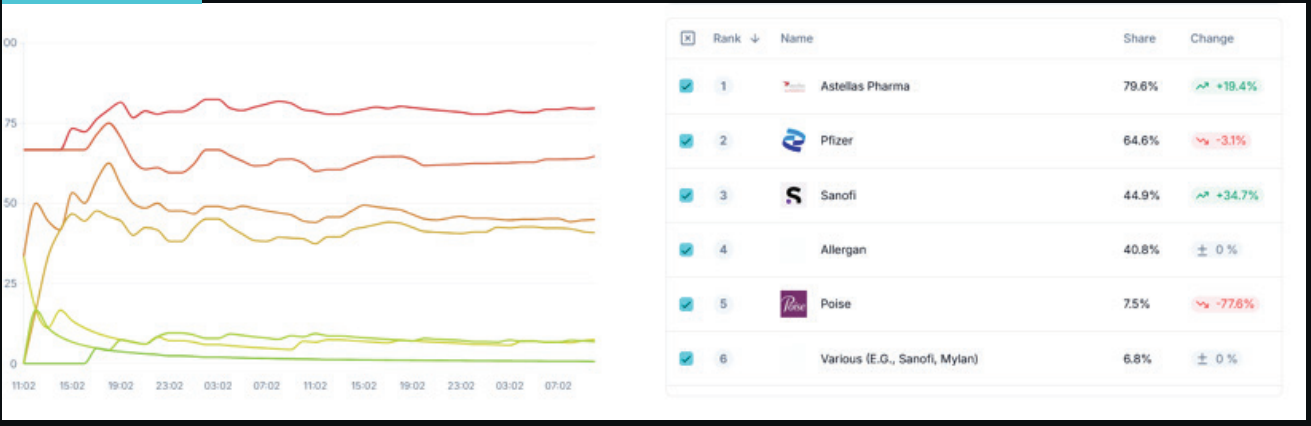
→ **Action:** Test and track prompts to influence how your product appears.

ChatGPT



Rank	Name	Share	Change
1	Pfizer	90.5%	+35.7%
2	Astellas Pharma	57.1%	± 0 %
3	Astellas	28.6%	-57.1%
4	Boehringer Ingelheim	23.8%	-28.6%
5	Johnson & Johnson	12.2%	± 0 %
6	Bristol-Myers Squibb	8.8%	± 0 %

Gemini



Rank	Name	Share	Change
1	Astellas Pharma	79.6%	+19.4%
2	Pfizer	64.6%	-3.1%
3	Sanofi	44.9%	+34.7%
4	Allergan	40.8%	± 0 %
5	Poise	7.5%	-77.6%
6	Various (E.G., Sanofi, Mylan)	6.8%	± 0 %

Brands often vanish – generics dominate LLM answers.

→ **Action:** Strengthen product-substance ties through structured content and citations.

Patient: male
Country:

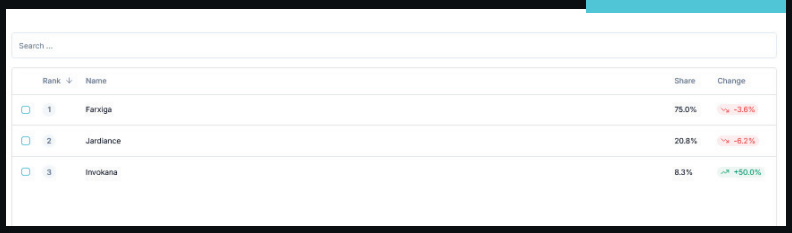
Looks for: Comparison of drug: Jardiance vs Farxiga

n: 100 **prompts**

ChatGPT

Rank	Name	Share	Change
1	Jardiance	79.2%	+1.8%
2	Farxiga	33.3%	0 %
3	Victoza	4.2%	-25.0%
4	Empagliflozin	4.2%	0 %
5	Canagliflozin	4.2%	0 %
6	Liraglutide	4.2%	0 %

Grok



Rank	Name	Share	Change
1	Farxiga	75.0%	-3.6%
2	Jardiance	20.8%	-6.2%
3	Invokana	8.3%	+50.0%

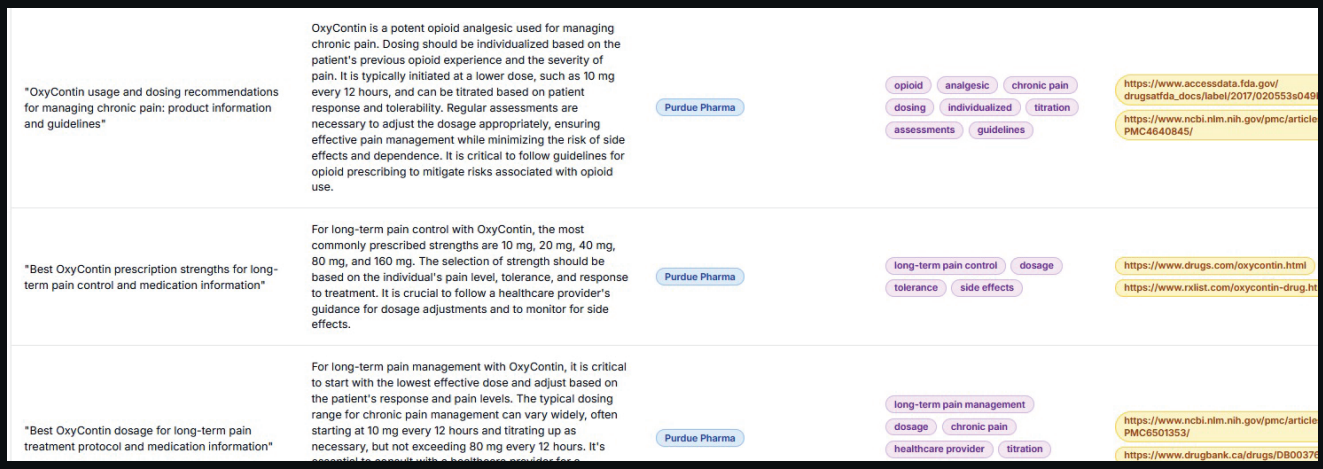
- **LLMs react sensitively to prompt context –** terms like “heart,” “kidney,” or “side effects” can shift which treatment is recommended, leading to either Farxiga or Jardiance depending on phrasing.

→ **Action:** Run structured prompt testing to understand how wording influences outputs and product exposure.

- **Compliance blind spots emerge –** hallucinated effects or misleading comparisons may appear in LLM responses.

→ **Action:** Set up continuous auditing to detect and document AI-generated misinformation before it causes regulatory or reputational risk.

DOSAGE IN LLMS – A CRITICAL RISK AREA FOR PHARMA



"OxyContin usage and dosing recommendations for managing chronic pain: product information and guidelines"	OxyContin is a potent opioid analgesic used for managing chronic pain. Dosing should be individualized based on the patient's previous opioid experience and the severity of pain. It is typically initiated at a lower dose, such as 10 mg every 12 hours, and can be titrated based on patient response and tolerability. Regular assessments are necessary to adjust the dosage appropriately, ensuring effective pain management while minimizing the risk of side effects and dependence. It is critical to follow guidelines for opioid prescribing to mitigate risks associated with opioid use.	Purdue Pharma	opioid, analgesic, chronic pain, dosing, individualized, titration, assessments, guidelines	https://www.accessdata.fda.gov/drugsatfda_docs/label/2017/020553s049l... https://www.ncbi.nlm.nih.gov/pmc/article... PMC4640845/
"Best OxyContin prescription strengths for long-term pain control and medication information"	For long-term pain control with OxyContin, the most commonly prescribed strengths are 10 mg, 20 mg, 40 mg, 80 mg, and 160 mg. The selection of strength should be based on the individual's pain level, tolerance, and response to treatment. It is crucial to follow a healthcare provider's guidance for dosage adjustments and to monitor for side effects.	Purdue Pharma	long-term pain control, dosage, tolerance, side effects	https://www.drugs.com/oxycontin.html https://www.rxlist.com/oxycontin-drug.ht...
"Best OxyContin dosage for long-term pain treatment protocol and medication information"	For long-term pain management with OxyContin, it is critical to start with the lowest effective dose and adjust based on the patient's response and pain levels. The typical dosing range for chronic pain management can vary widely, often starting at 10 mg every 12 hours and titrating up as necessary, but not exceeding 80 mg every 12 hours. It's essential to consult with a healthcare provider for a...	Purdue Pharma	long-term pain management, dosage, chronic pain, healthcare provider, titration	https://www.ncbi.nlm.nih.gov/pmc/article... PMC6501353/ https://www.drugbank.ca/drugs/DB0037...

- **Dosage accuracy is critical –** especially for medications like Oxycodone

→ **Action:** Monitor how LLMs describe dosing instructions across prompts and models.

- **LLMs often return inconsistent dosage guidance –** depending on prompt, tone, or source

→ **Action:** Track output variance and ensure alignment with approved product labeling.

- **LLMs can miss contraindications –** e.g. recommending tetracycline during pregnancy

→ **Action:** Extend audits to include safety-critical contexts like contraindications and high-risk populations.

- **Patient safety and liability risks arise when LLMs suggest inappropriate use**

→ **Action:** Establish structured oversight to catch and escalate potentially harmful recommendations.

OUR 4D FRAMEWORK FOR LLM ACCURACY AND VISIBILITY

A structured model to shape, safeguard, and scale product presence in AI-generated healthcare advice

1. DETECT

Audit how LLMs represent your products

→ Analyze responses across general and medical-specific LLMs (e.g. GPT-4, Claude, MedPalm, Meditron).

→ Check brand vs. substance visibility, dosage accuracy, and guideline alignment.

✓ **Multi-model gap report**

✓ **Compliance alerts & baseline risk map**

2. DEFINE

Clarify how your product should appear in LLMs

→ Link substance, indication, and patient context into structured messaging.

→ Shape content around regulatory labels, clinical benefits, and safety cues.

✓ **LLM-ready messaging architecture**

✓ **Reduced ambiguity, improved factual match**

3. DISTRIBUTE

Embed content into trusted ecosystems

→ Seed high-signal sources (e.g. Mayo Clinic, WebMD) with verified narratives.

→ Collaborate with PR & Med Affairs to secure citations and co-authored content.

→ Escalate dangerous hallucinations to model providers (e.g. OpenAI)

✓ **Earned visibility in model training sources**

✓ **Risk response protocols for critical errors**

4. DRIVE

Continuously monitor and improve LLM output

→ Track changes in how LLMs respond across time, models, and regions.

→ Benchmark across generalist (GPT, Gemini, Claude) and medical-specialist models (MedPalm, Meditron, BioGPT).

✓ Always-on visibility dashboard

✓ Audit trail to support EU AI Act & GVP standards

ABOUT THE AUTHORS & AI EXPERTISE

At ceel.ai, we specialize in evaluating how large language models (LLMs) influence decision-making across regulated industries.

We believe responsible AI starts with transparency, traceability, and testing – especially in high-stakes fields like healthcare.

Dr. Daniel Weimer

Andreas Gensch

Read also our paper on AI risk and governance, presented at SAIA 2024.
It reflects our roots in AI explainability, compliance, and end-to-end risk assessment – the perspective we bring into healthcare and pharma.

READ PAPER

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