Use Cases of

10 LLMS IN HEALTHCARE

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1. Education

LLMs are making a big impact in education by breaking down complex ideas and offering quick explanations.

Take **Oxford Medical Simulation**, for example. They've combined LLMs with VR to create lifelike patient scenarios. Students can practice handling situations like cardiac arrest, all in a safe, virtual setting.

The cool part? The virtual patients respond in real-time, making the experience feel unpredictable and much closer to actual clinical environments.

VR Patient Training Simulation by OFS

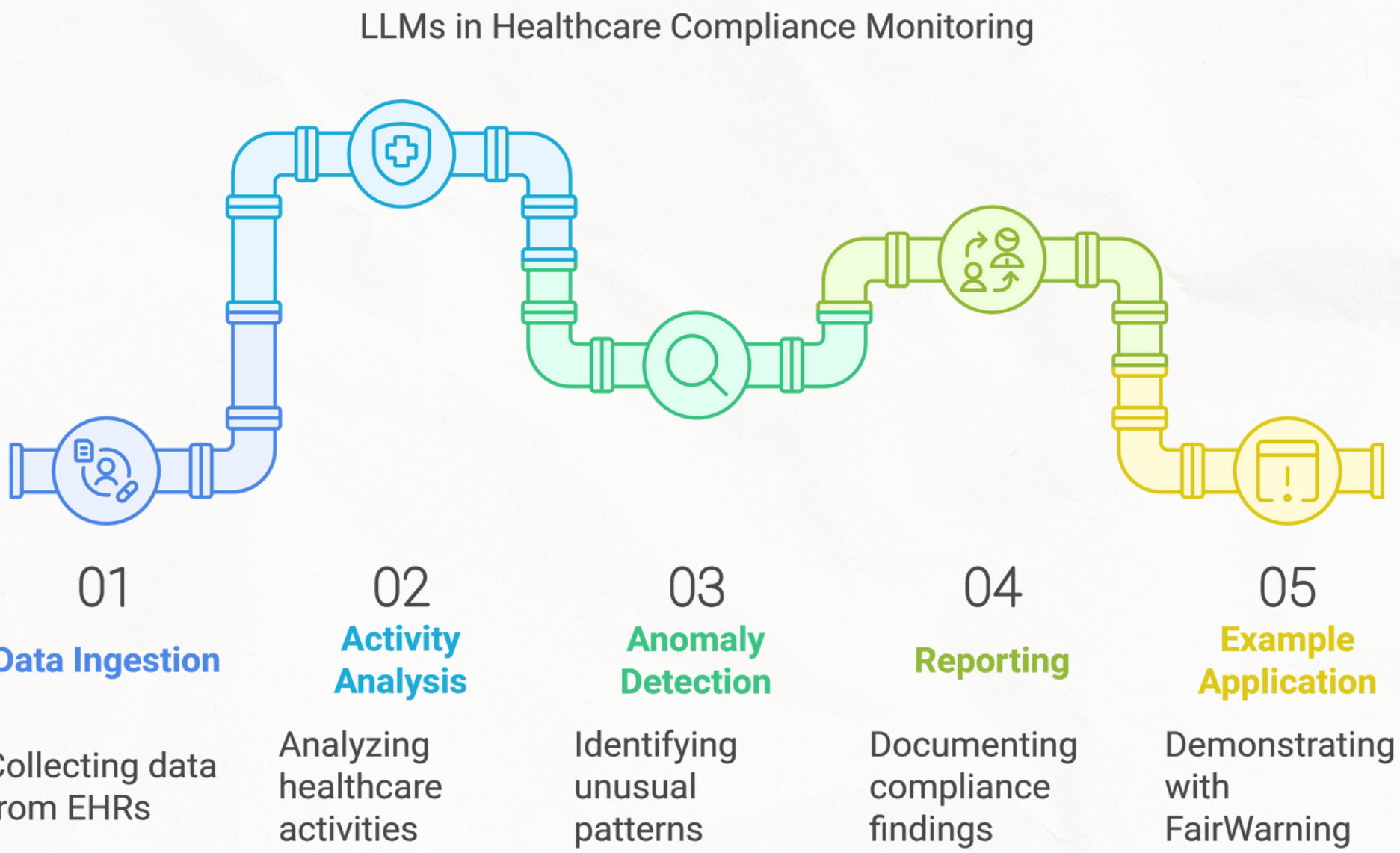
source: ofs

2. COMPLIANCE MONITORING

LLMs play a crucial role in ensuring adherence to healthcare regulations like HIPAA and GDPR, safeguarding sensitive patient information.

A notable example is **FairWarning**, a leading provider of patient privacy intelligence. The company uses LLMs to monitor healthcare systems for potential privacy violations by scanning and analyzing user activity within Electronic Health Records (EHRs).

This proactive approach helps detect unauthorized access or suspicious behavior, enabling healthcare organizations to maintain regulatory compliance and protect patient privacy effectively.

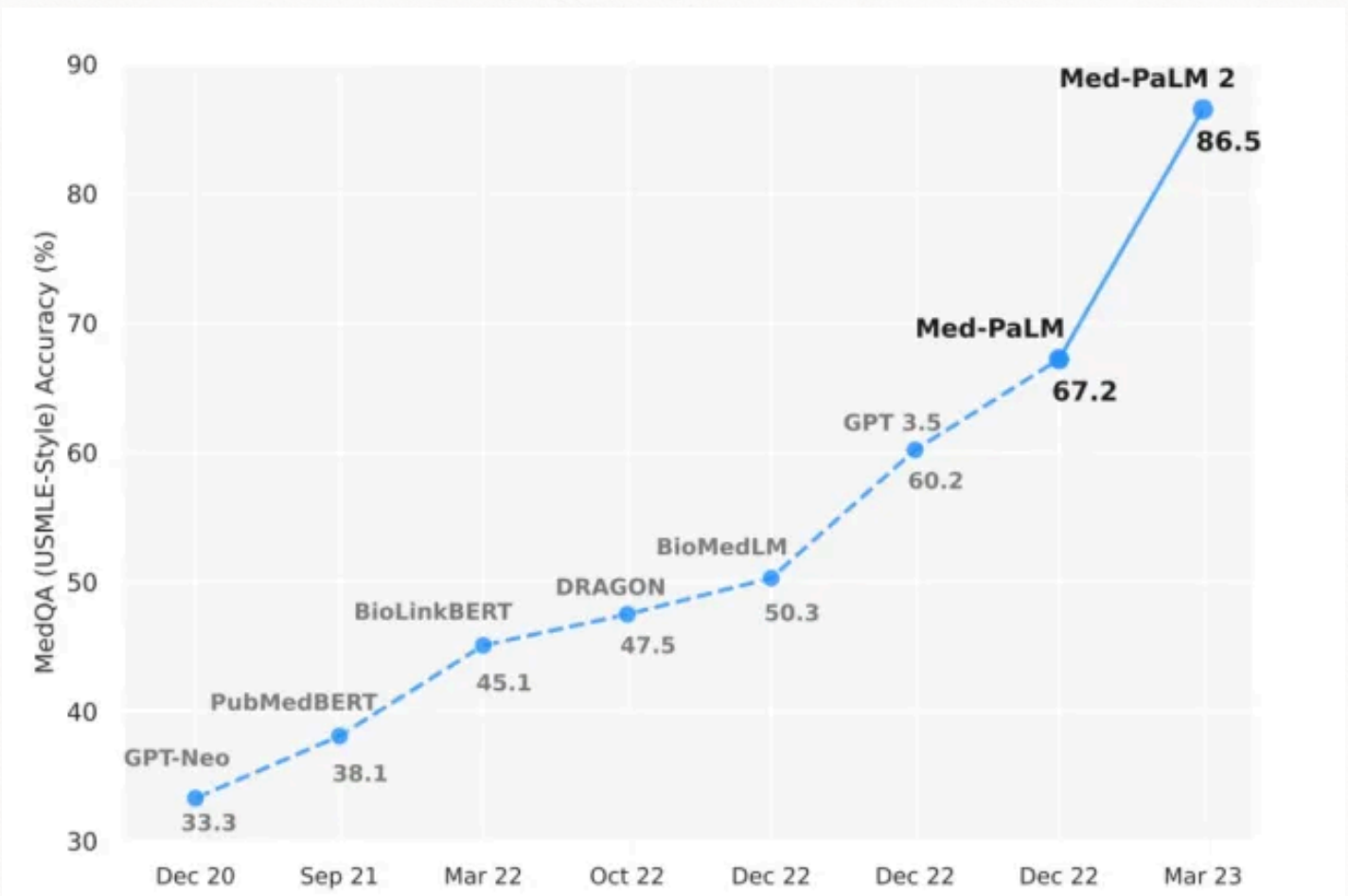


3. MEDICAL TRANSCRIPTION

LLMs can assist in creating medical transcriptions by:

- Analyzing natural conversations between patients and clinicians
- Identifying and extracting key medical information
- Structuring the extracted data into compliant medical records compatible with EHR systems

Real-world example: Google's MedLM can accurately capture and convert patient-clinician discussions into medical transcriptions.



Med-PaLM 2 is a specialized version of Google's PaLM models. It is trained on datasets of medical knowledge and has been fine-tuned to answer medical questions, perform clinical reasoning, and provide diagnosis support.

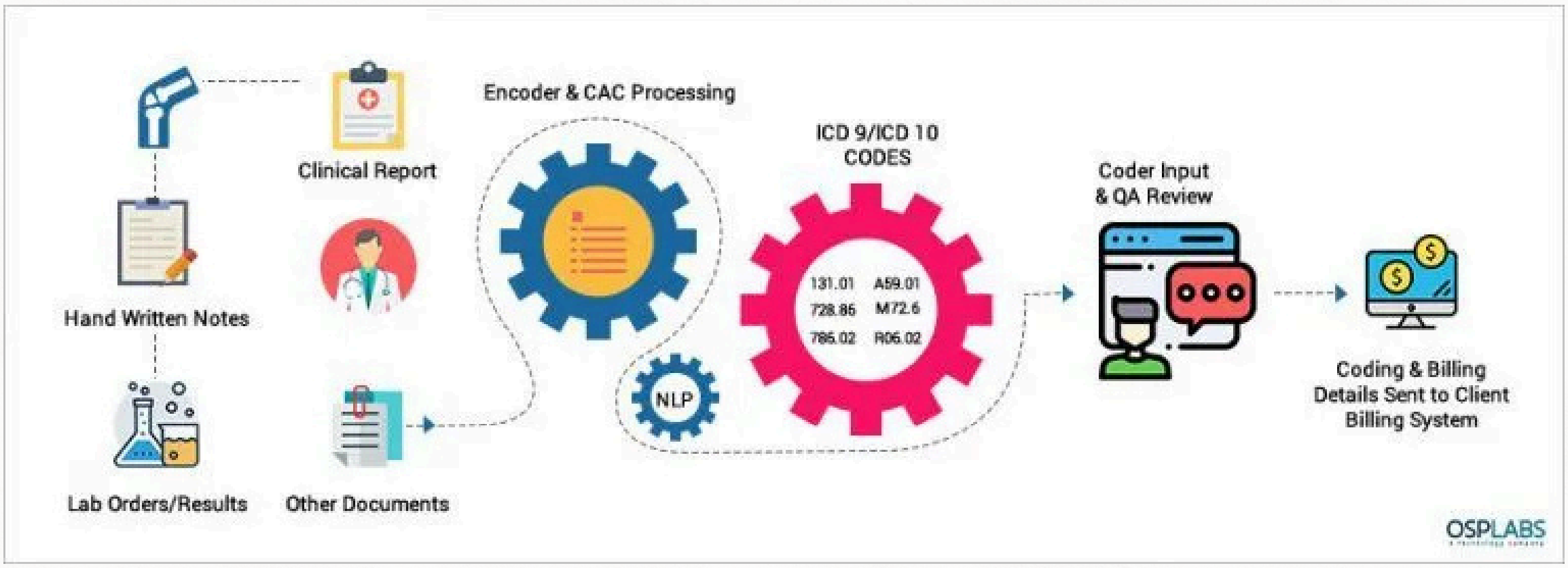
4. Medical Billing

LLMs enhance healthcare audits by efficiently analyzing patient records and EHR data.

- **Epic Systems:** Integrates LLMs for medical coding, billing, and detecting data access irregularities.

- **Accuracy Rates:** Models like GPT-3.5, GPT-4, Gemini Pro, and Llama2-70b Chat achieve up to 50% accuracy in assigning medical codes (CPT, ICD-9-CM, ICD-10-CM).

While improvement is ongoing, these tools show great potential for enhancing healthcare operations.



Medical Billing using NLP

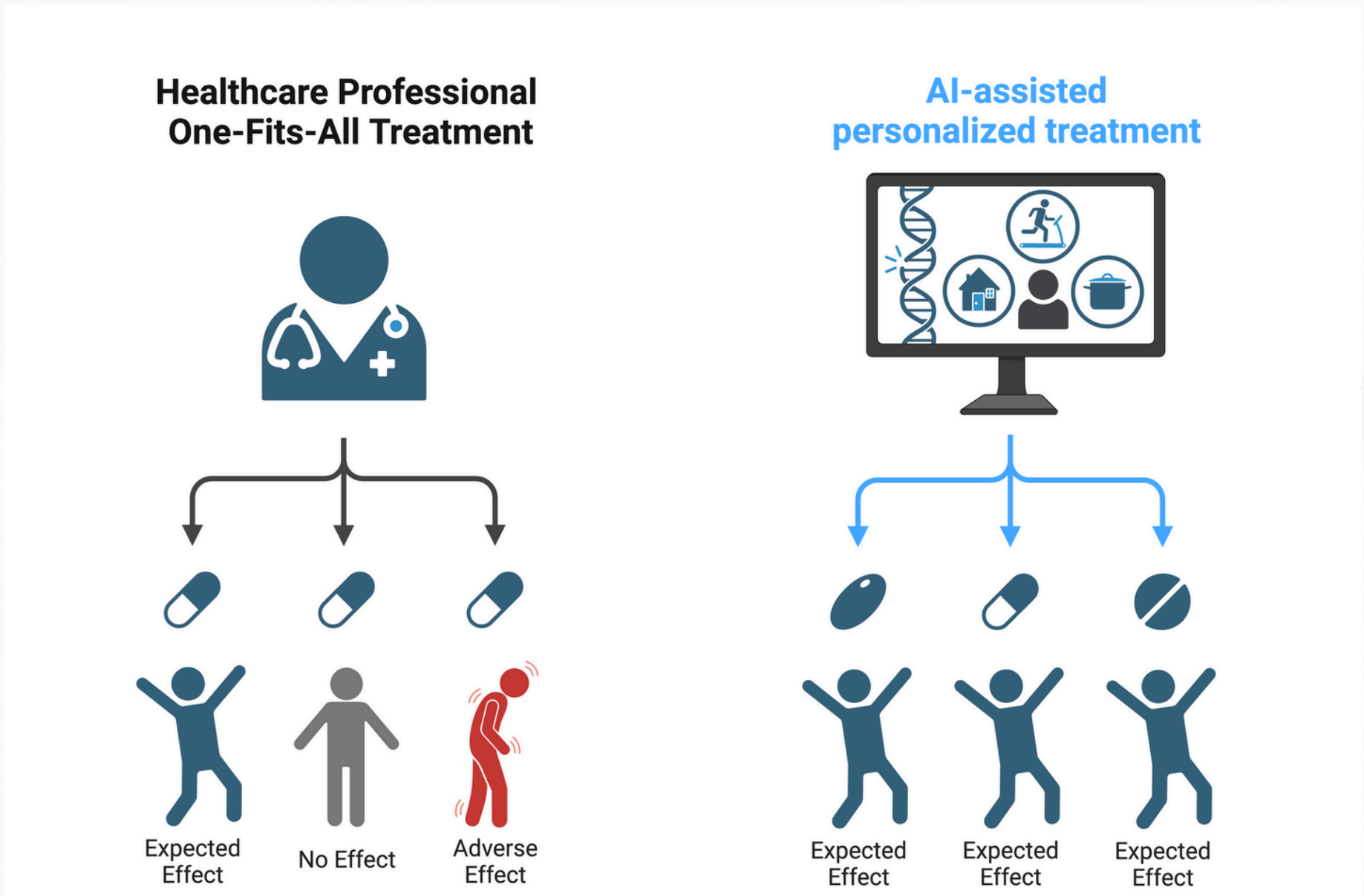
source: osplabs

5. Treatment Plans

LLMs are being used to create treatment plans that are tailored to an individual's medical history and specific needs.

For instance, **Babylon Health's** chatbot engages users in conversation, asking relevant questions to better understand their symptoms and medical history, then offering tailored advice.

This approach helps ensure that each patient receives a care plan that's customized to their unique health journey.



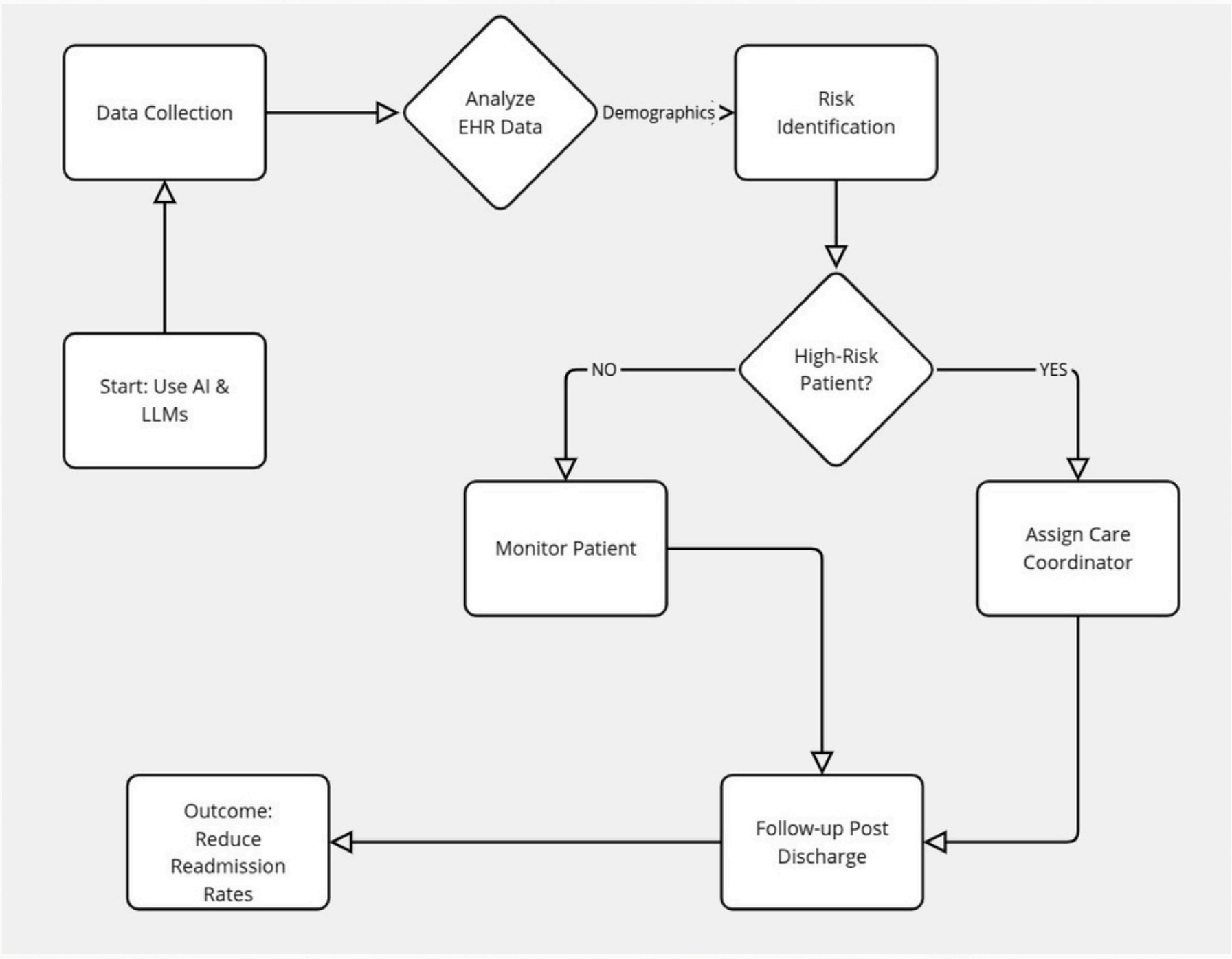
source: https://www.biorender.com

6. Predictive Analysis

Medication errors harm 1.5 million people annually, costing $3.5 billion in treatments.

WVU Pharmacists use AI and LLMs to predict patient readmission risks by analyzing EHR data, including demographics, clinical history, and social factors.

This helps identify high-risk patients, enabling care coordinators to follow up after discharge and reduce readmission rates.



EHR Data Analysis

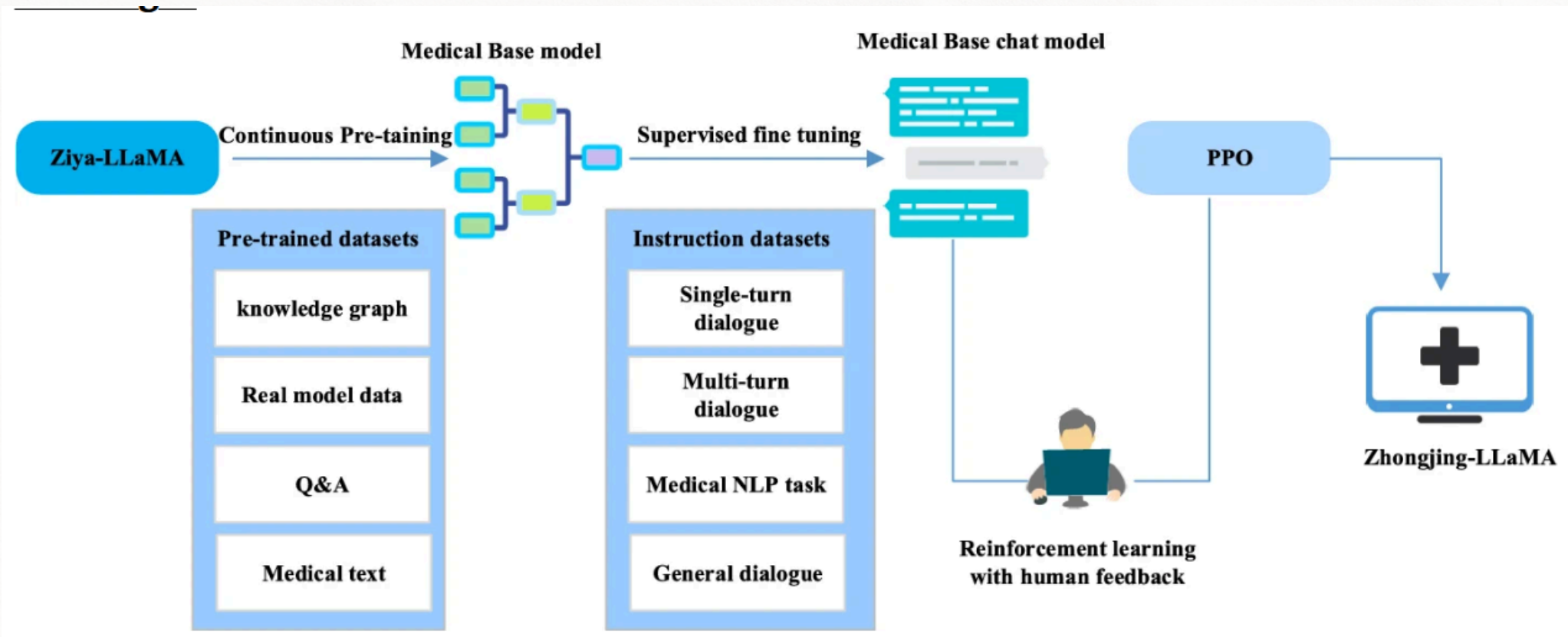
7. Medical Question-Answering

LLMs like GPT-4, ChatGPT, and MedPaLM2 enhance accuracy in answering complex medical queries.

- **PMC-LLaMA:** Fine-tuned on millions of biomedical papers, it delivers precise biomedical insights.

- **ChatDoctor:** Combines LLaMA with real-time Wikipedia access for accurate treatment recommendations.

- **Zhongjing:** Uses refined annotation rules and feedback reinforcement learning to improve diagnoses and treatments.



Architecture of Zhongjing LLM

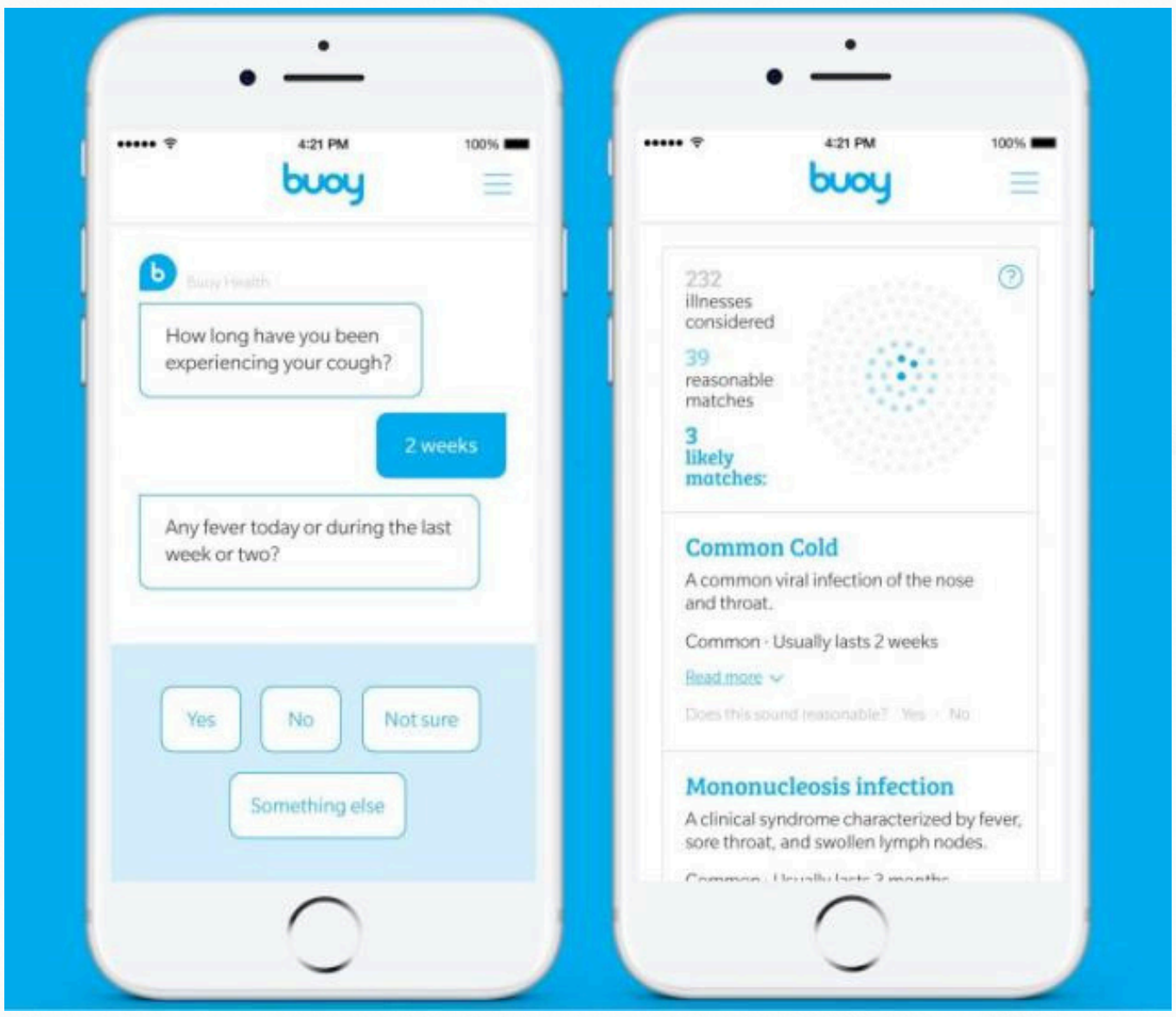
source: https://link.springer.com/article/10.1007/s10462-024-10921-0

8. Automated Patient Communication

LLMs enhance patient communication with informative and compassionate responses, improving healthcare interactions.

- **Medication Management:** Chatbots remind patients to take medications and confirm adherence.
- **Health Monitoring:** Post-operative patients report recovery progress via chatbots.
- **Educational Support:** Chatbots offer personalized advice for managing conditions like high blood pressure.

Example: Boston Children's Hospital uses **Buoy Health**, an AI chatbot, to triage symptoms, provide instant answers, and guide patients on seeking medical ca



Buoy App

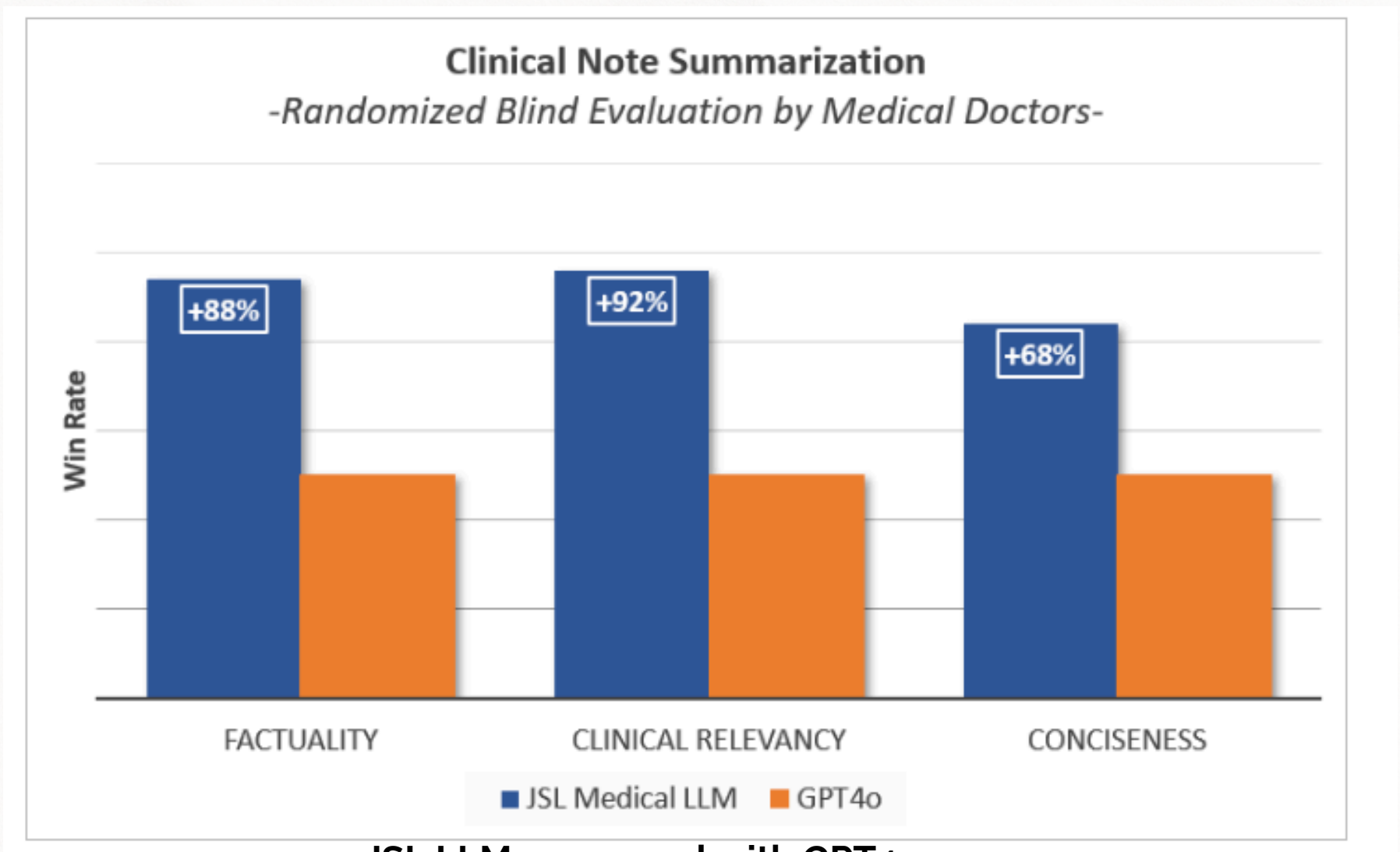
9. Research & Development

LLMs excel at summarizing large datasets, extracting key insights, and presenting synthesized findings efficiently.

- **ChatGPT:** Commonly used for text summarization, condensing complex data into clear insights.

- **John Snow's Healthcare Chatbot:** Helps researchers find papers, extract insights, and identify biomedical trends.

- **TidalHealth Peninsula Regional:** Uses Micromedex with Watson to provide clinicians with quick answers to research queries, achieving a 70% success rate in under a minute.



JSL LLM compared with GPT4o

10. Disease Diagnosis

LLMs enhance safety monitoring and disease diagnosis by analyzing diverse data sources and supporting medical professionals.

- **Adverse Event Detection:** The AEDE framework, using the T5 model, detects adverse events from social media text.

- **Diagnostic Support:** GPT-3 and GPT-4 outperform non-experts in diagnosing diseases and assist intensive care physicians and radiologists.

- **Real-World Use Cases:**
  - GPT-3: Improved accuracy in diagnosing common diseases.
  - ProKnow-algo: Diagnoses mental health conditions like depression and anxiety with high safety and explainability.

Natural Language Question Generation by ProKnow-algo

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