The Next Frontier: AI, Personalization & Global Equity with Digital Solutions

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Disclosures

Medtronic	*Consultant/Speaker*
Olympus	*Consultant/ Speaker*
Boston Scientific	*Advisory Board*
GI Windows	*Advisory Board*
Advantage Bariatrics	*Consultant*
INTITUIVE	*Consultant*
SEGER	*Advisory Board*

x

Why now?

Trend	Metric
Bariatric volume growth or will grow??	+60 % since 2015
Digital-health market size	US $250 B by 2028
GPU cost reduction	↓ 60 % since 2019

Topol EJ. Nat Med 2019;25(1):44–56.
Shafiq M et al. Surg Obes Relat Dis 2023;19(2):289–299

POSSIBLE APPLICATIONS IN BMS

RISK STRATIFICATION

REAL TIME DECISION-MAKING

CLINICAL RECOMMENDATIONS

OVERCOMING LEGAL AND ETHICAL HURDLES

SURGICAL PLANNING

POSTOP- FOLLOW UP

PREDICTIVE MODELS

ENHANCING ALGORITHM ACCURACY

OPTIMIZING OR PLANNING

AI Across the Bariatric Journey

Phase	Digital Tool	Clinical Pay-off
Pre-op	ML risk calculator	↓ OR cancellations
Intra-op	Computer-vision overlay	↓ 72 % vessel injuries
Post-op	Wearable leak alerts	↓ 40 % ER visits

Assisting Decision-Making

1 Predicting Long-Term Risks

Machine learning can estimate the risk of complications like heart disease and kidney disease in obese patients with diabetes.

2 Informing Surgical Choices

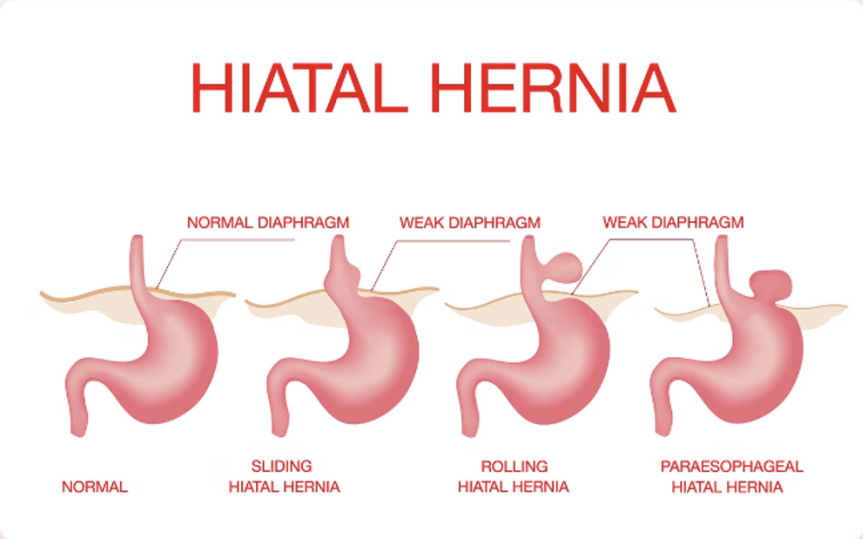
This can help patients and surgeons make more informed decisions about pursuing bariatric surgery.

3 Improving Outcomes

Personalized risk prediction could lead to better patient selection and improved long-term outcomes.

Bektaş M, Reiber BMM, Pereira JC, Burchell GL, van der Peet DL. Artificial Intelligence in Bariatric Surgery: Current Status and Future Perspectives. *Obes Surg*. 2022;32(8):2772-2783. doi:10.1007/s11695-022-06146-1

Diagnosing Comorbidities



Predicting Hiatal Hernias

Machine learning models can identify patients at risk of having a hiatal hernia prior to bariatric surgery.

Improving Surgical Planning

Better preoperative planning for the procedure.

Accuracy up to 88%

While promising, further refinement of these models is needed to enhance their clinical utility.

Bektaş M, Reiber BMM, Pereira JC, Burchell GL, van der Peet DL. Artificial Intelligence in Bariatric Surgery: Current Status and Future Perspectives. *Obes Surg*. 2022;32(8):2772-2783. doi:10.1007/s11695-022-06146-1

Predictive Analytics Before the OR

📊 **Machine Learning Performance**

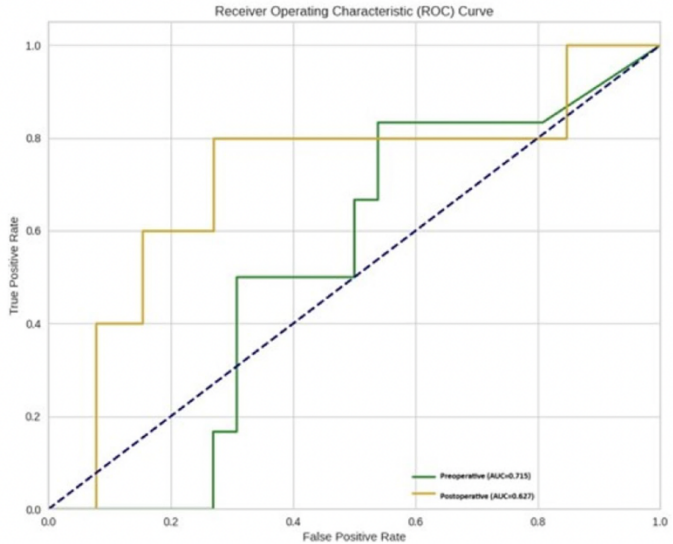
AUC: 0.715
→ Flags patients at risk for **Clavien-Dindo ≥ III complications**

🛠️ **Operational Impact**

🗂️ **Re-orders OR schedule**
→ Allows **proactive ICU bed allocation**

👥 **Shared Decision-Making**

💬 **Improved informed consent quality by 26%**
→ Better alignment between **patient expectations** and surgical risk



Obesity Surgery (2025) 35:2202–2209
https://doi.org/10.1007/s11695-025-07894-6

IFSO

RESEARCH

Check for updates

Integrating Machine Learning and Dynamic Digital Follow-up for Enhanced Prediction of Postoperative Complications in Bariatric Surgery

Eleonora Farinella[1,2] · Dimitrios Papakonstantinou[1] · Nikolaos Koliakos[1] · Marie-Thérèse Maréchal[1] · Mathilde Poras[1] · Luca Pau[1] · Otmane Amel[2] · Sidi Ahmed Mahmoudi[2] · Giovanni Briganti[2]

Forecasting Weight Loss

Accuracy up to 94%

Machine learning can accurately predict postoperative weight loss, a key outcome for bariatric patients.

Identifying Risk Factors

Factors like gender, race, and diabetes influence weight loss after bariatric surgery.

Validation Challenges

Lack of external validation limits the clinical application of these predictive models.

Bektaş M, Reiber BMM, Pereira JC, Burchell GL, van der Peet DL. Artificial Intelligence in Bariatric Surgery: Current Status and Future Perspectives. *Obes Surg*. 2022;32(8):2772-2783. doi:10.1007/s11695-022-06146-1

Predicting Complications

Accuracy up to 98%

Machine learning models can predict postoperative complications with high accuracy, helping to identify high-risk patients.

External Validation Needed

Further research is required to validate these models and enable their clinical implementation.

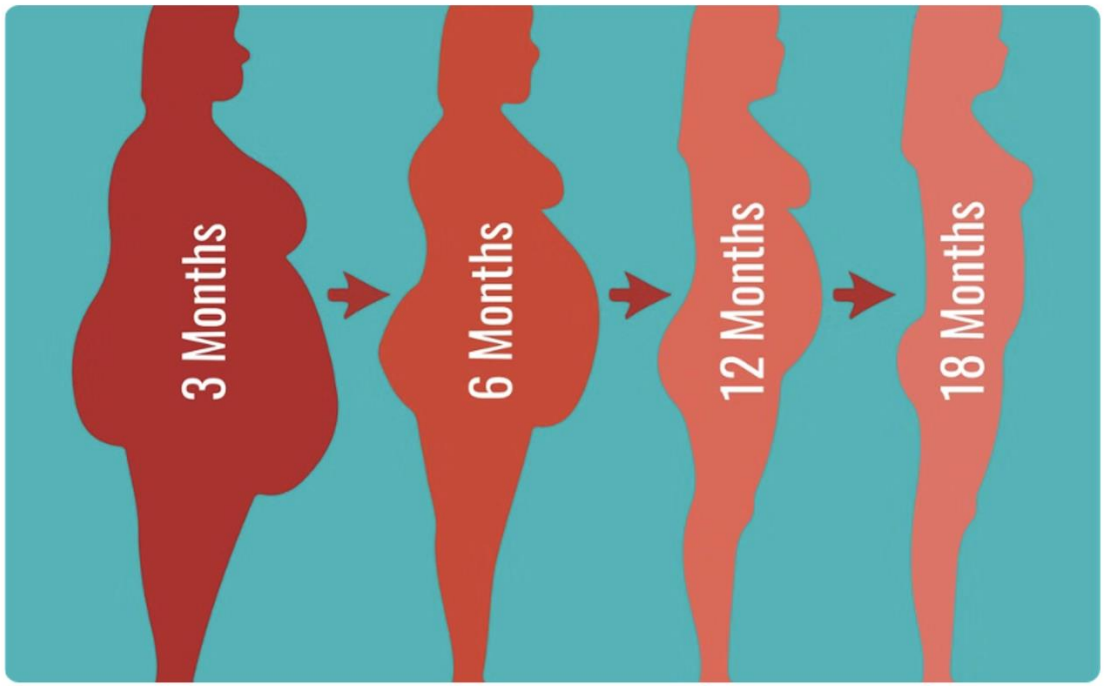
1 2 3

Key Risk Factors

Factors like age, BMI, and diabetes are important predictors of complications after bariatric surgery.

Bektaş M, Reiber BMM, Pereira JC, Burchell GL, van der Peet DL. Artificial Intelligence in Bariatric Surgery: Current Status and Future Perspectives. *Obes Surg*. 2022;32(8):2772-2783. doi:10.1007/s11695-022-06146-1

Forecasting Quality of Life



Predicting Outcomes

Machine learning can estimate improvements in patients' quality of life after bariatric surgery.

Personalized Expectations

This can help set realistic expectations and guide postoperative care and rehabilitation.

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🤖 Smart OR: Computer Vision & Robotics

🎯 **Real-Time Precision**

📍 **Landmark tagging system**
→ **95% accuracy** in **GEJ (gastroesophageal junction) detection**

📹 **Intraoperative Support**

🧠 **"Black-box" video streams**
→ Enable **real-time coaching** & **quality assurance**

🗣️ **Hands-Free Guidance**

📢 **Voice-activated stapler assistance**
→ Helps **reduce manual errors** during critical steps

📲 Impact of Remote Monitoring in Bariatric Care

📊 **Metric**	📈 **Result**
🚑 ER Visits	↓ 40% with Bluetooth + heart rate patch monitoring
🏥 Readmissions	↓ 18% reduction
📱 App Engagement	Strong linear correlation with % excess weight loss

Conterno LO et al. JAMA Netw Open 2022;5(5):e2212345.

Overcoming Limitations

Data Availability

Lack of large, diverse datasets limits the development and validation of machine learning models.

External Validation

Most studies lack external validation, hindering the generalizability of the predictive models.

Clinical Implementation

Integrating machine learning into clinical practice requires further research and regulatory approval.

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The Path Forward

1

Data Collection

Expanding data sources, including from laparoscopic and robotic surgery, will enhance model development.

2

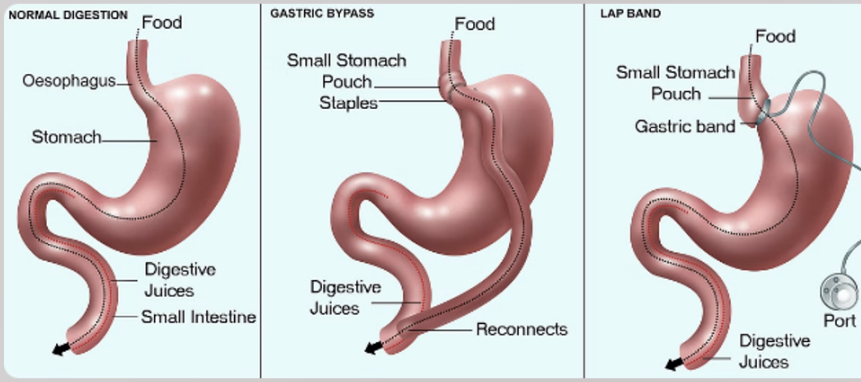
External Validation

Rigorous validation in diverse patient populations is crucial for clinical implementation.

3

Clinical Trials

Conducting clinical trials will demonstrate the real-world impact of machine learning in bariatric surgery.



Transforming Bariatric Care

Predicting Complications	Forecasting Weight Loss	Assisting Decision-Making
Accuracy up to 98%	Accuracy up to 94%	AUC up to 0.81
Identify high-risk patients	Personalize expectations	Estimate long-term risks

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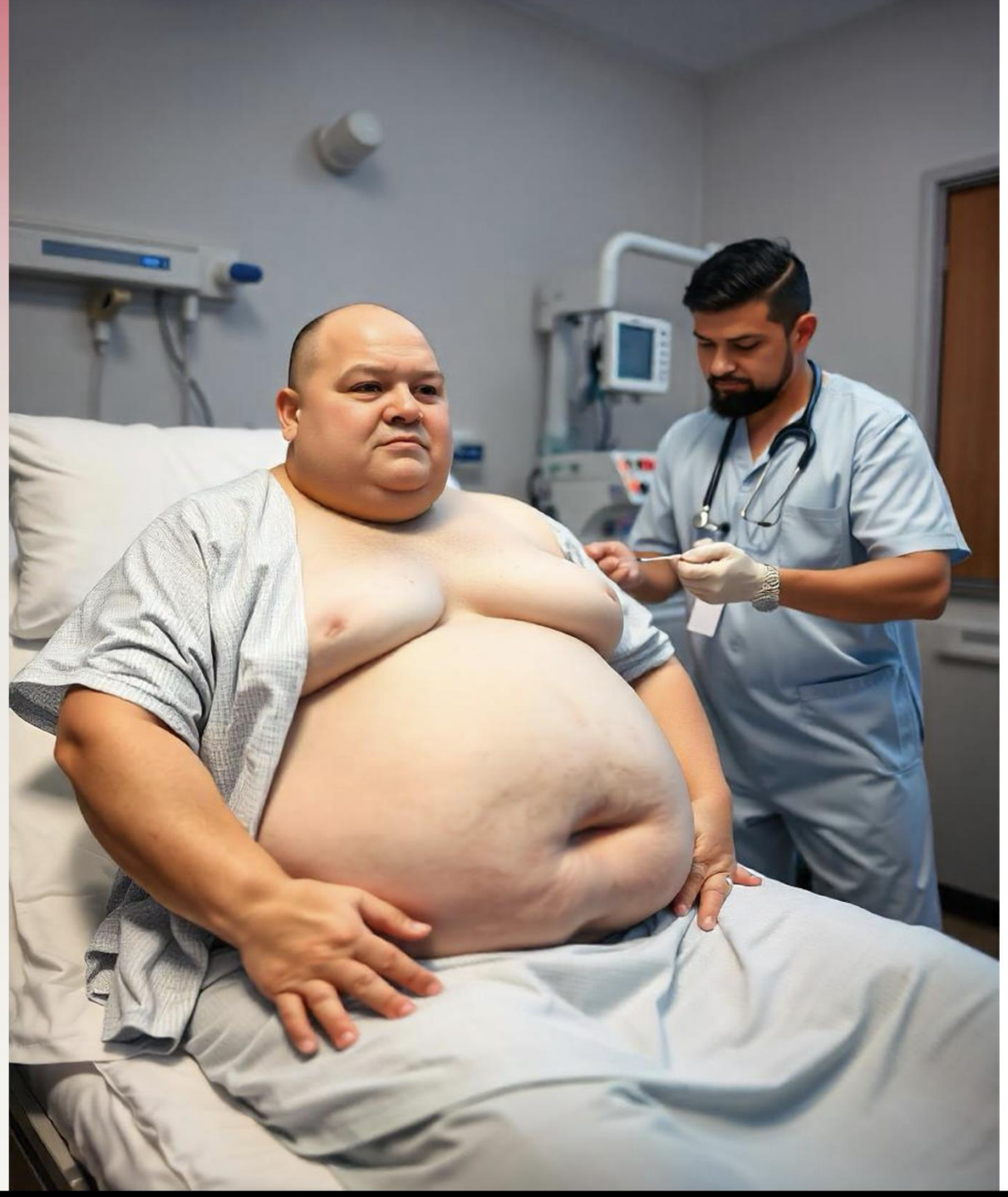
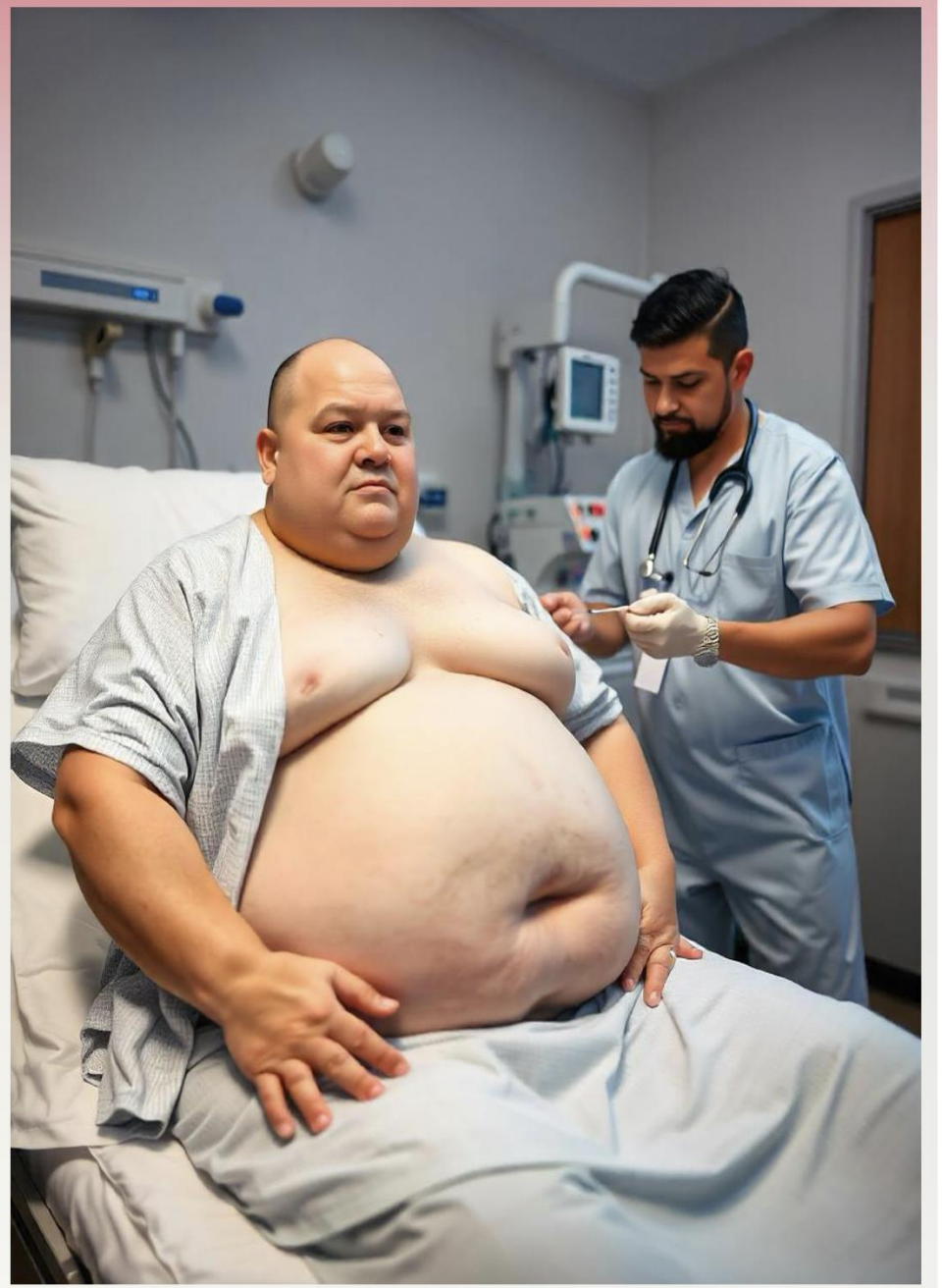


Overcoming Limitations / Challenges



Overcoming Limitations / Challenges

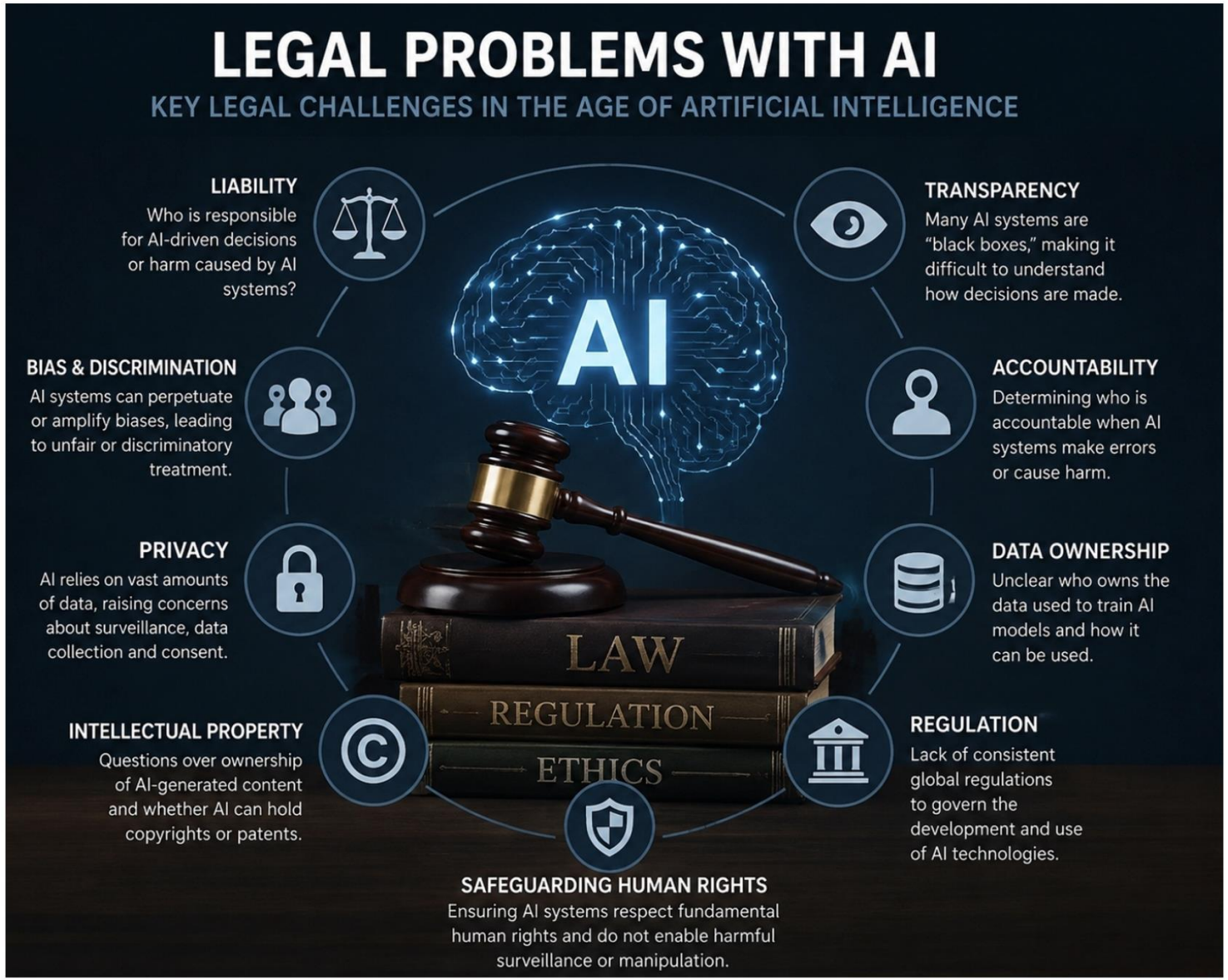
ETHICS

VALUES

LEGAL

- THEN I ASKED AI:

- WHAT ARE THE LEGAL PROBLEMS WITH YOU….SO I WONT BE BIAS


LEGAL PROBLEMS WITH AI
KEY LEGAL CHALLENGES IN THE AGE OF ARTIFICIAL INTELLIGENCE
LIABILITY
Who is responsible for AI-driven decisions or harm caused by AI systems?
TRANSPARENCY
Many AI systems are "black boxes," making it difficult to understand how decisions are made.
AI
BIAS & DISCRIMINATION
AI systems can perpetuate or amplify biases, leading to unfair or discriminatory treatment.
ACCOUNTABILITY
Determining who is accountable when AI systems make errors or cause harm.
PRIVACY
AI relies on vast amounts of data, raising concerns about surveillance, data collection and consent.
DATA OWNERSHIP
Unclear who owns the data used to train AI models and how it can be used.
LAW
REGULATION
ETHICS
INTELLECTUAL PROPERTY
Questions over ownership of AI-generated content and whether AI can hold copyrights or patents.
REGULATION
Lack of consistent global regulations to govern the development and use of AI technologies.
SAFEGUARDING HUMAN RIGHTS
Ensuring AI systems respect fundamental human rights and do not enable harmful surveillance or manipulation.

Governance & Ethics in Surgical AI

Patient-Centered Data Control

Dynamic consent dashboards

→ Enable real-time patient control over data use and sharing

Bias Monitoring

Annual model audits

→ Evaluate bias across sex, race, and socioeconomic status (SES)

🎓 What Is Global Equity in Education?

🌍 **Definition:**
Global equity in education ensures that **all individuals—regardless of background or circumstance—have fair and equal access to quality learning opportunities**.

🔑 **Focus Areas:**

- **Access:** Education available to all, including marginalized and remote communities.
- **Quality:** Relevant, engaging, and personalized learning.
- **Inclusion:** Supportive environments for all learners.
- **Outcomes:** Achievement not predetermined by SES or ethnicity.
- **Resources:** Adequate funding, infrastructure, and trained teachers.
- **Policy:** Systemic change through inclusive education policies.

🧠 *Equity goes beyond equality—it adapts support to meet individual needs.*

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🌐 Barriers & Solutions to Global Equity

🚧 Key Challenges:

- **Poverty & Inequality:** Socioeconomic barriers to Access
- **Discrimination & Marginalization:** Impact on girls, minorities, and people with disabilities
- **Conflict & Displacement:** Interruptions to education systems
- **Lack of Resources:** Teachers, materials, infrastructure
- **Language & Culture:** Barriers to participation

I ASKED AI

- SHOW ME A VIDEO OF A BALANCED DIET


THIS IS A
BALANCED DIET

⚖️ The Equity Gap

🚧 **Challenge**	🌍 **Reality**
📡 Connectivity	3.6 billion people remain offline worldwide
🧬 Dataset Bias	80% of medical images come from Western populations
🩺 Surgeon Shortage	<1 bariatric surgeon per 250,000 people in Sub-Saharan Africa

Opinion

VIEWPOINT

Digital Health Equity as a Necessity in the 21st Century Cures Act Era

Ross EG et al. JAMA 2020;323(23):2464–2465

🌐 Barriers & Solutions to Global Equity

💡 **Promising Initiatives:**

- **Global Education Equity Alliance (GEEA):** Promotes fair outcomes regardless of geography
- **UNESCO Higher Ed Equity:** Supports inclusive, virtual, and blended mobility programs

📣 *Global equity requires collaboration, innovation, and commitment.*

🛠️ Low-Cost Tech Solutions for Scalable Access

💡 Solution	📍 Example	💰 Cost ($/mo)
📲 SMS fallback	160-character leak triage bot	$0.04
🗣️ WhatsApp voice bot	CHW-led triage scripts	$1
☁️ Cloud AI on 2G	Uploading low-res CT scans	$3

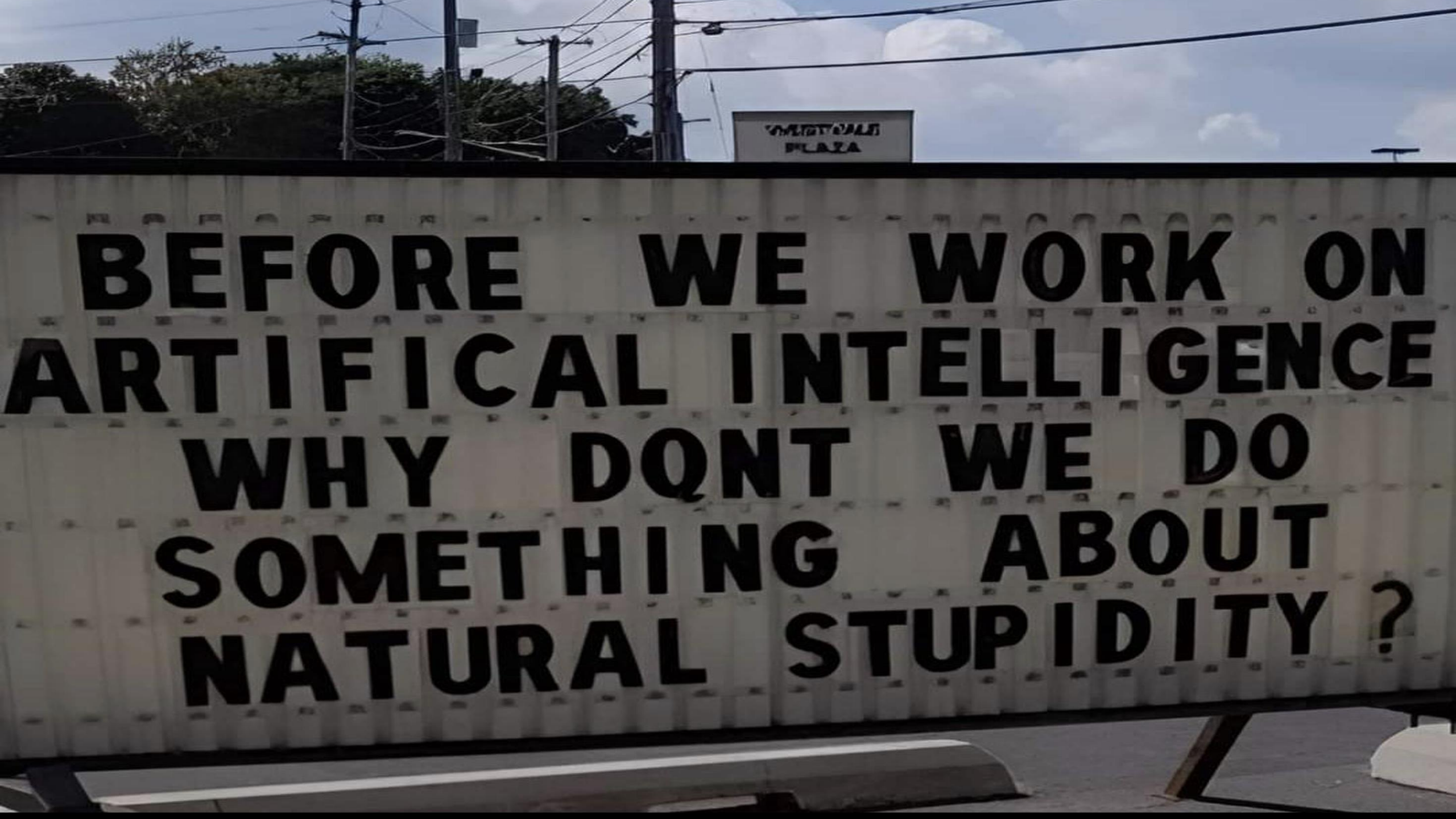
📜 Global Standards

UNESCO 2021 Guidelines:

→ Emphasize transparency and human oversight in AI systems

UNESCO. Recommendation on the ethics of AI. 2021

WHO. Global strategy on digital health 2020–2025. 2021


PLAZA
BEFORE WE WORK ON
ARTIFICAL INTELLIGENCE
WHY DQNT WE DO
SOMETHING ABOUT
NATURAL STUPIDITY ?

✅ Key Takeaways

✓ **Use AI with surgical intent**
→ Diagnose **anatomically**, treat **physiologically**

✓ **Personalize the patient journey**
→ Move beyond **one-size-fits-all** approaches

✓ **Prioritize equity as a core metric**
→ Make it the **KPI**, not an afterthought

💬 *"Let's build a bariatric future coded for everyone."*

The Future is Intelligent

Revolutionizing Bariatric Care

Machine learning has the potential to transform decision-making, improve outcomes, and enhance the patient experience in bariatric surgery.

Overcoming Challenges

Addressing data availability, validation, and clinical integration will be key to realizing the full potential of AI in this field.

Towards Personalized Medicine

As machine learning models mature, they can enable truly personalized, data-driven approaches to bariatric surgery.

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