Innovation in Fertility and the Patient Impact

Eduardo Hariton, MD, MBA

PCRS

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Disclosures

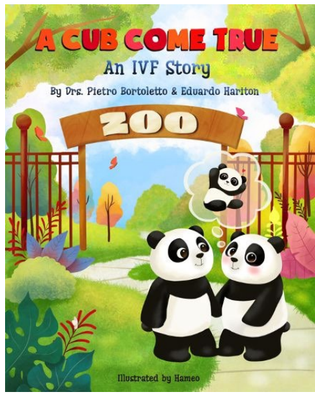
- **Consulting Fee (e.g., Advisory Board):** Alife Health, Cercle Al, Evernow Inc., Fertilidad Integral, Inti Labs, Levy Health, Modern Fertility/ Ro, Oova
- **Stock Option Holder (Individual Stocks, Stock Options; Diversified Mutual Funds do not need to be disclosed):** Alife Health, Cercle AI, Evernow Inc., Fertilidad Integral, Inti Labs, Levy Health, Modern Fertility/ Ro, Oova
- **Other:** Board Member for Granata Bio, PozitIVF

Disclosures

- I will be mentioning tools built by private companies in the ART space
- Mentioning a tool is not in any way an endorsement of that tool or company

About Me

- MD/MBA
- REI at RSC of the SF Bay Area
- VP of Strategic Initiatives at US Fertility
- Managing Director of the USF Innovation Fund
- Founder of Fertility Explained
- Author of “A Cub Come True”



These are my own opinions and not those of my employer

Learning Objectives

- Understand how emerging technologies and redesigned workflows are addressing bottlenecks in fertility care, including access, clinical variability, patient experience, and operational efficiency.
- Evaluate practical examples of innovation already in use, such as clinical decision support tools, workflow automation, and personalized treatment pathways, and their impact on patient outcomes.
- Identify how large fertility networks are integrating technology and scalable care structures, and gain insight into the broader shift from boutique, artisanal fertility practice to a more consistent, technology-enabled model across the industry.

Innovation is core to ART

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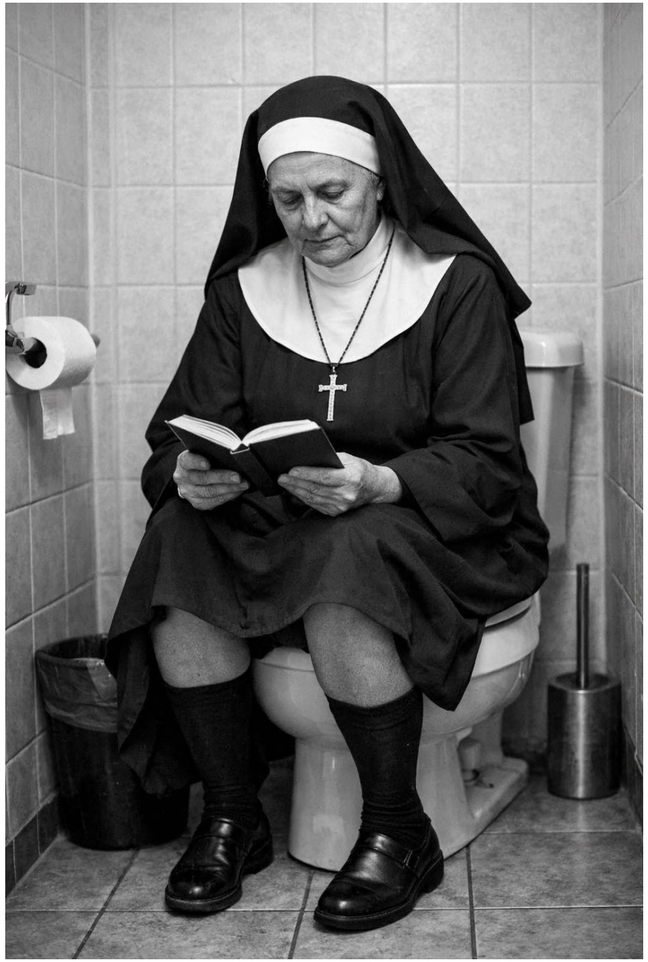
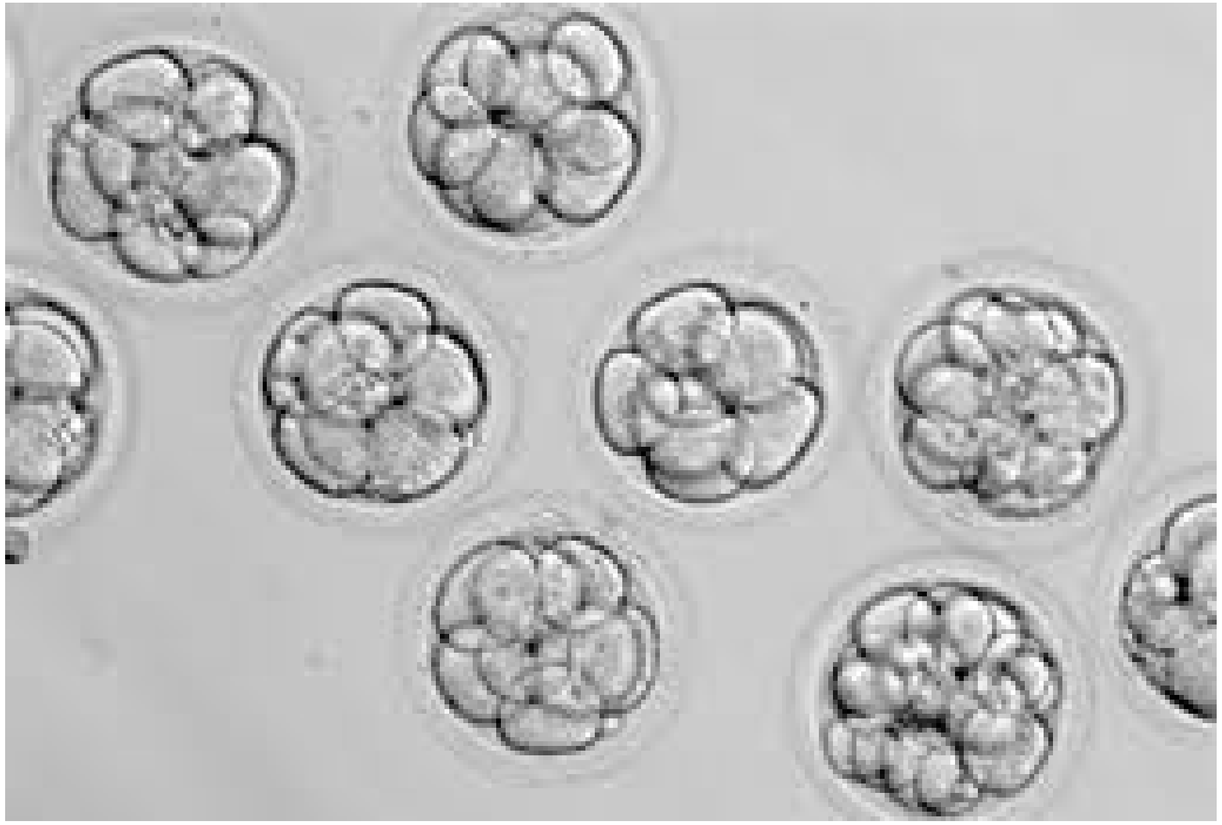


Innovation is core to ART



Innovation is core to ART

How is it going?

SEMINAL CONTRIBUTIONS

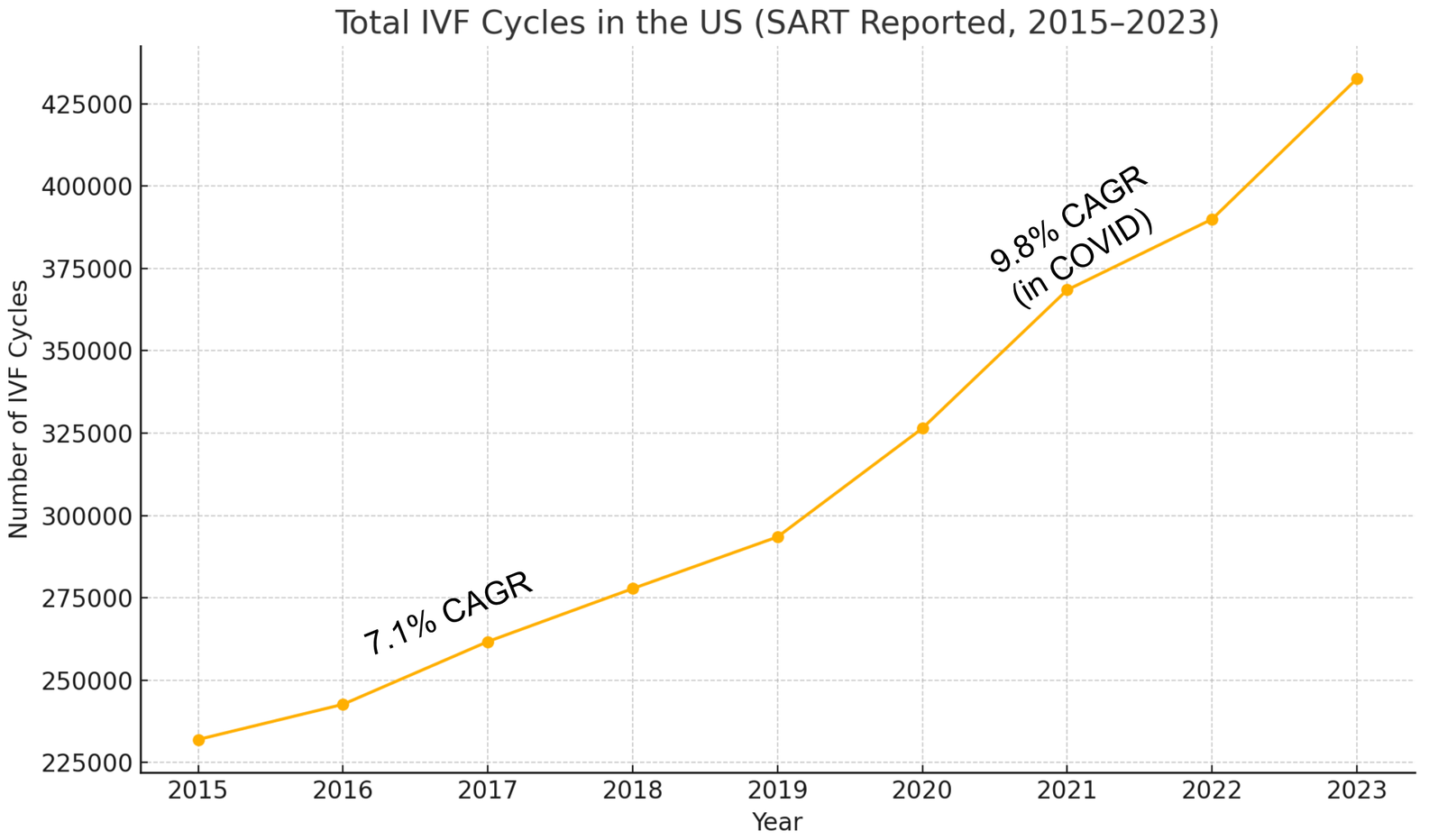
Check for updates

How many infants have been born with the help of assisted reproductive technology?

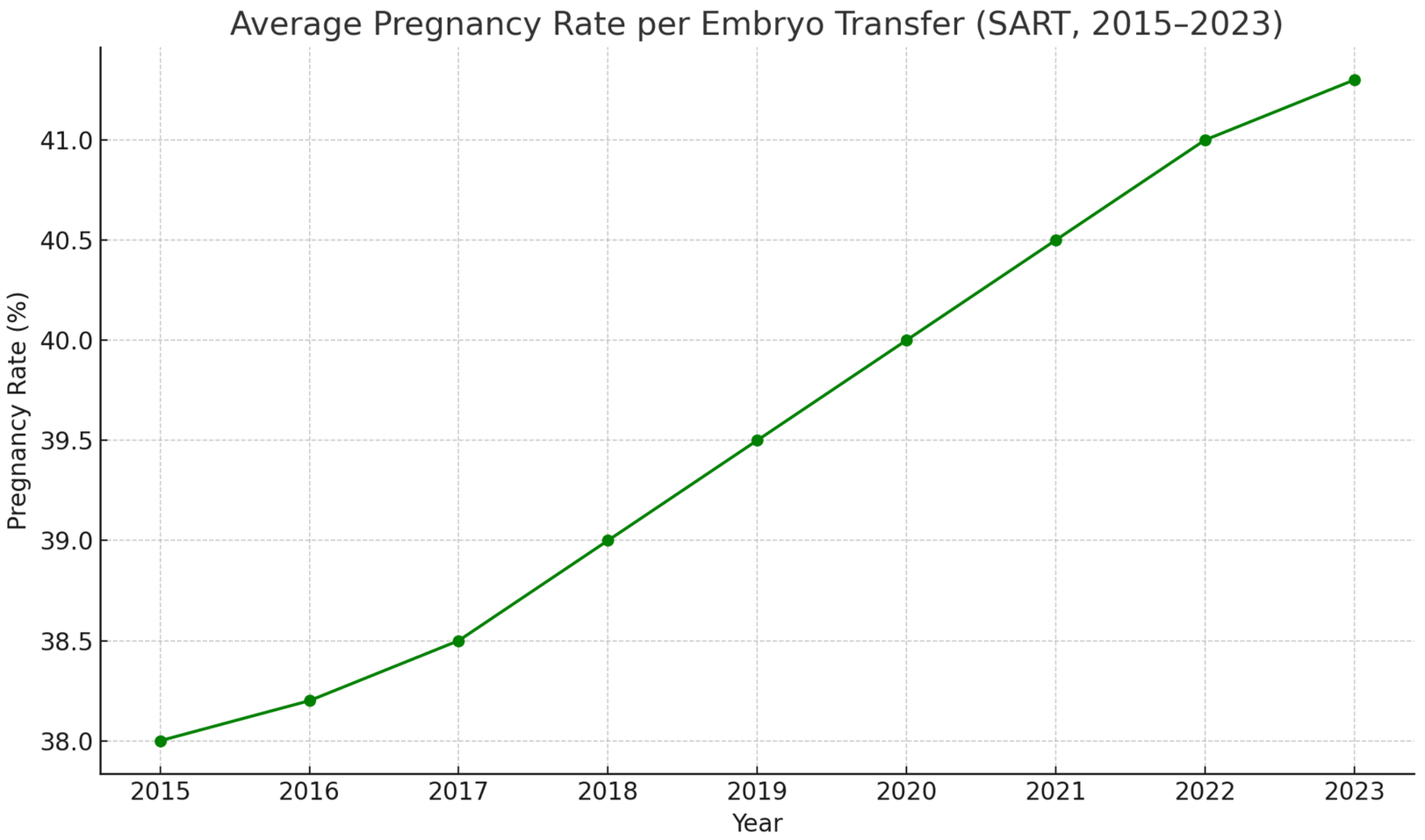
G. David Adamson, M.D.,[a,b] Prudence Creighton, M.Stat.,[c] Jacques de Mouzon, M.D., M.P.H.,[d] Fernando Zegers-Hochschild, M.D.,[e] Silke Dyer, M.D.,[f] and Georgina M. Chambers, Ph.D.[c]

At least 10 million!!!

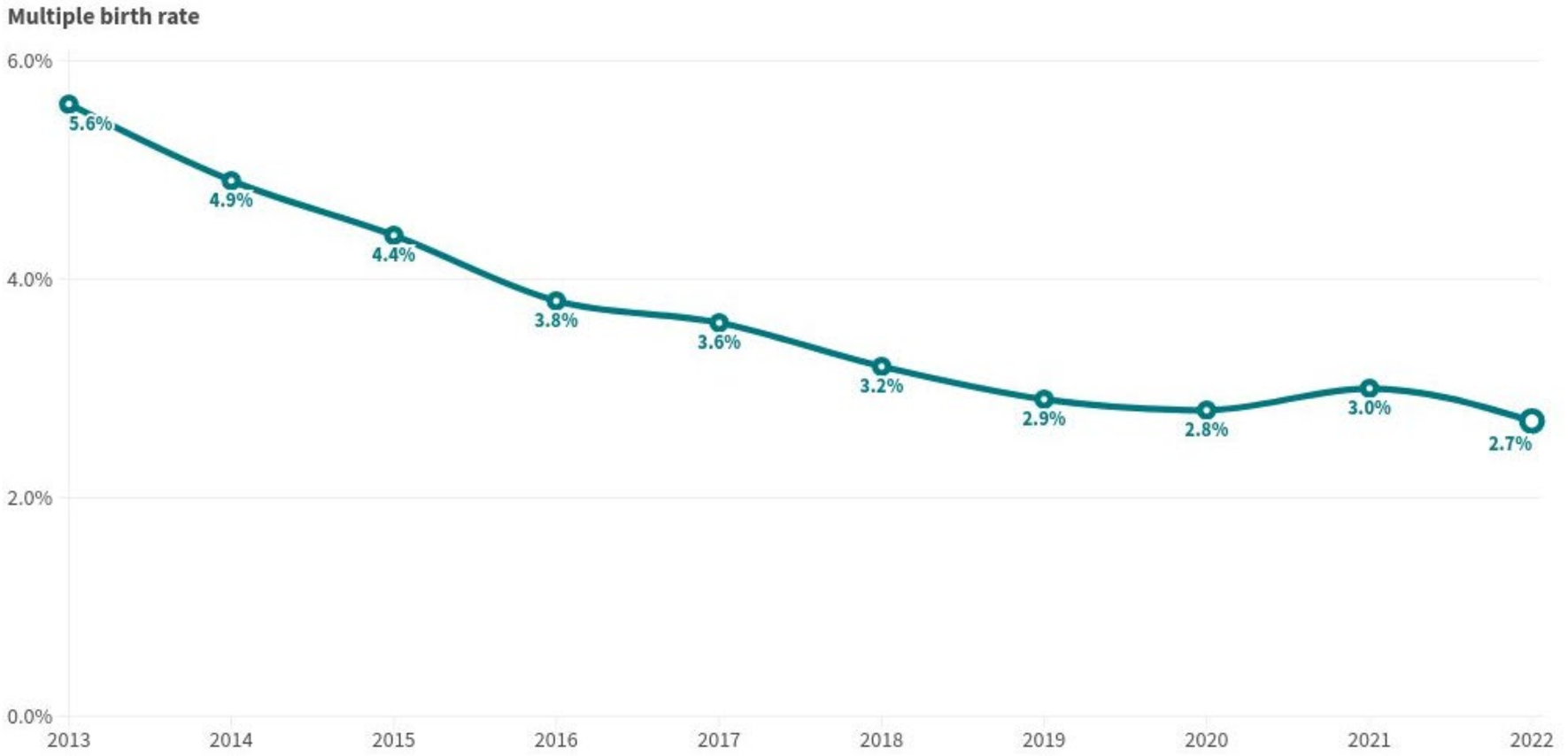
Just in the last decade, we doubled our volume



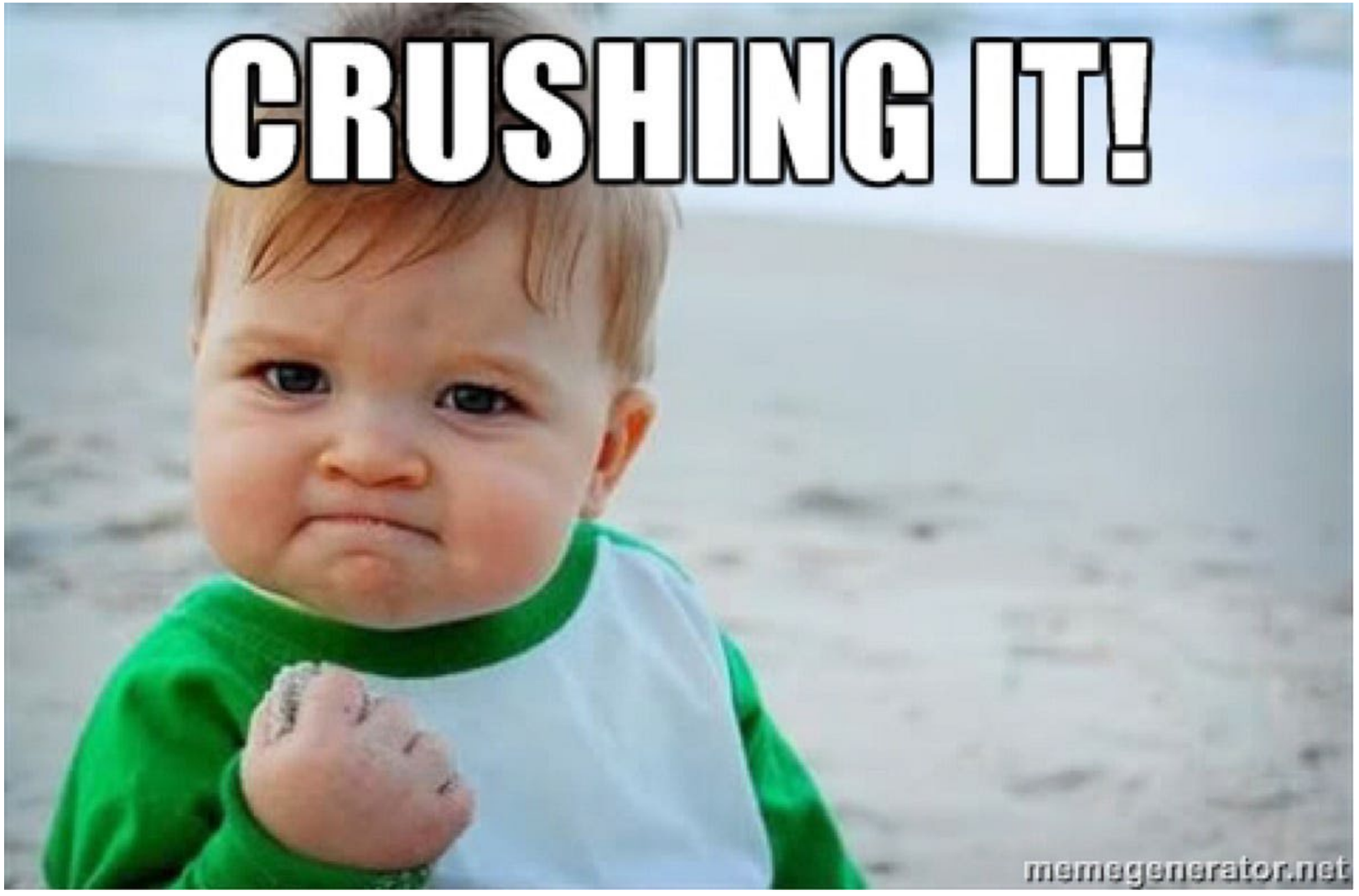
While increasing our pregnancy rates



And lowering multiple birth rates



Source: Assisted reproductive technology in Australia and New Zealand 2022 • © Copyright UNSW Sydney 2024


CRUSHING IT!
memegenerator.net

How did we do it?

- Hired more **RNs** and **clinical staff** to manage patient load
- Hired **sonographers** to help with monitoring ultrasounds
- Hired more **embryologists** to manage increase lab volume
- Hired **APPs** do IUIs, saline sonograms, and OB sonograms
- Hired more **financial counselors** and **billing specialists** to deal with the financial complexity
- Hired expert **management teams**

- Realigned patient expectations about how and when they interact with their provider

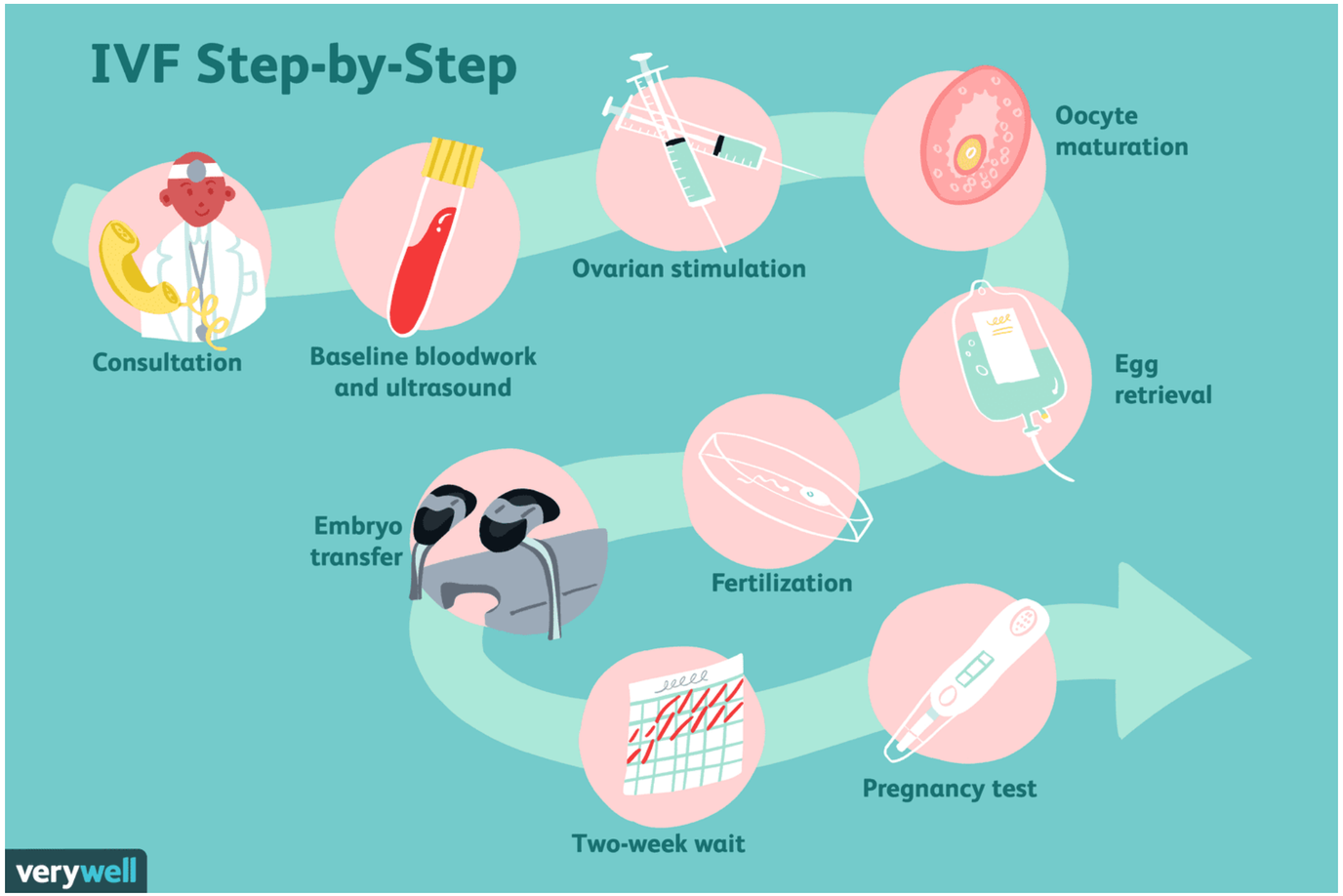
What do we ask of patients?

- Learn a new language (OPK, DPO, TIC, IUI, ICSI, OPU/VOR,s AH, PGT, FET,PIO..)
- Come in person to our center 10-100+ times at somewhat inflexible times
- Pick up our spontaneous phone calls any day, any time
- Reconstitute meds at home and inject themselves hundreds of times without making a mistake
- Spend anywhere from $25-100k+ out of pocket if no insurance
- Among others …

What do they get?

An age and diagnosis adjusted chance of having a baby

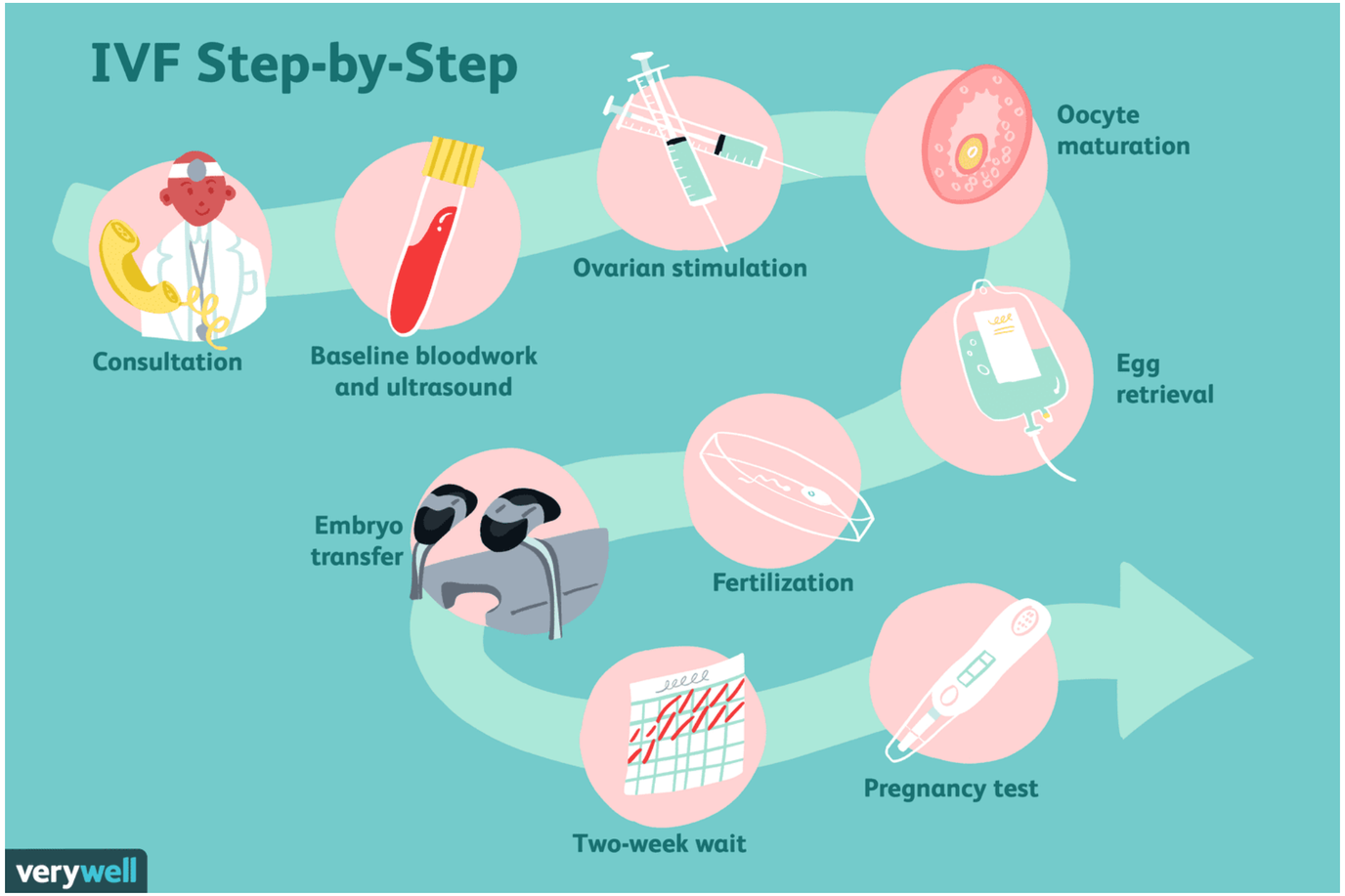
We have changed A LOT, but NOT the patient journey



What do physicians want?

- The best possible outcomes for our patients
- Safe, evidence-based care
- Time to focus on the most complex and meaningful clinical decisions
- A system that allows more patients to access fertility care
- A sustainable model for our clinics and teams

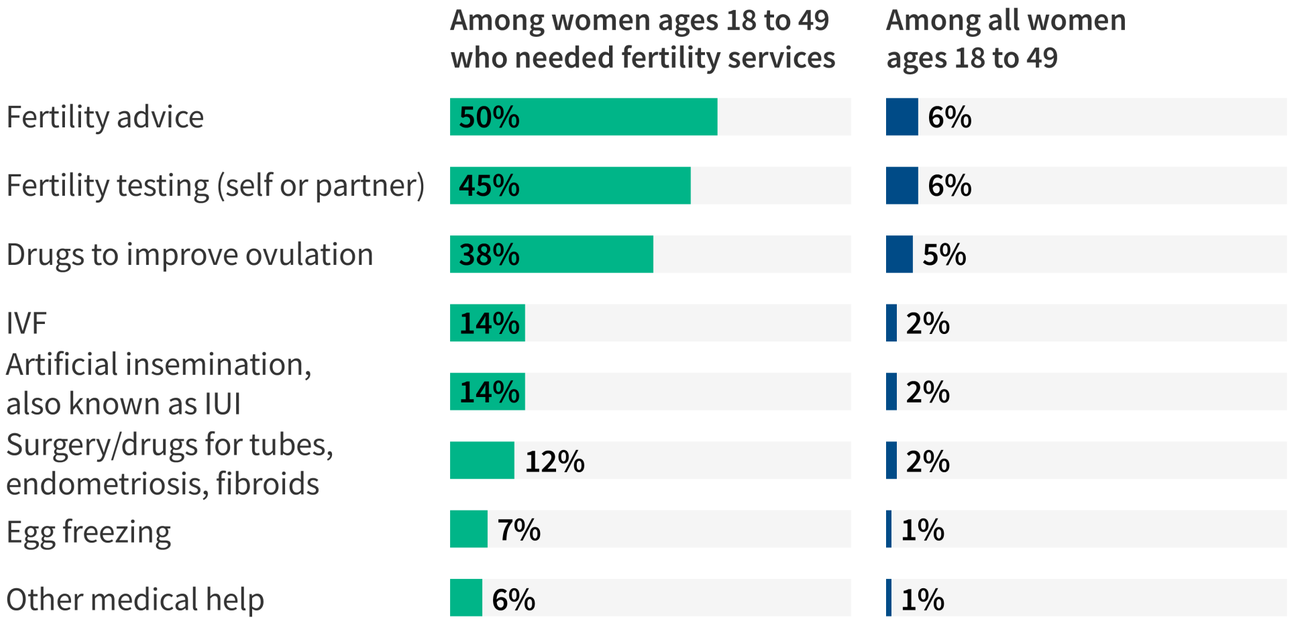
Is this the optimal system?



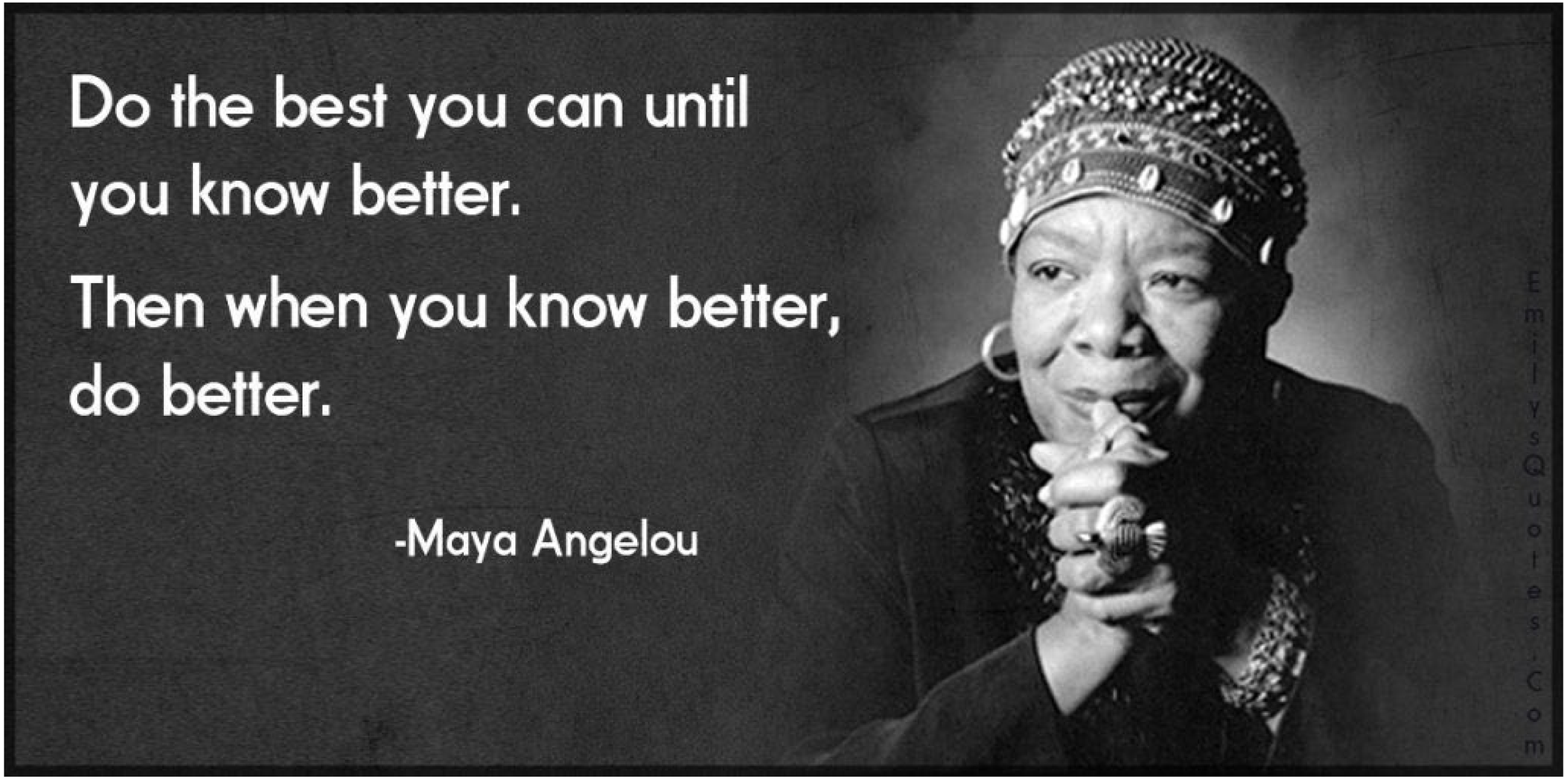
So, are we really crushing it?
It depends on…

- Where do you live?
- Where do you work?
- Do you have insurance?
- How much do you make?
- What is your race?

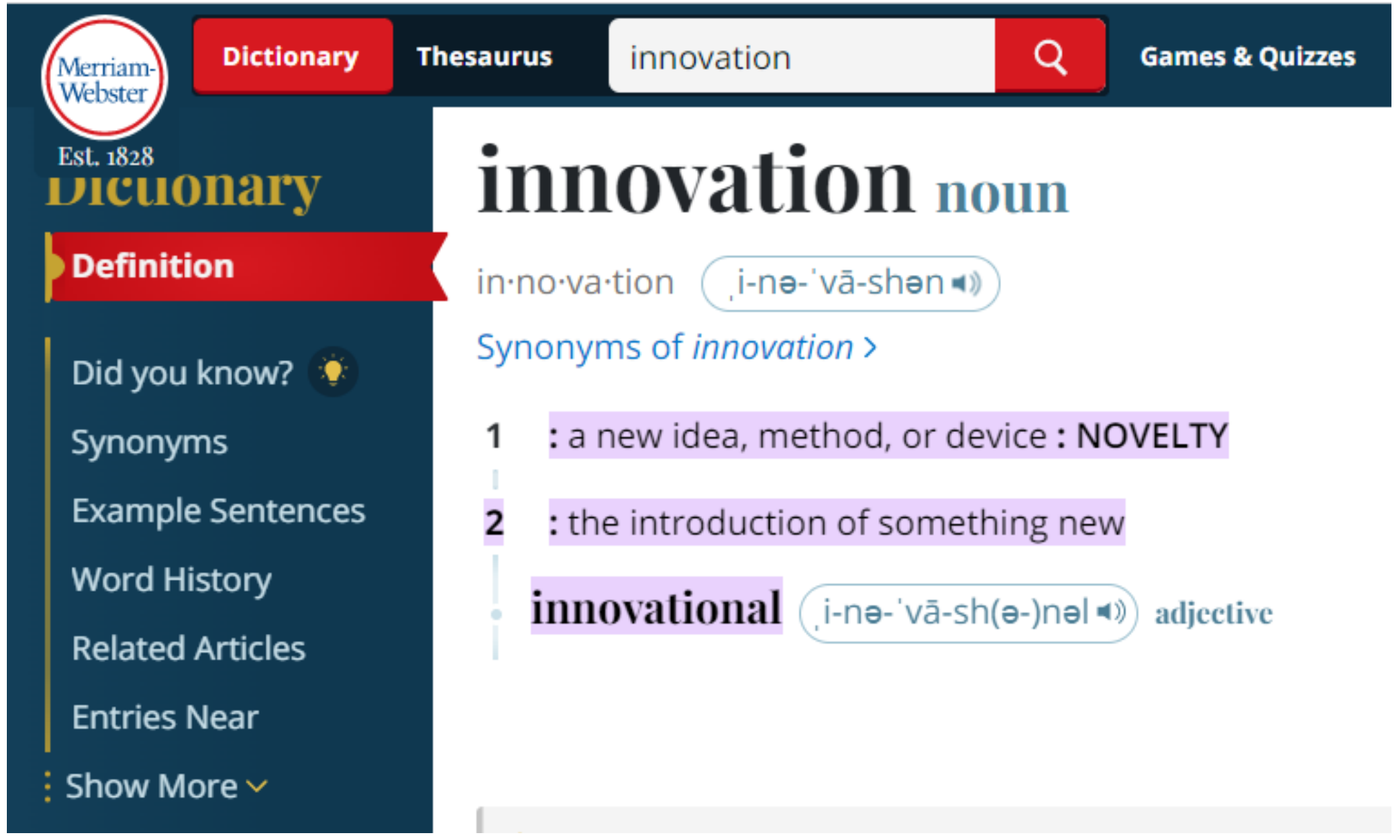
Among One in Eight Reproductive Age Women Who Say They Ever Needed Fertillity Assistance, 14% Report Receiving In Vitro Fertilization (IVF)



Ranji, U., Diep, K., Frederiksen, B., Gomez, I., & Salganicoff, A. (2024). *Access to fertility care: Findings from the 2024 KFF Women's Health Survey*. Kaiser Family Foundation. https://www.kff.org


Do the best you can until
you know better.
Then when you know better,
do better.
-Maya Angelou
EmilysQuotes.Com

What is Innovation?



Innovation according to Chat GPT

Define innovation for my PCRS talk attendees

Innovation in fertility care is the implementation of new tools, technologies, or care models that measurably improve reproductive outcomes, patient experience, access to treatment, or the efficiency with which fertility clinics deliver care.

To really learn how innovation will change the fertility field…

Let’s talk about crooked teeth!

1970s–1980s: Boutique & Exclusive

- High-cost, out-of-pocket service for upper-class families
- Small, independent “mom-and-pop” orthodontic practices
- Manual braces with frequent office visits
- Focused on adolescents; limited access
- Seen as elective, not essential

1990s–2000s: Growing Demand & Early Tech

- Cosmetic appeal expands patient base (teens & adults)
- Dental insurance starts offering partial orthodontic benefits
- Larger group practices emerge
- New tools: digital imaging, self - ligating brackets
- Marketing shifts: straight teeth = confidence

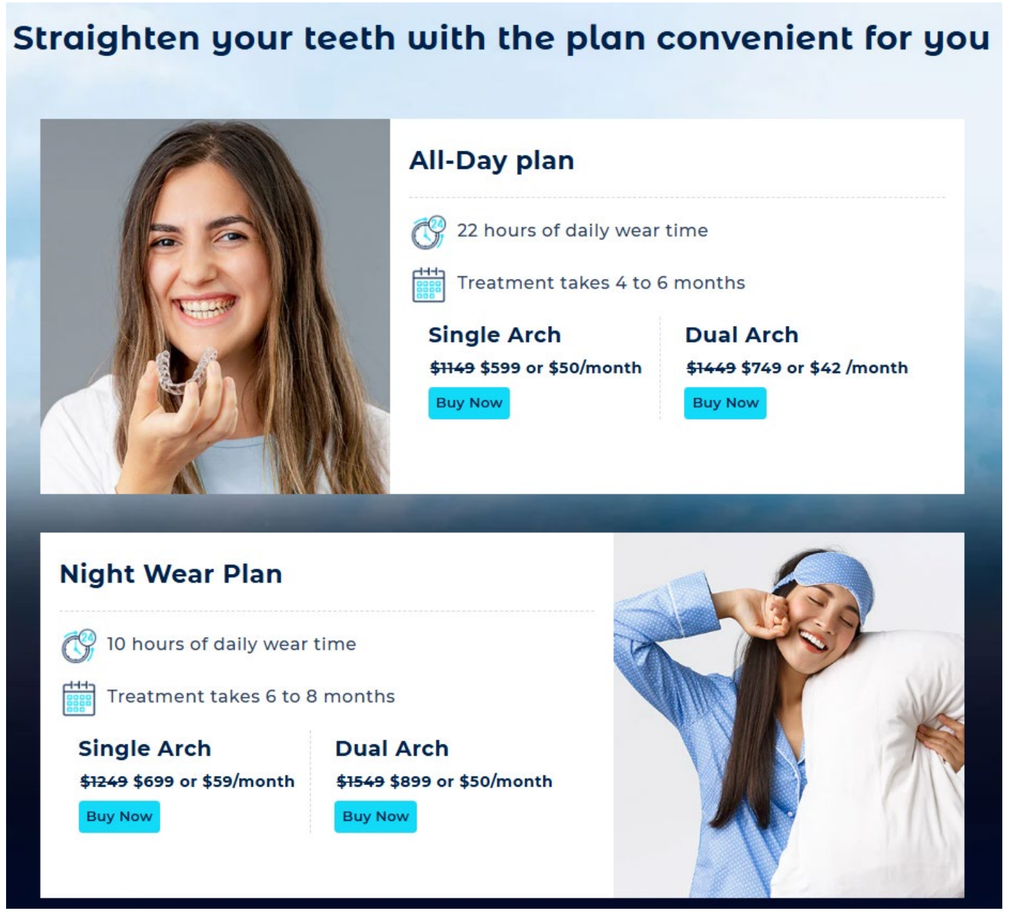
2010s: The Consumer Shift

- Private equity and DSOs enter the market
- Invisalign and clear aligners go mainstream
- SmileDirectClub and DTC models disrupt the traditional path
- Orthodontics becomes retail: in malls, online, pharmacy clinics
- Volume and convenience > boutique experience

Sound familiar?

Now: Mass Market & Tech - Enabled

- Aligner treatment can cost less than $1K with financing
- AI, remote monitoring, and 3D printing reduced costs
- General dentists offer basic ortho services
- Virtual check - ins & subscription models become common
- Orthodontics as a consumer product, not a medical service



Now: Mass Market & Tech - Enabled

What are the benefits?

Teeth straightened without braces

With Aligner32's removable and invisible clear aligners, you will not have to go through the hassle of getting traditional braces attached to your teeth with their metal brackets and wires on display, every time you open your mouth.

No monthly dental visits

Nobody wants to spend long hours being trapped on a dentist's chair. With our clear aligners, you will not be required to make those dreadful monthly visits as your whole treatment process will be remotely monitored.

Easy to clean

They can be easily cleaned with the use of running tap water and a clean toothbrush. You just have to place them under the tap water and gently rub with a help of a clean toothbrush.

Easily Removed

Our clear aligners can easily be removed as unlike traditional metal braces, they do not come with attachments. In case you wish to bite on your desired food, you can easily remove your clear aligners and eat whatever you prefer.

Our guarantee

We guarantee you the best experience for your teeth straightening process. Our expert dental team will ensure that you fit all the requirements for our clear aligners treatment otherwise you will be refunded.

Expert supervision

Our experts will supervise your case throughout your treatment. Our team will keep on remotely monitoring your treatment as you keep on sending pictures of your progress.

Affordable prices

Our clear aligners treatment comes with extremely affordable treatment plans. We offer two payment plans for our day and night clear aligners. You can either pay through a one-time payment plan or pay in installments at an affordable price per month.

Quick customer support

Customers are our first priority. Our customer support service is available 24/7. We are always here for any kind of help or difficulty.

In 50 years, orthodontics evolved

1970s:

- Niche, luxury care
- Manual, specialist - driven
- Adolescents
- Expensive and Out - of - pocket
- Limited access

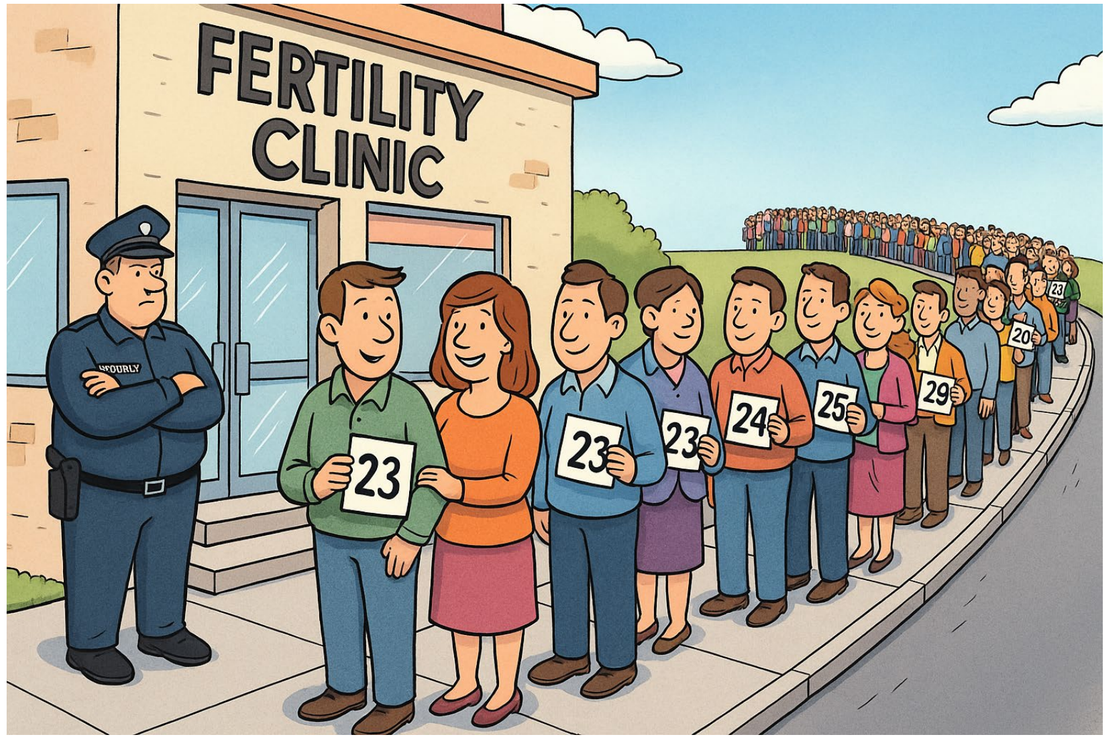
Now:

- Accessible, scalable service
- Digital, tech - enabled workflows
- All ages, lifestyle - oriented
- Affordable and often covered or financed
- Mass market delivery

The industry grew 25x

Scaling IVF ≠ Scaling Orthodontics

- IVF = babies, not smiles
- Outcome is binary, not subjective (healthy baby)
- Higher complexity
- Higher costs to deliver care
- High anxiety
- Low tolerance for error



IVF cannot become retail orthodontics, but it can adopt scalable delivery models

Lessons from Obstetrics

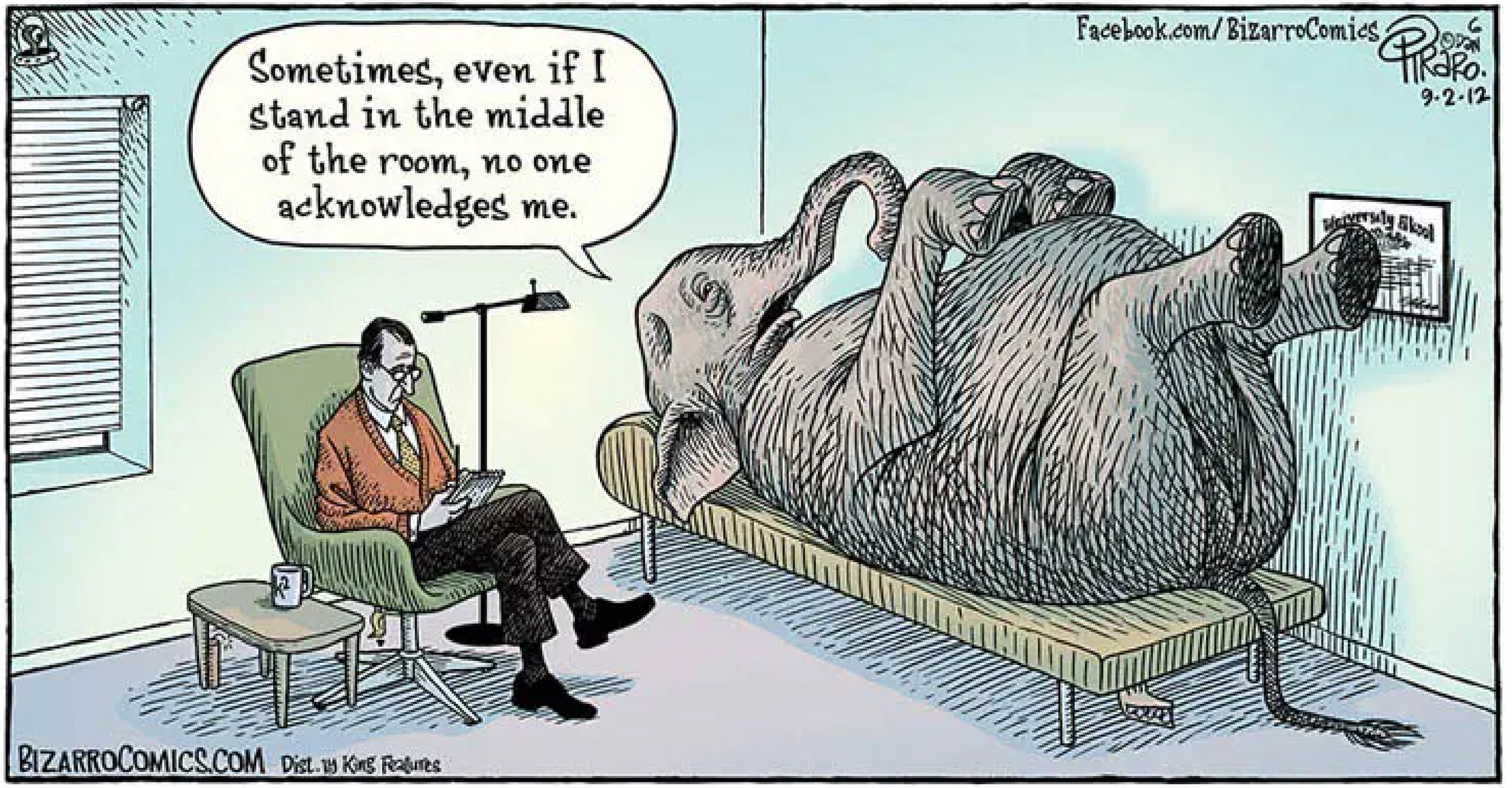
Midwife (Certified Nurse Midwife – CNM)
- Manages low-risk pregnancies providing prenatal, birth, postpartum, and newborn care
- Emphasizes natural birth, education, and minimal intervention
- Practices in homes, birth centers, and hospitals
- Delivers ~50–75% of births globally, ~10% in the U.S.

OB/GYN (Obstetrician-Gynecologist)
- Manages moderate-to high-risk pregnancies
- Trained in surgery, C-sections, and complications
- Provides full-spectrum reproductive care
- Delivers ~10–25% globally, ~85–90% in the U.S.

MFM (Maternal-Fetal Medicine Specialist)
- OB/GYN with fellowship training in complex pregnancies
- Consults on anomalies, multiples, preeclampsia, diabetes, etc.
- Performs high-level imaging and procedures
- Delivers <5% of births; *focuses on consult and co-management*

Triage, Escalation, and Scope Guardrails

- Triage at intake and escalate appropriately
  - **Midwife → OB:** Escalate for complications like labor dystocia, fetal distress, need for surgical delivery (vacuum, forceps or C section) or onset of medical issues (e.g. hypertension, gestational diabetes, etc.)
  - **OB/GYN → MFM:** Escalate for high-risk cases—fetal anomalies, multiple gestations, or significant maternal conditions (e.g. lupus, cardiac disease)
- Defined scopes of practice by training and credentialing
- Collaborative protocols for shared management and handoffs
- Scope built around **risk stratification** and acuity-based workflows

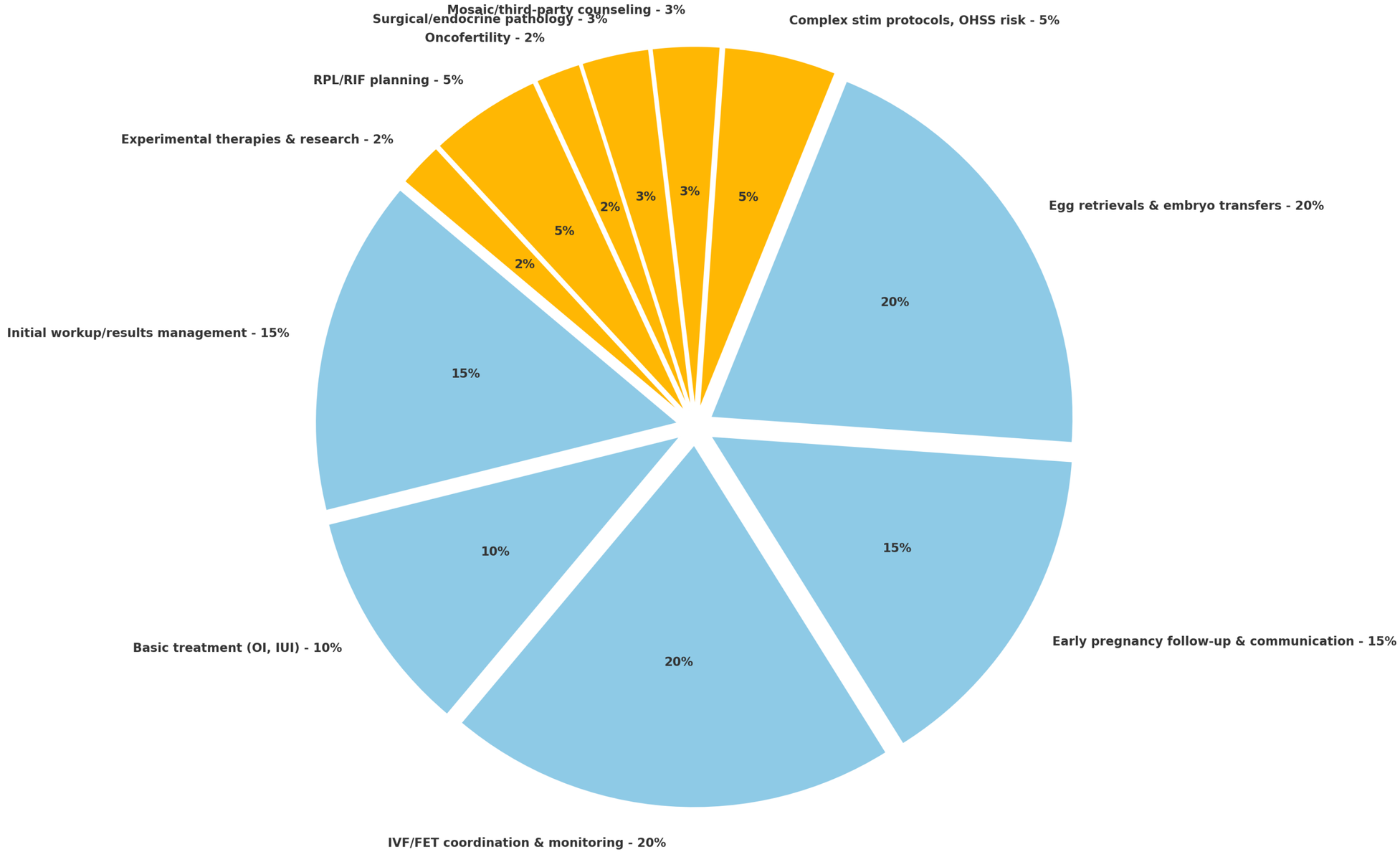

Sometimes, even if I stand in the middle of the room, no one acknowledges me.
Facebook.com/BizarroComics
PIRATO.
9-2-12
BIZARROCOMICS.COM Dist. by King Features

Compensation and Lifestyle

- Midwife (CNM)
  - Average Salary: $178,939
  - Works overnight
  - Manages low risk births
- OB/GYN
  - Average Salary: $386,691
  - Works overnight
  - Manages moderate - to high - risk births, performs surgery
- MFM (Maternal - Fetal Medicine)
  - Average Salary: $580,173
  - Rarely works overnight
  - Primarily consultative, few deliveries

2024 MGMA Total Regional Compensation

A Week in the Life of an REI today



The REI of the Future will NOT look the same

- REIs will supervise and manage complex counseling and care
- Will have large team of providers beneath them with clear guidelines for:
  - How to risk stratify
  - Who does what
  - When to escalate
- Push workup and routine care down to not just Ob/Gyns and APPs, but PCPs and family practitioners
- We will leverage:
  - Standardized education and basic counseling
  - Automation of record review, intake, work up, and follow - up
  - Technology platforms that support seamless communication and optimized workflows

Protecting Scope vs. Expanding Access

- REIs are understandably protecting our scope —it's tied to our identity and livelihood
- We want to do right by our patients and are working very hard to serve them
- However, the market demand will drive this shift and it will happen with or without REI support
- REIs are the experts so we *must* design the care pathways
  - REIs will not be obsolete - our expertise will just be leveraged differently

Common Concerns

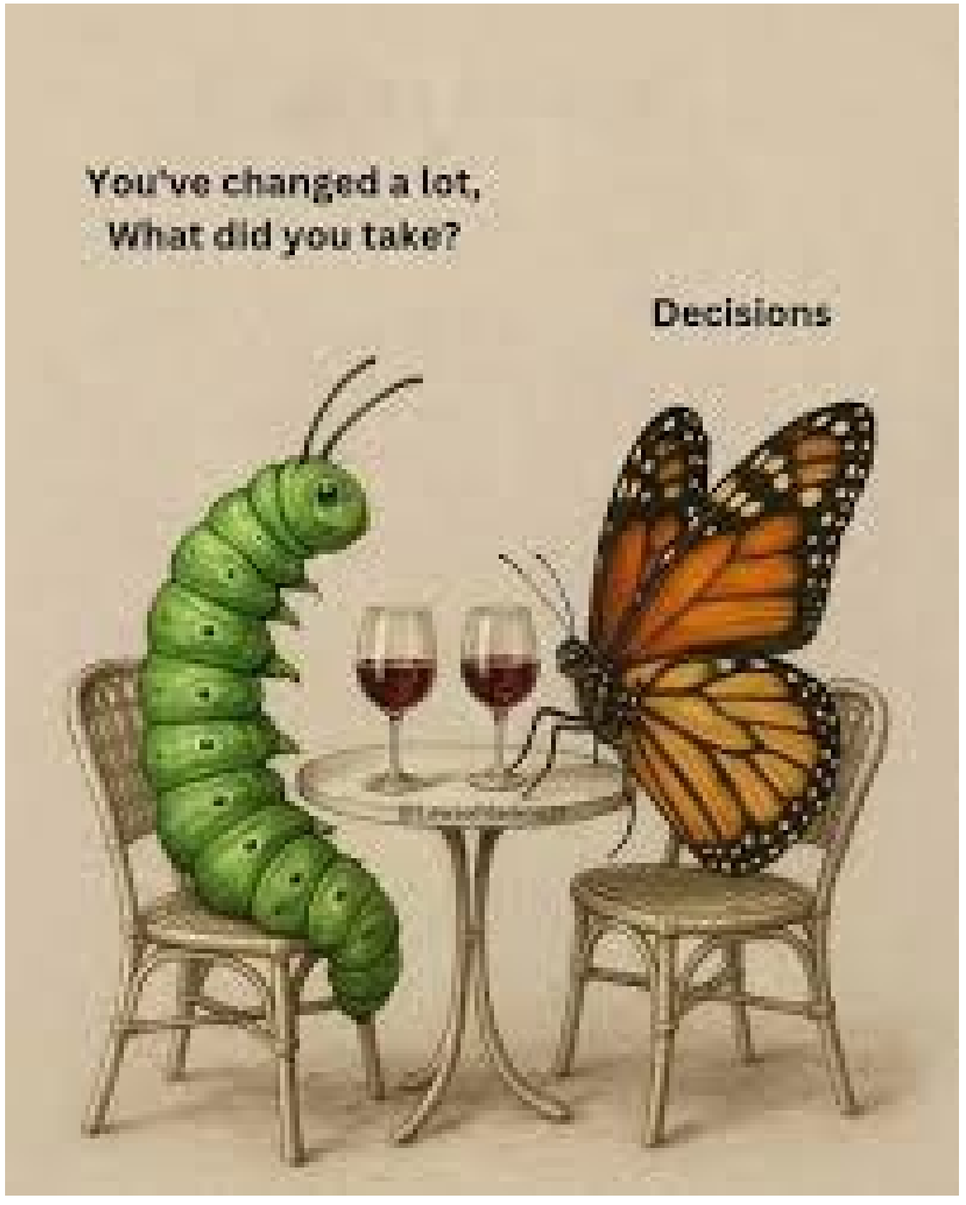
- **“Outcomes and safety will suffer”**
  - Deliveries aren’t more unsafe with adequate risk stratification

- **“Patients want to be cared for by REIs”**
  - They do, but they want a baby more
    - Pilots fly the plane, they don’t change the oil or do the safety briefing – you never meet them yet you still trust the safety and quality
  - RNs and care coordinators do most of the communication already

Common Concerns

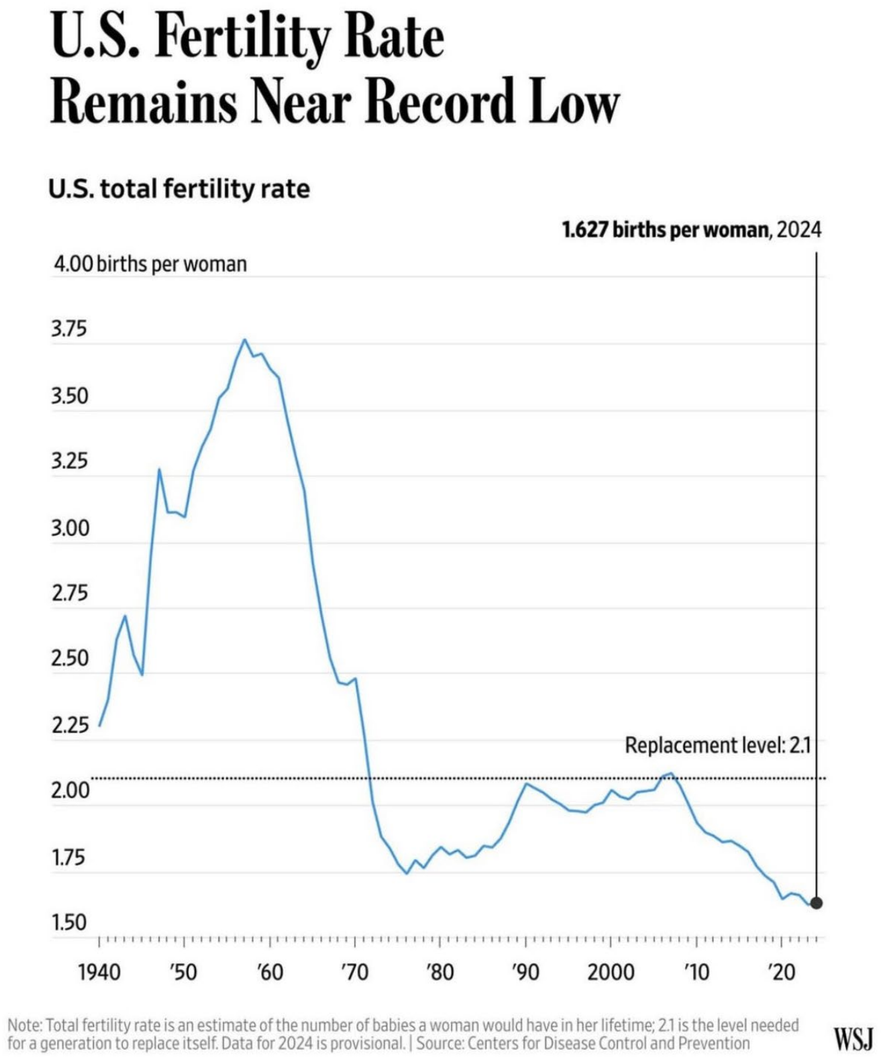
- **“We are the most trained, why delegate?”**
  - Because we can’t serve every patient and many are going unserved
  - We already delegated menopause and pediatric endocrine
  - Cardiologists don’t manage mild hypertension and 90% of diabetes care is done by PCPs
- **“Fragmentation will dilute the patient experience”**
  - Not if its well designed and expectations are articulated
  - Redesigning the model will center around outcomes and experience
- **“We will lose control of the field”**
  - *The opposite: we retain control by defining the model and setting the guardrails*
    - When we hoard all the care, others will design around us
    - When we lead the redesign, we stay essential

"What if we don't change at all ...
and something magical just happens?"

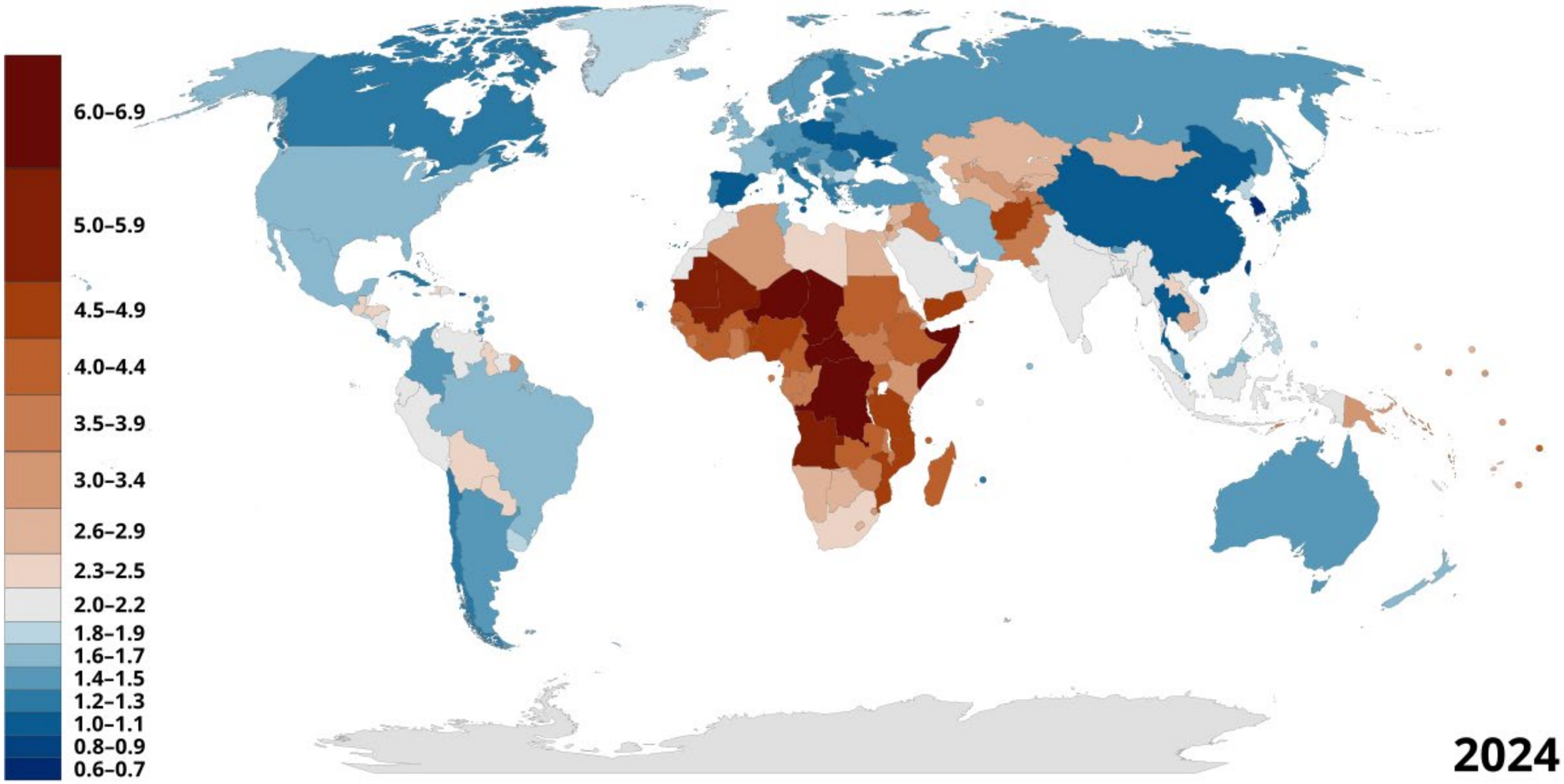

You've changed a lot,
What did you take?
Decisions


WHY
NOW?

Why now? Demographic Crisis

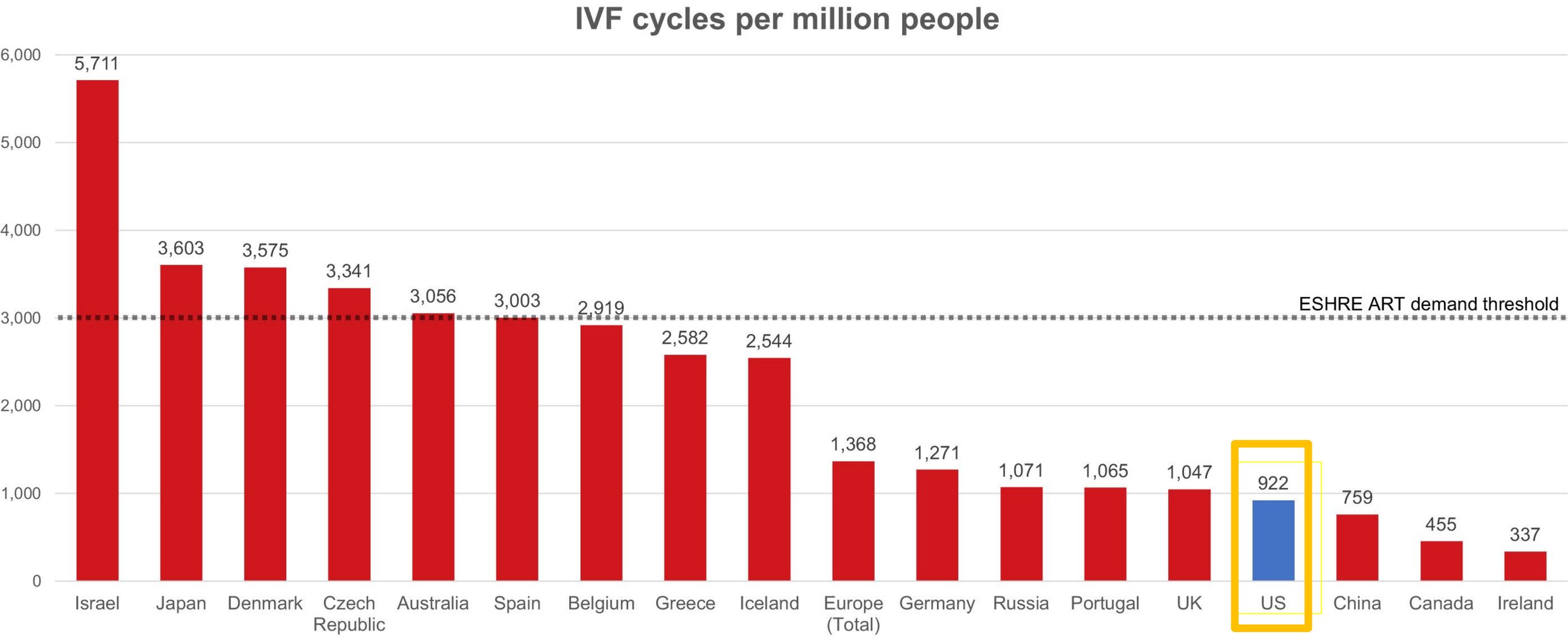


Why now? Demographic Crisis



United Nations Department of Economic and Social Affairs (UNDESA), Population Division. (2024). *World fertility rates by country (2024)*

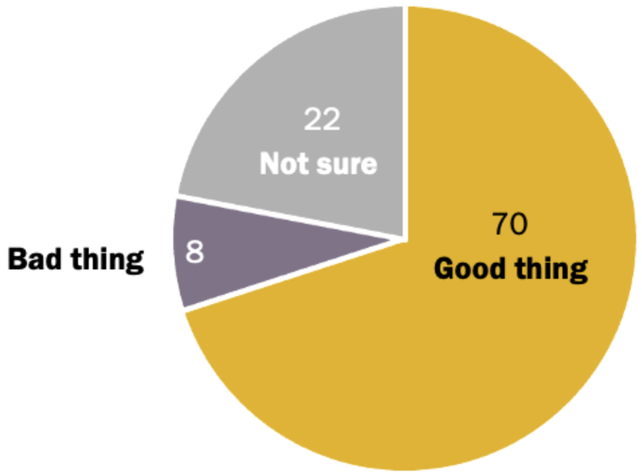
Why now? Underpenetrated Market



Why now? Public Support

More than two-thirds of Americans say having access to IVF is a good thing

% who say people having access to in vitro fertilization (IVF) is a ...

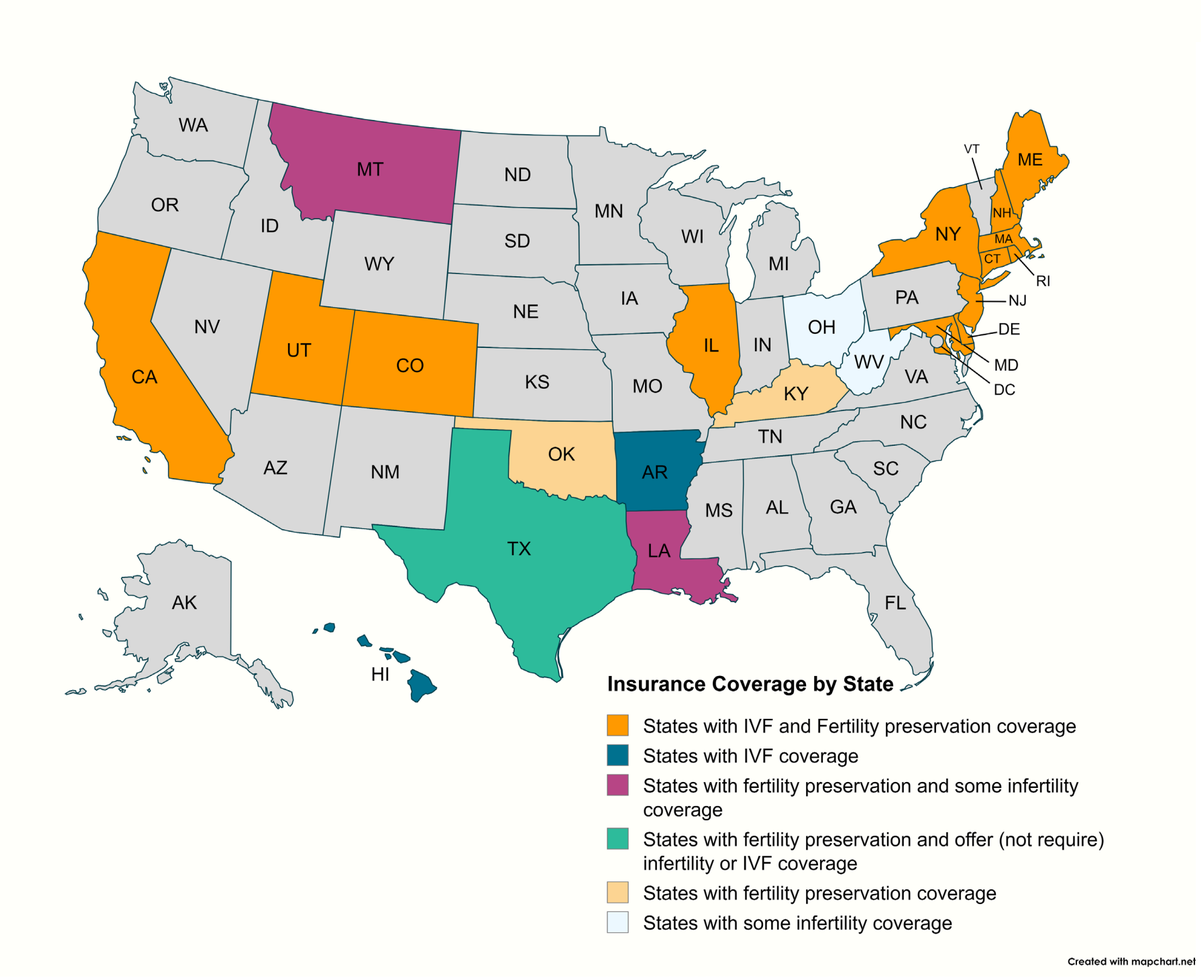


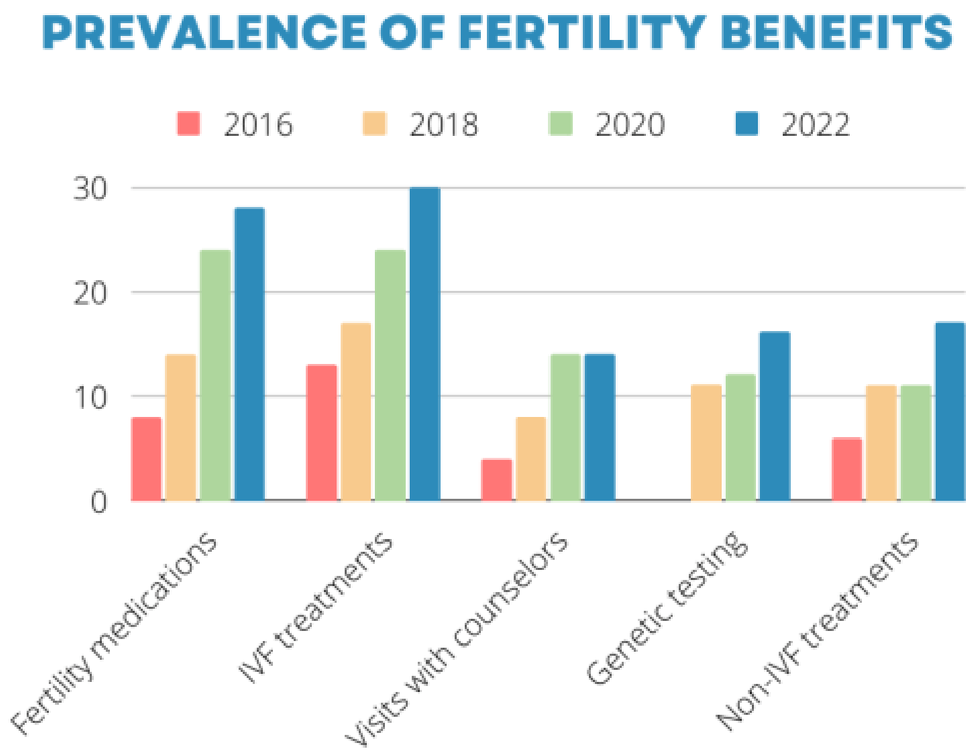
Note: Fewer than 1% of respondents did not answer the question.
Source: Survey of U.S. adults conducted April 8-14, 2024.

PEW RESEARCH CENTER

Why now? Government Tailwinds

Why now? Increasing Access





RESOLVE: The National Infertility Association. (2024). *State fertility insurance laws map*

International Foundation of Employee Benefit Plans (IFEBP). (2023, November 6). *Fertility benefits on the rise*.

Meeting the demand for fertility services: the present and future of reproductive endocrinology and infertility in the United States

Eduardo Hariton, M.D., M.B.A.,[a] Ruben Alvero, M.D.,[b,c] Micah J. Hill, D.O.,[d] Jennifer E. Mersereau, M.D., M.S.C.I.,[e] Shana Perman, P.A.,[f,g] David Sable, M.D.,[h] Fiona Wang, P.A.,[i] Geoffrey David Adamson, M.D.,[j] Christos Coutifaris, M.D., Ph.D.,[k] LaTasha B. Craig, M.D.,[l] Pardis Hosseinzadeh, M.D.,[m] Anthony N. Imudia, M.D.,[n] Erica B. Johnstone, M.D., M.H.S.,[o] Ruth B. Lathi, M.D.,[p] Paul C. Lin, M.D.,[q,r] Erica E. Marsh, M.D., M.S.C.I.,[s] Michele Munch, C.R.N.P.,[t] Gloria Richard-Davis, M.D.,[u] Lauren W. Roth, M.D.,[v] Amy K. Schutt, M.D.,[w,x] Kim Thornton, M.D.,[y,z,aa] Lauren Verrilli, M.D., M.S.C.I.,[o] Rachel S. Weinerman, M.D.,[bb] Steven L. Young, M.D., Ph.D.,[cc] and Kate Devine, M.D.[d,f,dd]

The Supply/Demand Imbalance

- **Current vs. Required IVF Cycles** :
  - In the U.S., the 3.7 million births in 2021 could lead to over 800,000 infants born annually via IVF, ~10 times the number born via IVF
    - Includes infertility, genetic disease prevention, LGBTQ+, oncofertility
  - This demand would necessitate over 2 million annual IVF cycles in the U.S. to meet the theoretical needs
- **Current REI providers:**
  - 1,500 board - certified, 1,250 active, conducting 291,484 cycles annually.
    - On average, 233 per provider
  - Future demand requires each provider to manage approximately 1,600 ART cycles per year, or **6.8 times more cycles per provider**

So what is coming?

- Increased awareness and acceptance
- Massive increase in volume
- Pricing pressure - > As volume goes up, revenue per retrieval will go down

How are we going to prepare for this?

LEARNING MADE EASY

HOW TO SCALE IVF CAPACITY

dummies

Risk stratification

—

Value-based care

—

Physician extenders

—

Technology

Why does scale matter?
Fertility is a Fixed Cost Business

- Clinic space, IVF lab, equipment, software, etc. are all fixed costs
- Whether you do 500 or 5,000 retrievals, your base cost structure stays the same
- In theory, that should mean your marginal cost (the cost of producing one additional unit of a good or service) per retrieval drops as volume grows
  - More patients = more revenue - > Each additional retrieval should dilute fixed overhead
  - This is classic economies of scale
- But our costs are not dropping *fast enough* because our labor model hasn't changed
  - Every retrieval still requires: Physician chart review and medication planning, monitoring oversight, manual cycle coordination, direct communication, etc.
- **We're scaling patients, but not scaling people**

Remember this slide?
How did we scale IVF care so far…

- Hired more **RNs** and **clinical staff** to manage patient load
- Hired **sonographers** to help with monitoring ultrasounds
- Hired more **embryologists** to manage increase lab volume
- Hired **APPs** do IUIs, saline sonograms, and OB sonograms
- Hired more **financial counselors** and **billing specialists** to deal with the financial complexity
- Hired expert **management teams**

- Realigned patient expectations about how and when they interact with their provider

amazon

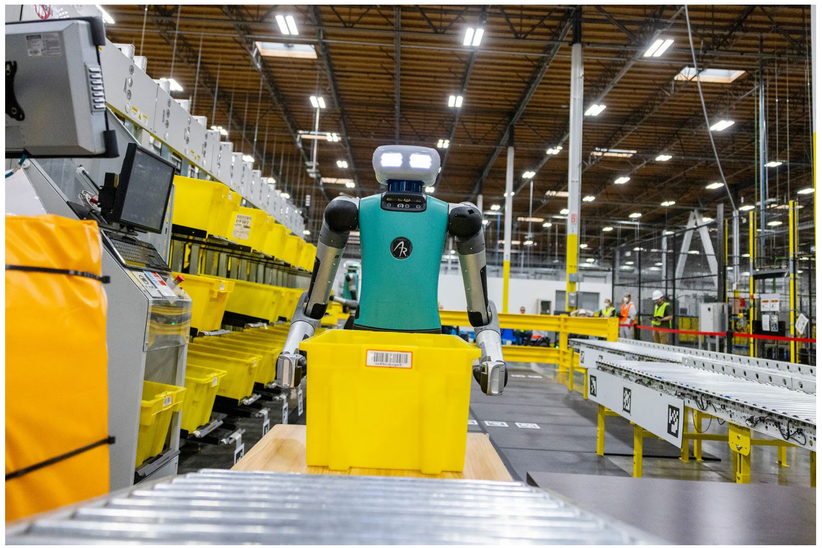
CONSTRUCTION UNDERWAY ON $500 MILLION AMAZON WAREHOUSE IN UPSTATE NY

Dan Bahl | Published: October 10, 2024

Getty Images

amazon

- Massive investments in centralized infrastructure (fulfillment centers, robotics, software, data science)
  - These are fixed costs
- Amazon’s genius isn’t’ just speed, it is unit economics
- As volume grew, marginal cost per unit dropped dramatically
- Each additional order adds volume and margin, not complexity and cost



What Can IVF Clinics Learn from Amazon

- We built a clinic and lab with costly equipment —our fixed costs
- We haven't reduced marginal labor - > That's where the opportunity lies:
  - Centralize what's expensive (labs), decentralize what's not (monitoring)
  - Automate any task that can be automated
    - From front desk through end - to - end clinical care and into the IVF lab
  - Build systems that reduce provider labor per cycle
    - And use providers at the top of their license
- REI scarcity is real, so we need to design around them and optimize their time
- **We need technology to absorb the next patient, without needing another REI/embryologist/RN (i.e. human)**

How do we align incentives?
Value - based care

What we can learn from Orthopedics

- Patients with arthritis and knee pain didn't want a knee replacement, they wanted to walk pain free
- Before 2016: Fee for service — payments for surgery, hospital stay, rehab, readmissions
  - More care = higher cost = higher reimbursement
- After 2016: CMS' CJR bundled payments for the outcome: a functioning knee at 90 days
- Results:
  - Average cost per episode dropped by ~4 – 10%
    - Reduced use of inpatient rehab facilities
    - Lower readmission rates
    - Improved care coordination and discharge planning
  - No decline in quality
  - Patient satisfaction remained high —despite lower costs
- Proved that outcome - based care could both **reduce cost and improve quality, increasing value to the system**

We Have a Measurable Outcome: We Just Don't Pay for It

- Patients (or insurers) pay fee for service per IVF cycle
- No guarantee of outcome
- If the first cycle fails, patients start over —emotionally, physically, financially
- But the desired outcome is clear: a baby
  - Cost to baby
  - Time to baby
  - Life disruption to baby (missed work, stress, logistics, etc.)
- These are measurable, patient - centered, and increasingly being captured in real - world data

What Value - Based Care *Will* Unlock in Fertility

- **Pay for a baby, not a cycle**
  - Align financial incentives with what patients actually want: a live birth
  - Reward outcomes, not procedures
- **Lower cost per baby**
  - Reduce unnecessary interventions and failed cycles
  - Efficient, protocol - driven care becomes the standard
- **Incentivize performance**
  - Clinics that deliver high success rates efficiently share in the upside
  - Data - driven quality rises across the board
- **Expand access**
  - Bundled payments make it easier for employers and payers to cover fertility care —simpler pricing, clearer ROI
- **Better outcomes!**

Physician Extenders

- **Unlock physician capacity** : Extenders handle routine monitoring, education, and follow - up so REIs can focus on procedures and complex decision - making
- **Scale high - quality care** : Standardized protocols + team - based care allow clinics to treat more patients without compromising outcomes
- **Improve Cost and System Efficiency:** Deliver high - quality care at lower cost per visit for low - complexity care compared with physician - only models

Improve overall system efficiency as demand for fertility care rises

Technology

- Digital tools
  - Patient intake
  - Patient communication
  - Med inventory management
- Operations
  - Insurance Benefit Verification (IBV)
  - Billing
  - Appointment scheduling and rescheduling
    - Automated waiting lists
- AI
  - Record review/summarization
  - Ambient listeners / note takers
  - Outcome prediction
  - Dose selection
  - Follicular monitoring
  - Trigger optimization
  - Level loading
  - LLM for patient communications
  - Embryology lab applications

Artificial intelligence in reproductive medicine: a fleeting concept or the wave of the future?

IVF cannot become retail orthodontics, but it can adopt scalable delivery models.

Zev Rosenwaks, M.D.

Ronald O. Perelman and Claudia Cohen Center for Reproductive Medicine, Weill Cornell Medicine, New York, New York

AI in ART

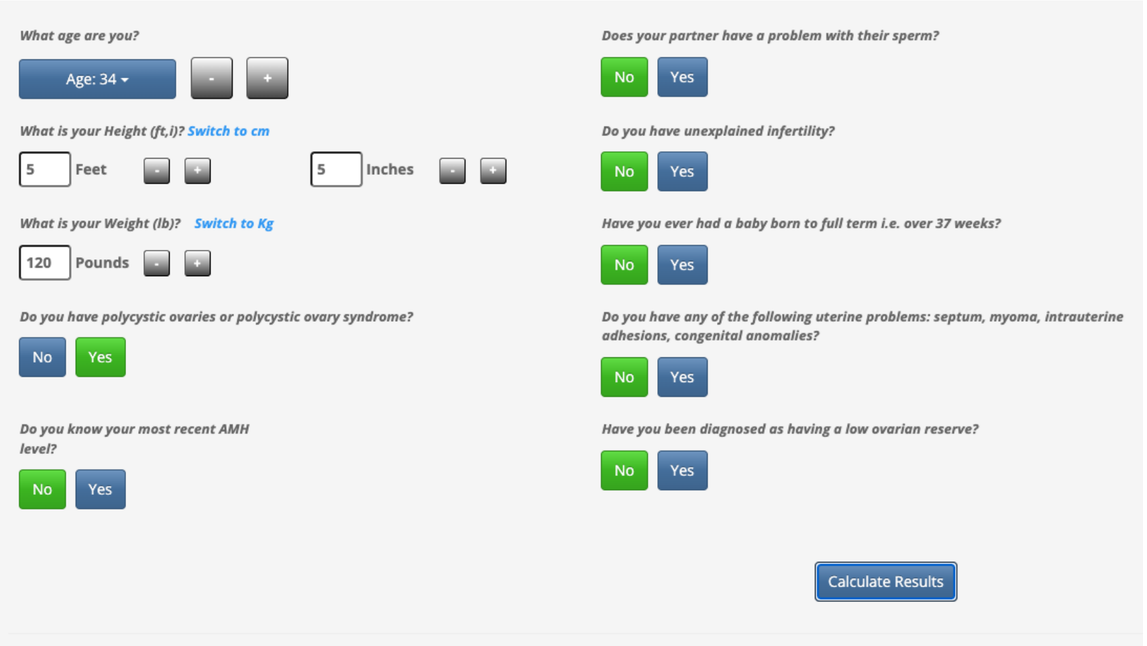
- Outcome prediction
- Dose selection
- Trigger decision/Level loading

AI in ART

- **Outcome prediction**
- Dose selection
- Trigger decision/Level loading

Outcome Prediction

- Accurate prognosis before or during a treatment cycle can be vital for patient counseling and treatment planning
  - Physicians are inherently biased
- Patients want to see personalized expectations of treatment success, ideally visually
- Better expectation setting will lead to better conversion and retention, as well as happier patients



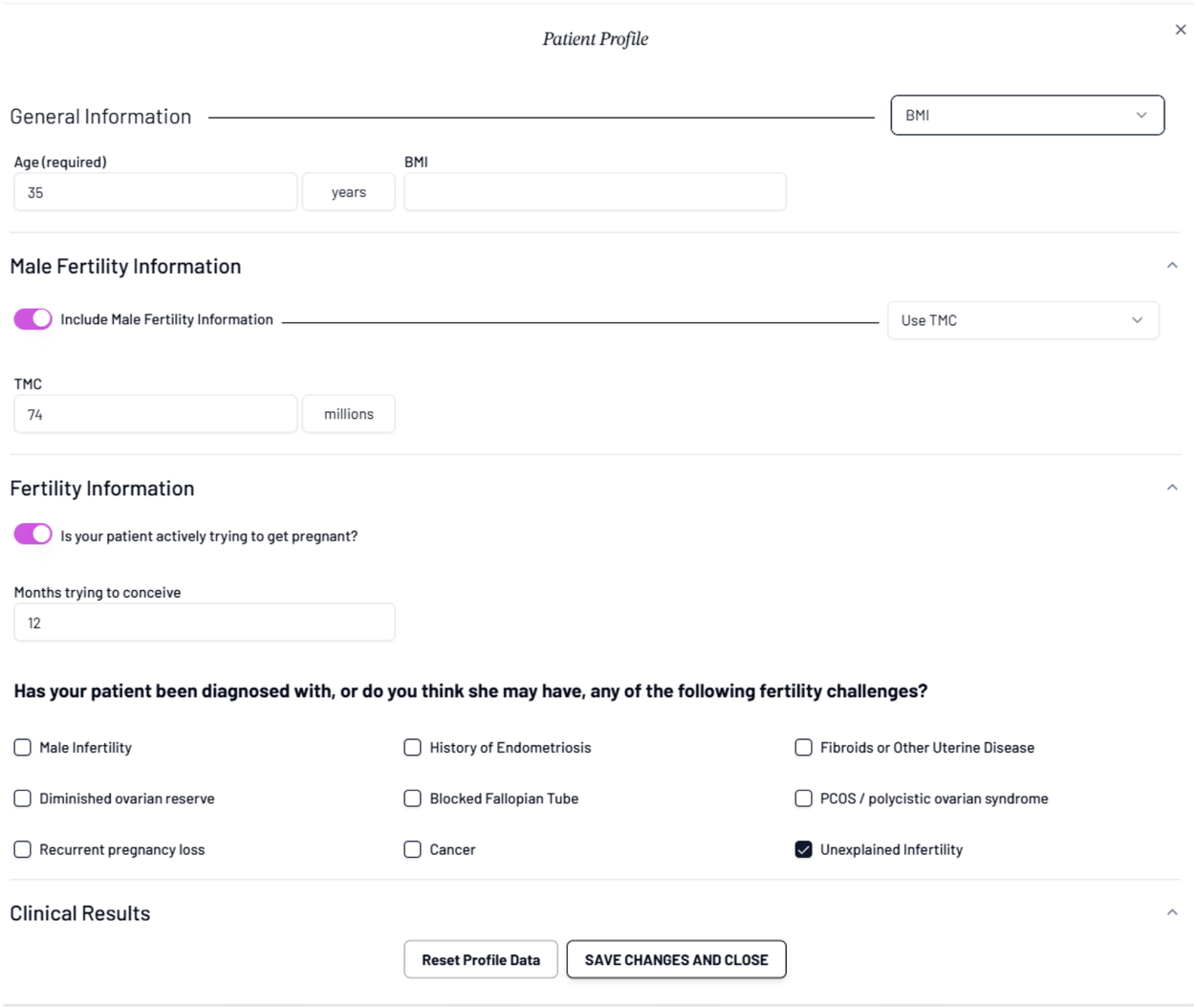
SART IVF Calculator

USF AI Pathway to Parenthood

- In partnership with Cercle AI, USF developed the AI Pathway to Parenthood
- Using millions of real patient data points, we provide patients with a personalized probability of success for IVF, IUI and egg freezing, at a high level of precision

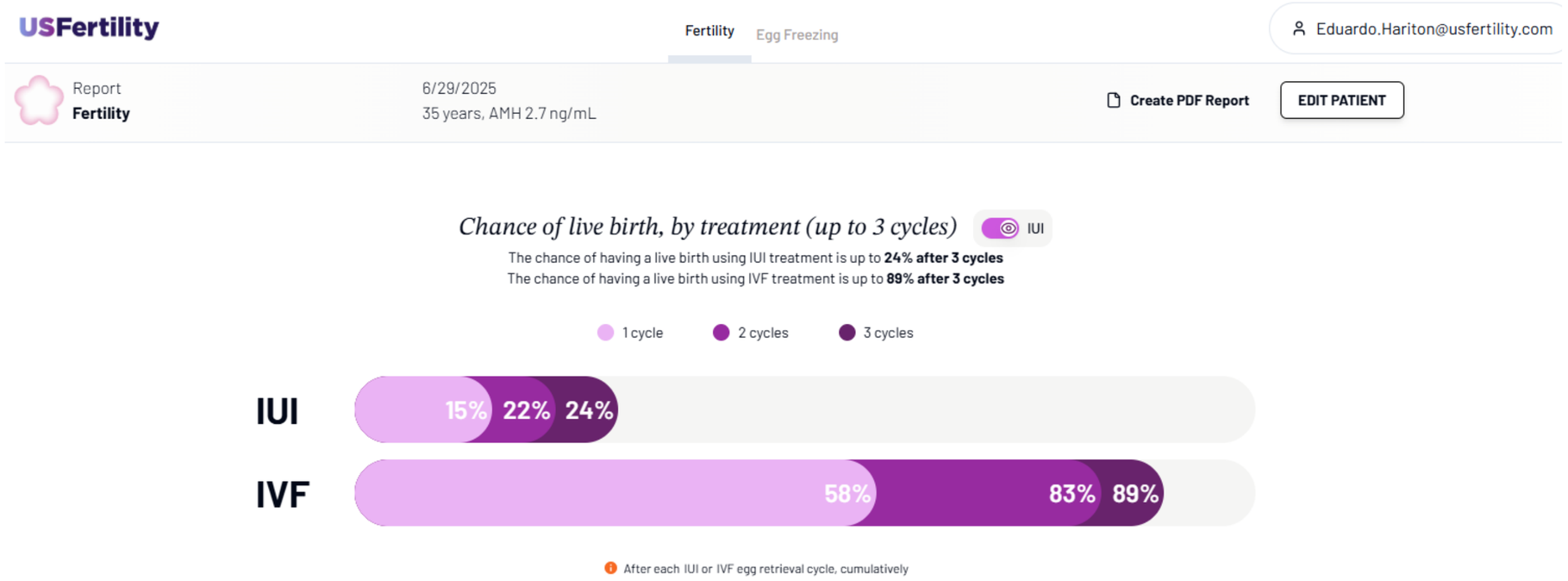
Customized report for patient

USF AI Pathway to Parenthood



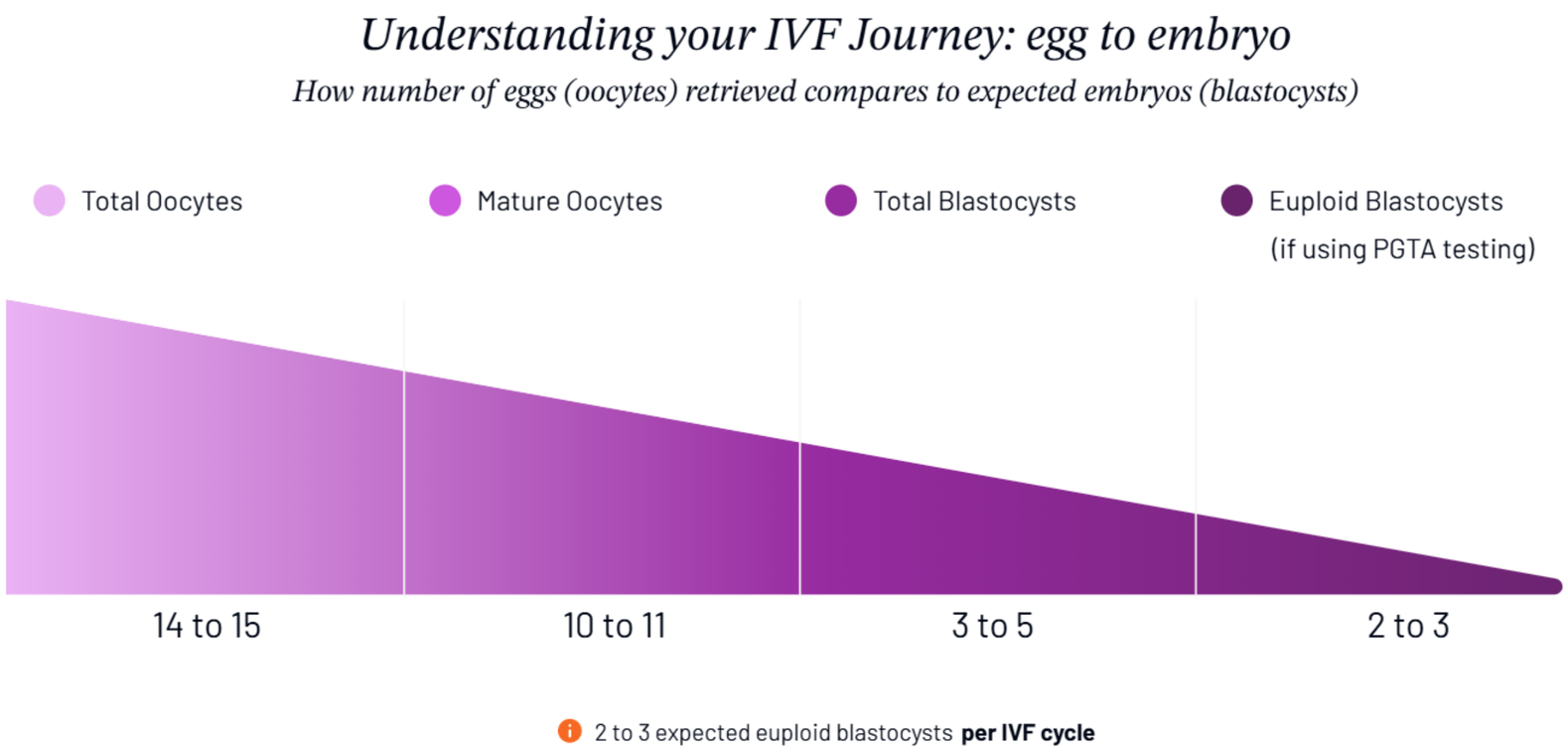
USF AI Pathway to Parenthood

The predictions display results for up to 3 IUI and IVF cycles based on real patient data (given the patient's profile entered by the physician).



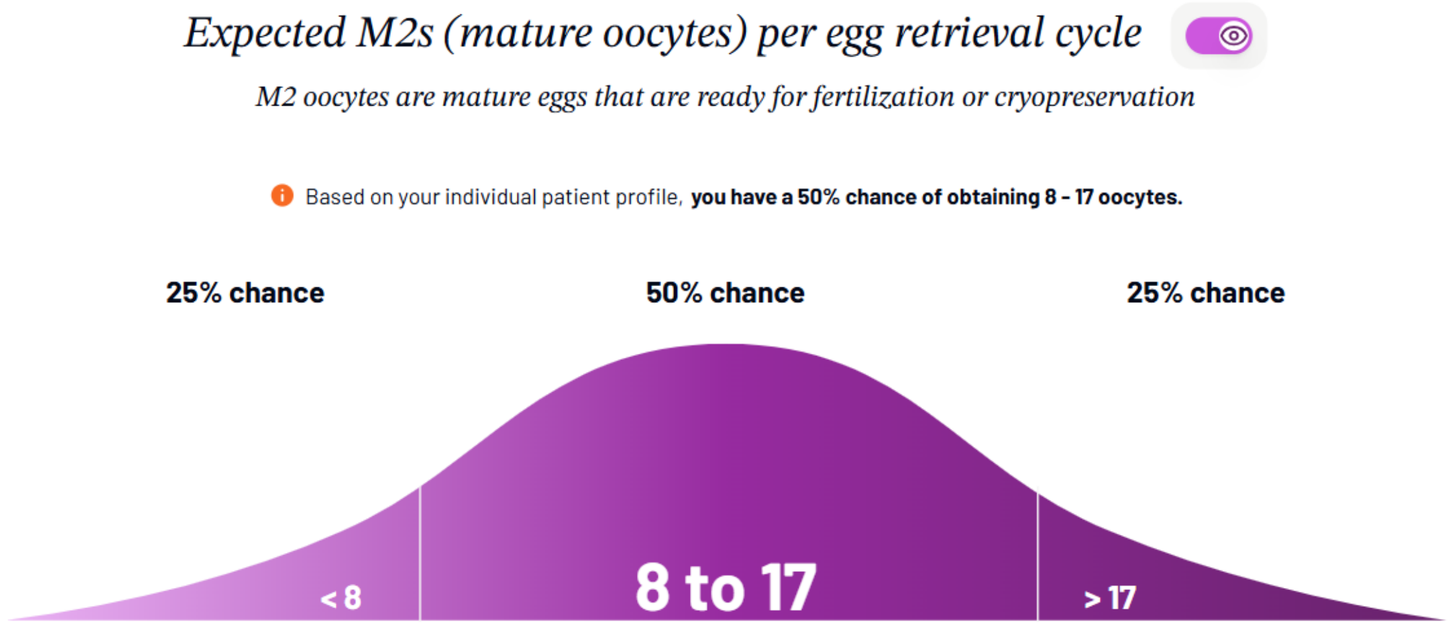
USF AI Pathway to Parenthood

This insight shows a personalized prediction shows the attrition from oocytes to blastocysts



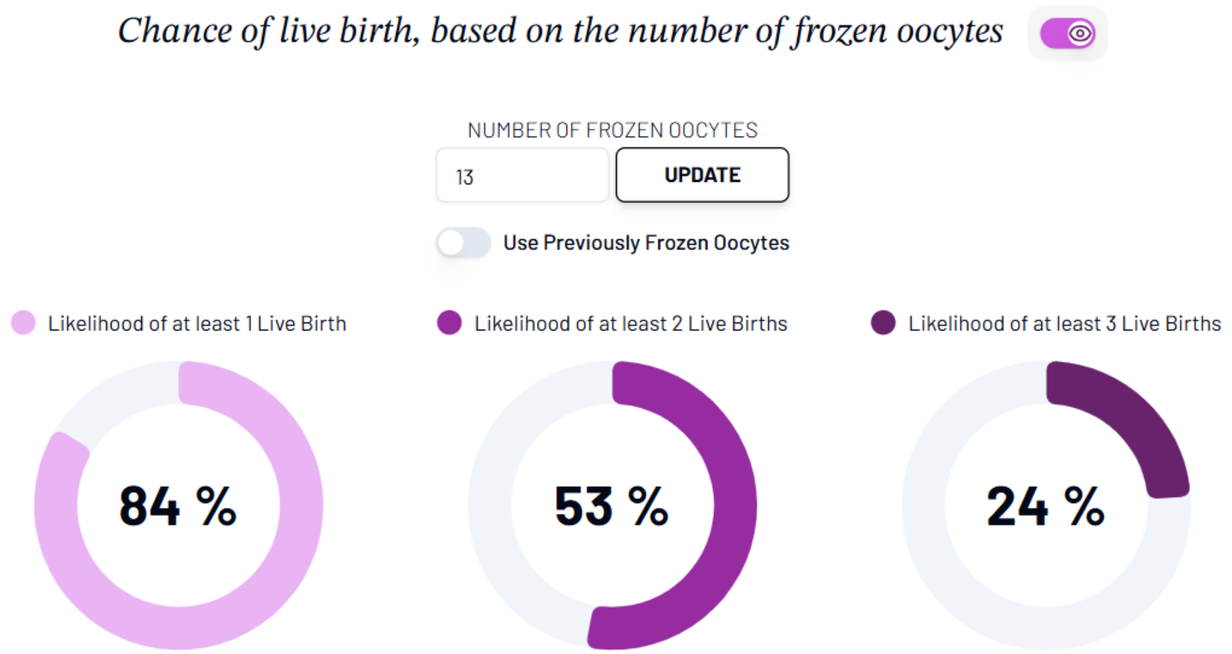
USF AI Pathway to Parenthood

This insight provides a range of M2s a patient can expect on a percentile basis (and the original patient profile entered by the physician).



USF AI Pathway to Parenthood

This insight provides a personalized prediction of 1, 2, or 3 live births based on the number of frozen M2s (allows from a prior cohort at a different age)



Outcome Prediction

FertilAI

Fertility Journey Insights

The Fertility Journey Insights is a statistically-based informational tool meant to help understand potential outcomes of treatment. Every individual's fertility journey is unique; exact outcomes may be different and variations may occur and as such, any treatment decisions should be made with the advice of a physician.

Estimated Outcomes

Estimated retrieved oocytes: ∽ 12 *

The estimated number of oocytes (eggs) that may be collected during your oocyte retrieval procedure.

* Based on outcomes of patients with similar characteristics.

Estimated MII oocytes: ∽ 9 *

The estimated number of mature oocytes that are ready for fertilization after retrieval.

* Based on a 75% chance that an oocyte will mature.

Estimated blastocysts: ∽ 3 *

The number of embryos estimated to reach the multi-cell stage, 5–6 days after fertilization (blastocyst).

* Based on a 30% chance for a woman of age 34 that a mature oocyte will develop into a blastocyst.

Estimated euploid blastocysts: ∽ 2 *

The estimated number of blastocyst embryos with the right number of chromosomes, increasing the chances of pregnancy.

* Based on a 66% chance for a woman of age 34 that a blastocyst is a euploid blastocyst.

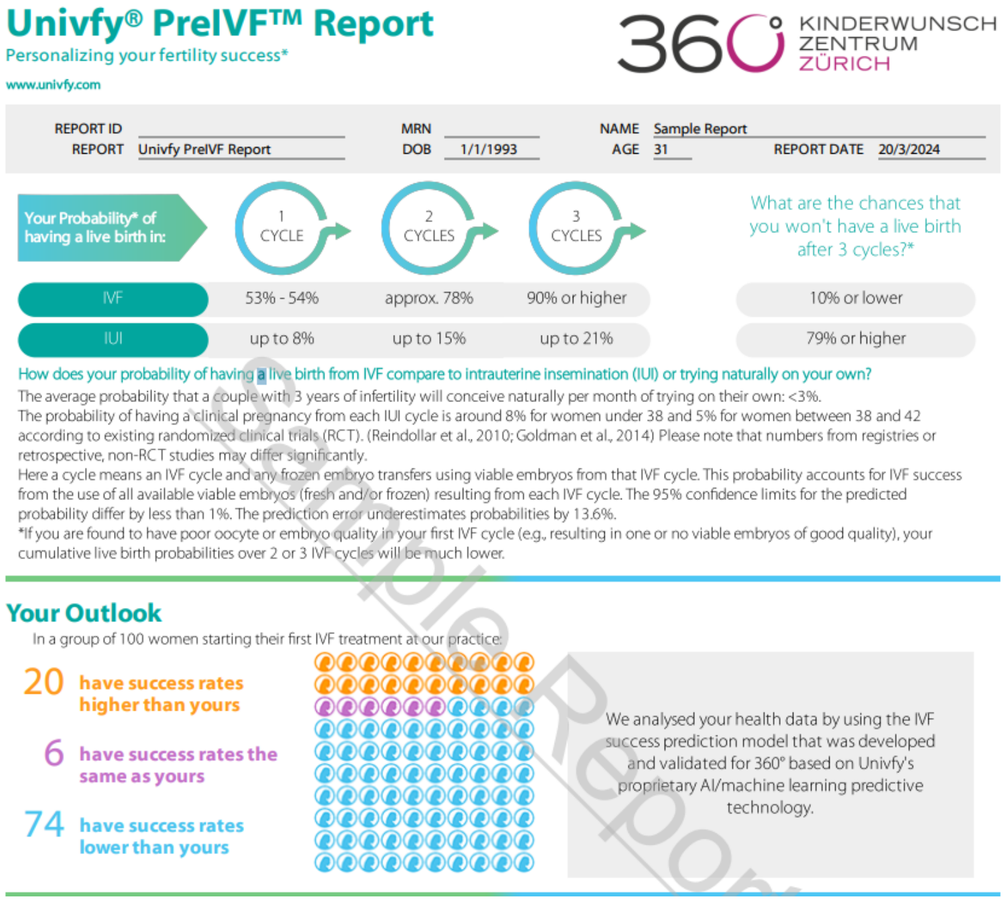
Probabilities of Live Birth

The likelihoods of achieving live births across different numbers of retrieval cycles are as follows:

1 Cycle	Chance of 1 live birth

Outcome Prediction: Conversion Impact

- Univfy tested their center-specific, machine learning (ML)-powered report that predicts a patient's personalized chance of live birth
- Retrospective analysis of 24,238 new fertility patients across 7 centers (2016–2022) evaluating the impact of a center-specific, AI-powered prognostic tool on treatment decisions



Univfy® PreIVF™ Report

Personalizing your fertility success*

www.univfy.com

360° KINDERWUNSCH ZENTRUM ZÜRICH

REPORT ID | MRN | NAME Sample Report
REPORT Univfy PreIVF Report | DOB 1/1/1993 | AGE 31 | REPORT DATE 20/3/2024

Your Probability* of having a live birth in:	1 CYCLE	2 CYCLES	3 CYCLES	What are the chances that you won't have a live birth after 3 cycles?*
IVF	53% - 54%	approx. 78%	90% or higher	10% or lower
IUI	up to 8%	up to 15%	up to 21%	79% or higher

How does your probability of having a live birth from IVF compare to intrauterine insemination (IUI) or trying naturally on your own?

The average probability that a couple with 3 years of infertility will conceive naturally per month of trying on their own: <3%.
The probability of having a clinical pregnancy from each IUI cycle is around 8% for women under 38 and 5% for women between 38 and 42 according to existing randomized clinical trials (RCT). (Reindollar et al., 2010; Goldman et al., 2014) Please note that numbers from registries or retrospective, non-RCT studies may differ significantly.
Here a cycle means an IVF cycle and any frozen embryo transfers using viable embryos from that IVF cycle. This probability accounts for IVF success from the use of all available viable embryos (fresh and/or frozen) resulting from each IVF cycle. The 95% confidence limits for the predicted probability differ by less than 1%. The prediction error underestimates probabilities by 13.6%.
*If you are found to have poor oocyte or embryo quality in your first IVF cycle (e.g., resulting in one or no viable embryos of good quality), your cumulative live birth probabilities over 2 or 3 IVF cycles will be much lower.

Your Outlook

In a group of 100 women starting their first IVF treatment at our practice:

20 have success rates higher than yours

6 have success rates the same as yours

74 have success rates lower than yours

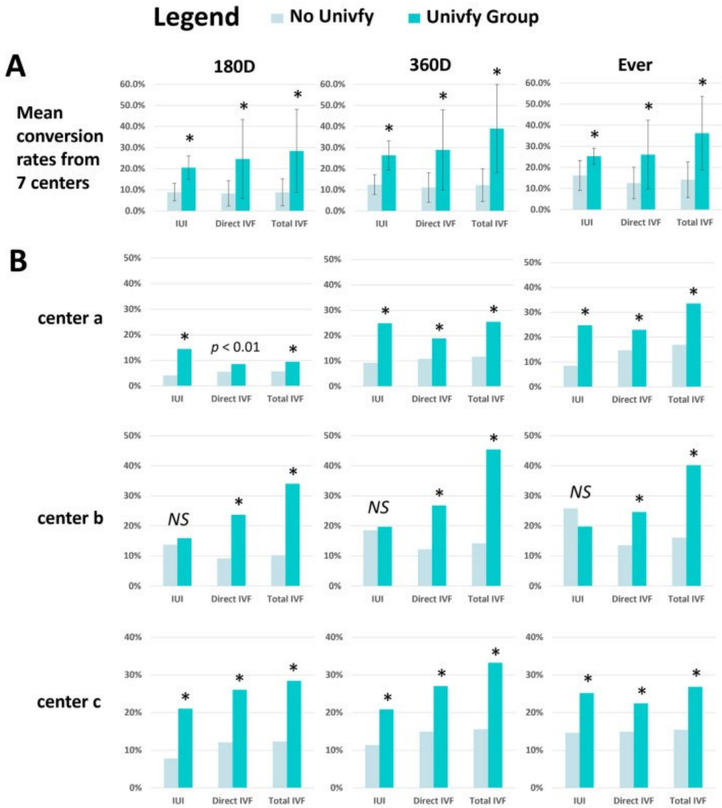
We analysed your health data by using the IVF success prediction model that was developed and validated for 360° based on Univfy's proprietary AI/machine learning predictive technology.

Sample Report

M.W.M. Yao et al., 2024

Outcome Prediction: Conversion Impact

- Report use was associated with significantly higher IVF conversion rates—patients were 2-4x more likely to initiate IVF, with or without IUI, across all time intervals
- At 180 days from first visit:
  - Direct IVF conversion: 24.6% with Univfy vs. 8.3% without→ OR 3.13 (95% CI 2.83–3.46)
  - Total IVF conversion (with or without prior IUI): 28.4% vs. 8.8%→ OR 3.41 (95% CI 3.09–3.75)
  - IUI conversion: 20.5% vs. 8.9%→ OR 2.95 (95% CI 2.63–3.31)
- The personalized, AI-based IVF prognostic counseling tool increased utilization of fertility treatments



M.W.M. Yao et al., 2024

AI in Ovarian Stimulation

- Outcome prediction
- **Dose selection**
- Trigger decision/Level loading

Gonadotropin Dosing

- Gonadotropin dosing is often standardized by ovarian reserve (AMH/AFC), but remains subjective
- AI has been shown to standardize gonadotropin dosing during ovarian stimulation

ORIGINAL ARTICLE · Volume 6, Issue 2, P147-148, June 2025 · *Open Access*

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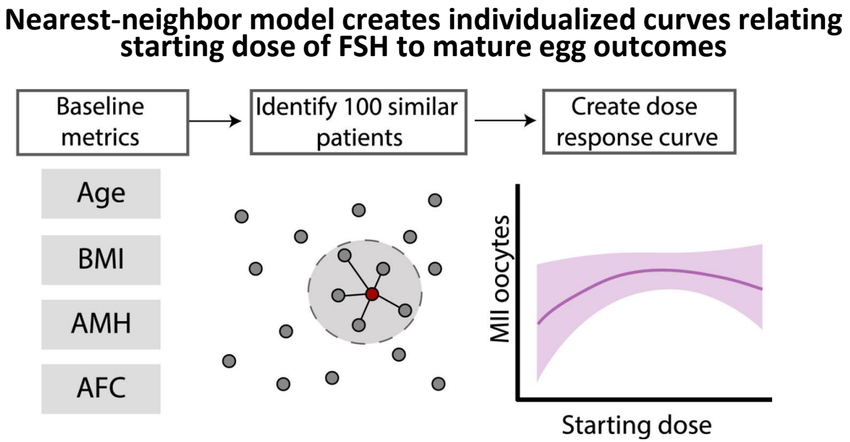
To dose or to let artificial intelligence dose: that is the question!

Eduardo Hariton, M.D., M.B.A. [a] · Salomon Edery [b]

M. Fanton et al., 2022

Gonadotropin Dosing

- Fanton et al developed a patient-specific, interpretable machine learning model to optimize FSH starting dose
- Retrospective analysis of 18,591 autologous IVF cycles across 3 U.S. clinics (2014–2020)
- Used K-nearest neighbors (KNN) to find 100 similar patients based on age, BMI, AMH, and AFC
- Generated individualized FSH dose–response curves to predict mature oocyte (MII) outcomes
- Patient classification:
  - 30% were **dose-responsive** (MII outcomes varied meaningfully by dose)
  - 64% were **flat-responsive** (similar MII outcomes across dose range)
  - 6% insufficient data



M. Fanton et al., 2022

Gonadotropin Dosing

- Propensity score matching
- Dose-responsive group:
  - Patients receiving optimal dose had +1.5 MII, +1.2 2PN, +0.6 blastocysts, using 10 IU lower starting FSH and 195 IU less total FSH
- Flat-responsive group:
  - Patients on lower doses had comparable outcomes (+0.3 MII, +0.3 2PN, +0.2 blastocysts), but used 149IU lower starting FSH and 1375 IU less total FSH
- Following the model is expected to improved efficiency, reduced medication use and cost, and personalize dosing without compromising outcomes

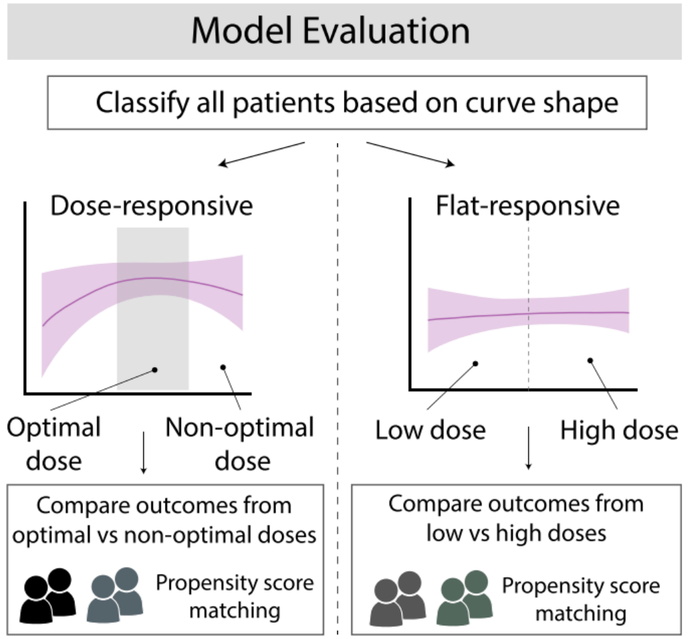


FIGURE 2 Approach for evaluating the expected benefit of the model. A dose–response curve was created for each patient in the dataset. Patients were classified as either dose-responsive or flat-responsive based on the shape of the dose–response curve. For dose-responsive patients, those given an optimal starting dose were propensity matched to patients given a non-optimal dose, and average outcomes were compared. For flat-responsive patients, those given a low dose were propensity matched to patients given a high dose, and average outcomes were compared.

M. Fanton et al., 2022

Gonadotropin Dosing

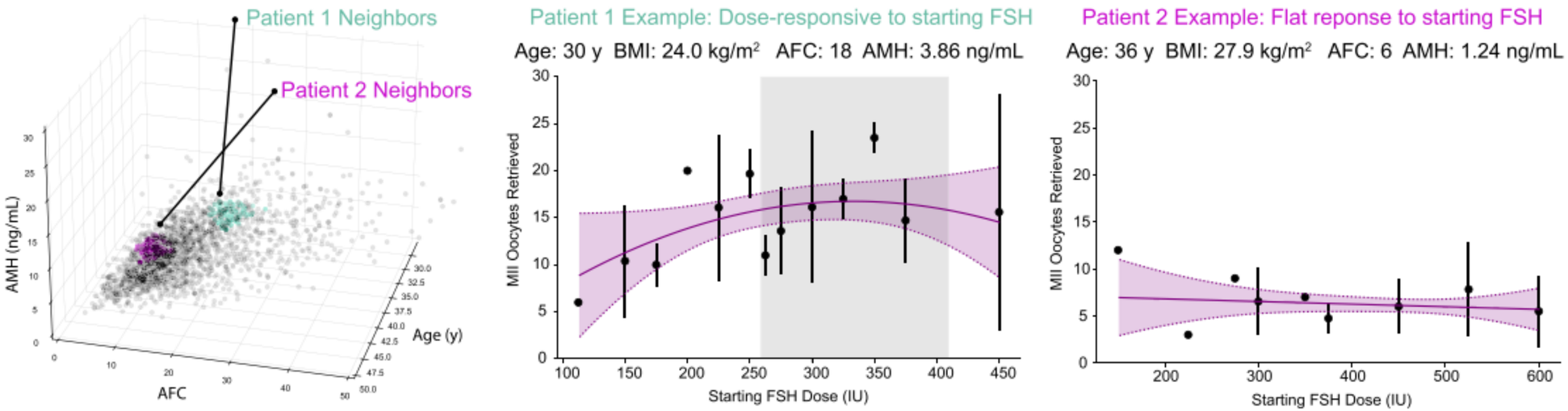


FIGURE 3 Example of using the 100 nearest neighbours to create patient-specific dose–response curves. Neighbours are identified based on similar age, body mass index (BMI), anti-Müllerian hormone (AMH) concentration and antral follicle count (AFC) (left). Patients typically show a dose-responsive profile (middle) or flat-responsive profile (right). The dose–response curve (purple) shows the relationship between the starting FSH dose and the number of metaphase II (MII) oocytes retrieved, with confidence intervals shaded. Data points represent the MII oocytes retrieved (mean ± standard deviation) among all neighbours given that starting dose.

M. Fanton et al., 2022

Gonadotropin Dosing

M. Fanton et al., 2022

AI in Ovarian Stimulation

- Outcome prediction
- Dose selection
- **Trigger decision/Level loading**

Trigger Timing

- When to trigger is one of the most subjective decisions in ART, where a clinician must balance multiple factors simultaneously
  - Mature egg yield, OHSS risk, lab capacity, etc.
- Multiple studies have shown AI's potential to help optimize day of trigger to increase mature egg yield

SEMINAL CONTRIBUTIONS

Check for updates

A machine learning algorithm can optimize the day of trigger to improve in vitro fertilization outcomes

Eduardo Hariton, M.D., M.B.A.,[a] Ethan A. Chi,[b] Gordon Chi,[b] Jerrine R. Morris, M.D., M.P.H.,[a] Jon Braatz, B.S.,[b] Pranav Rajpurkar, Ph.D.,[b] and Mitchell Rosen, M.D., H.C.L.D.[a]

[a] Department of Obstetrics, Gynecology and Reproductive Sciences, University of California San Francisco, San Francisco, California; [b] Department of Artificial Intelligence, Stanford University, Palo Alto, California.

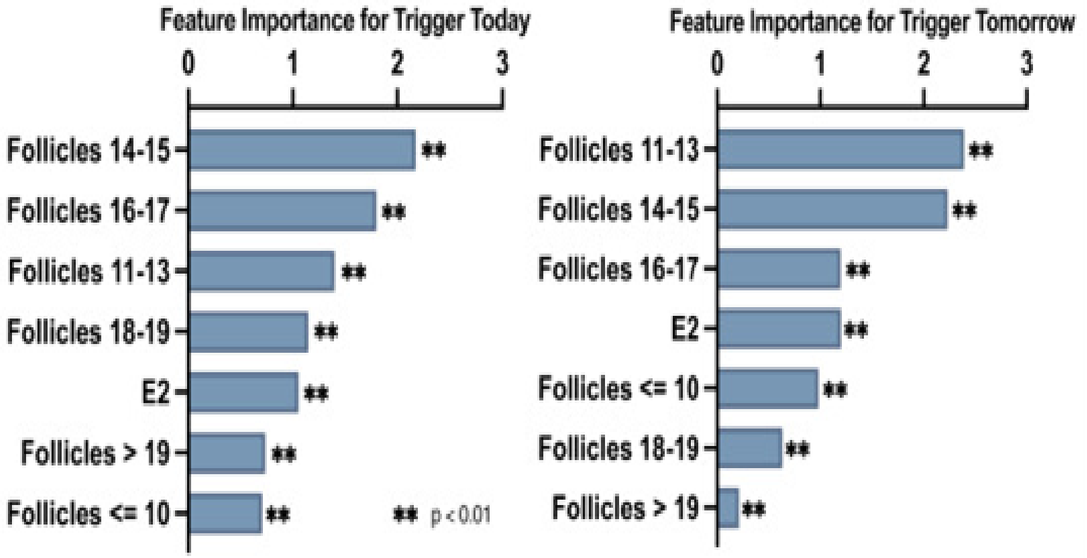
Check for updates

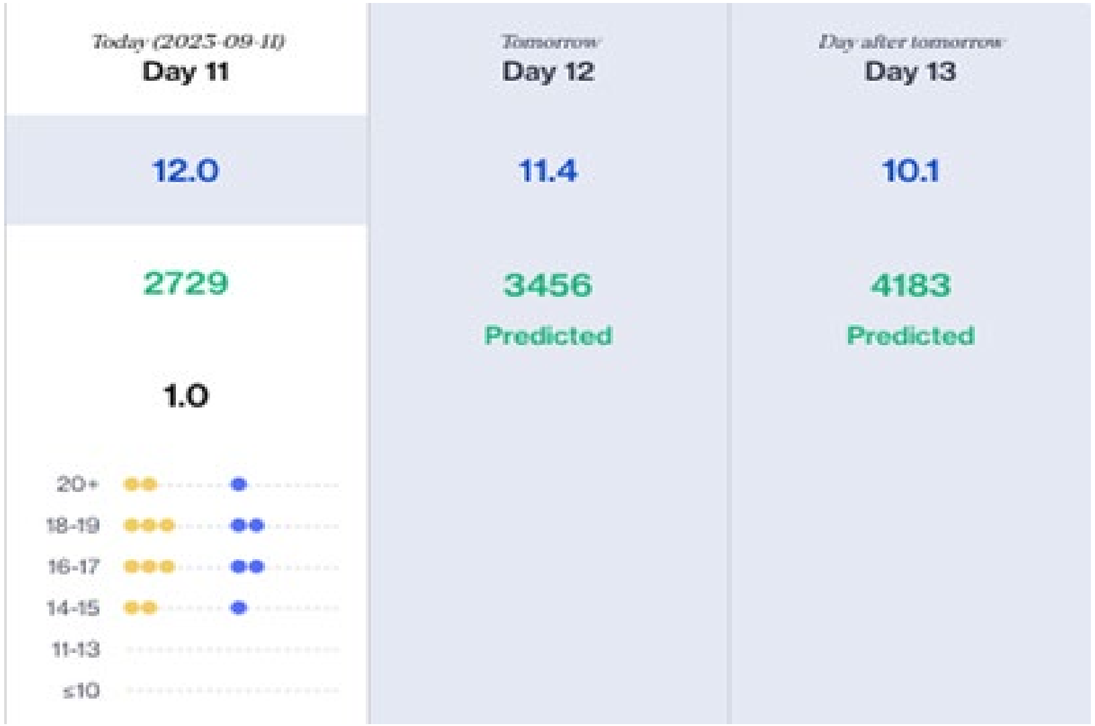
An interpretable machine learning model for predicting the optimal day of trigger during ovarian stimulation

Michael Fanton, Ph.D.,[a] Veronica Nutting,[a] Funmi Solano,[a] Paxton Maeder-York, M.S., M.B.A.,[a] Eduardo Hariton, M.D., M.B.A.,[b] Oleksii Barash, Ph.D.,[c] Louis Weckstein, M.D.,[c] Denny Sakkas, Ph.D.,[d] Alan B. Copperman, M.D.,[e] and Kevin Loewke, Ph.D.[a]

[a] Alife Health, Inc., Cambridge, Massachusetts; [b] Department of Obstetrics, Gynecology and Reproductive Sciences, University of California, San Francisco; [c] Reproductive Science Center, San Ramon, California; [d] Boston IVF—The Eugin Group, Waltham, Massachusetts; and [e] Reproductive Medicine Associates of New York, New York, New York

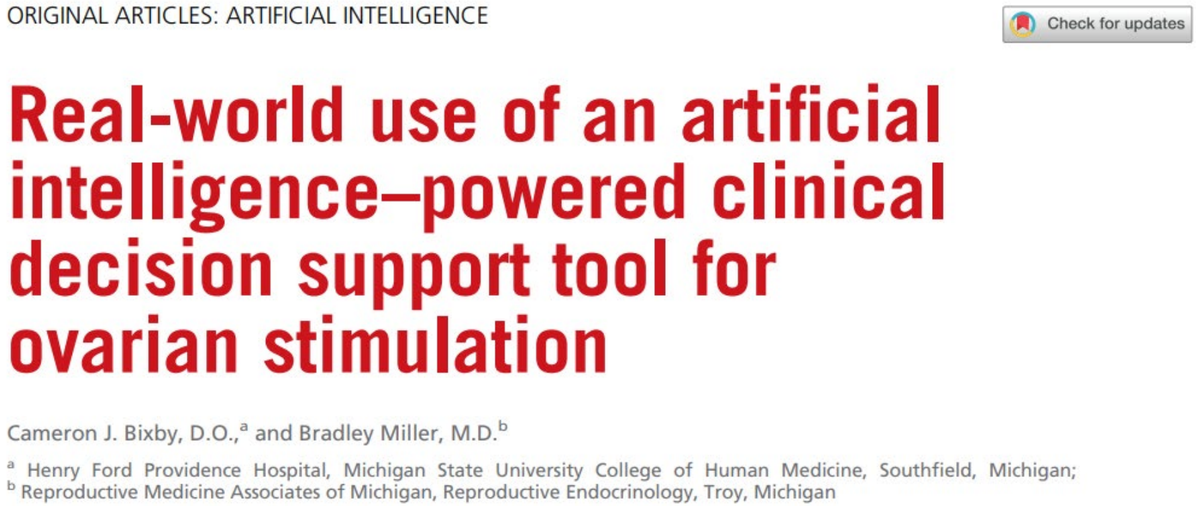
Trigger Timing





Real World Example

- Involved two senior reproductive endocrinologists in the U.S.
- Analyzed multiple IVF cycles where clinicians used the tool for trigger timing decisions
- The aim was to assess how the tool influenced clinical choices, medication use, and patient outcomes



ORIGINAL ARTICLES: ARTIFICIAL INTELLIGENCE

Check for updates

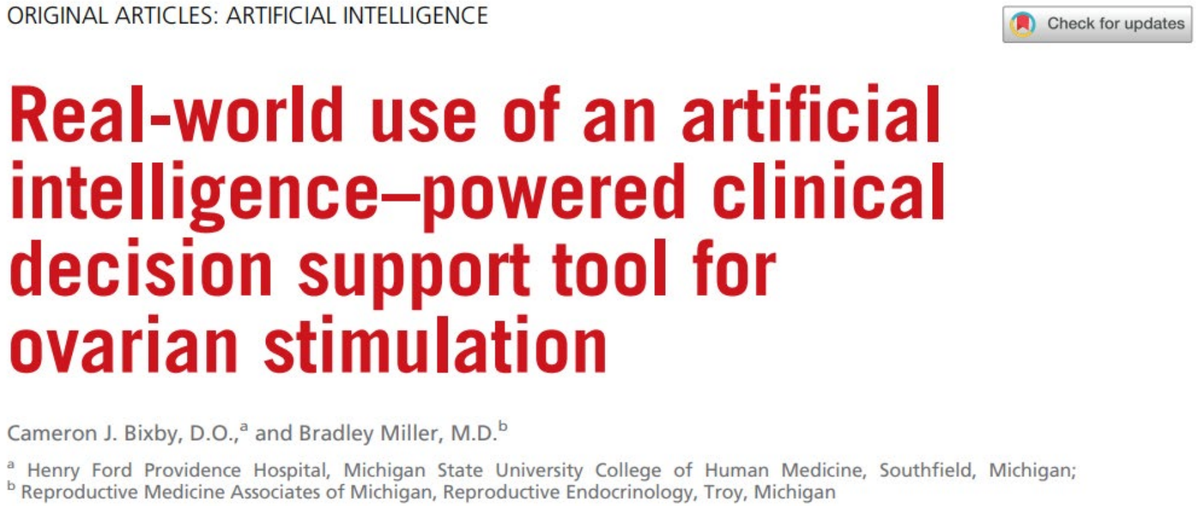
Real-world use of an artificial intelligence–powered clinical decision support tool for ovarian stimulation

Cameron J. Bixby, D.O.,[a] and Bradley Miller, M.D.[b]

[a] Henry Ford Providence Hospital, Michigan State University College of Human Medicine, Southfield, Michigan; [b] Reproductive Medicine Associates of Michigan, Reproductive Endocrinology, Troy, Michigan

Real World Example

- Stim Assist provided daily recommendations—“trigger today” vs “wait” based on patient metrics.
- Physicians chose to follow, discuss, or override the algorithm’s suggestion.
- Engagement rate: ~78% of cycles involved alignment with or adaptation of the tool’s guidance



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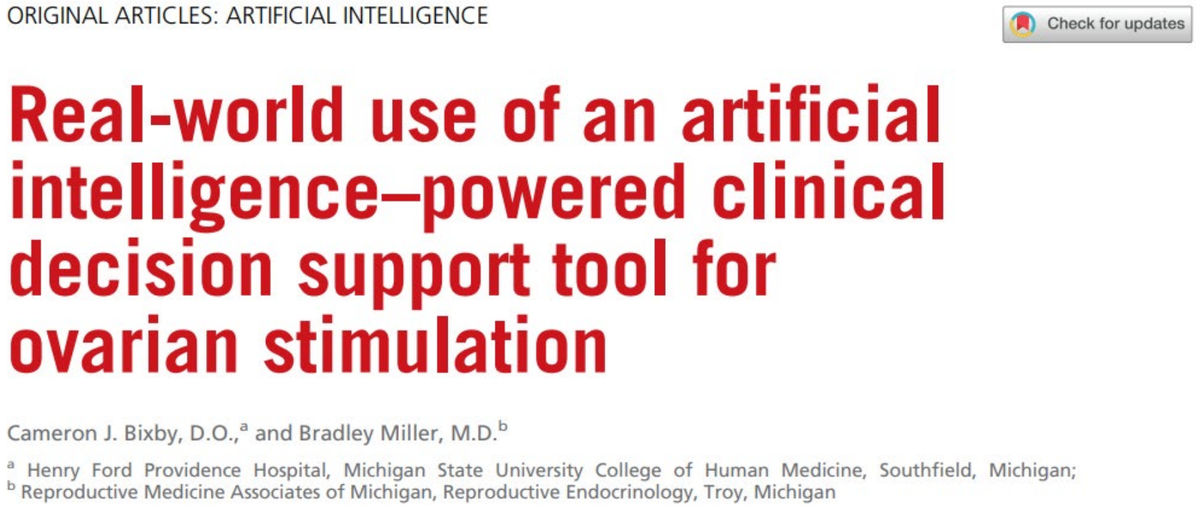
Real World Example

- Increased mature oocytes
  - Average MII counts rose by ~2.6 (from 12.65 to 15.22; p=0.76)
- Medication optimization
  - Average starting FSH dose decreased by ~50 IUs (445.99 to 396.30, p=<.01)
  - Total FSH dose decreased by ~88 IU per cycle (4591.87 to 4199.70, p=<.01)
  - Cost saving $400-1200 per patient
- No cases of ovarian hyperstimulation syndrome (OHSS) were reported during the study timeframe



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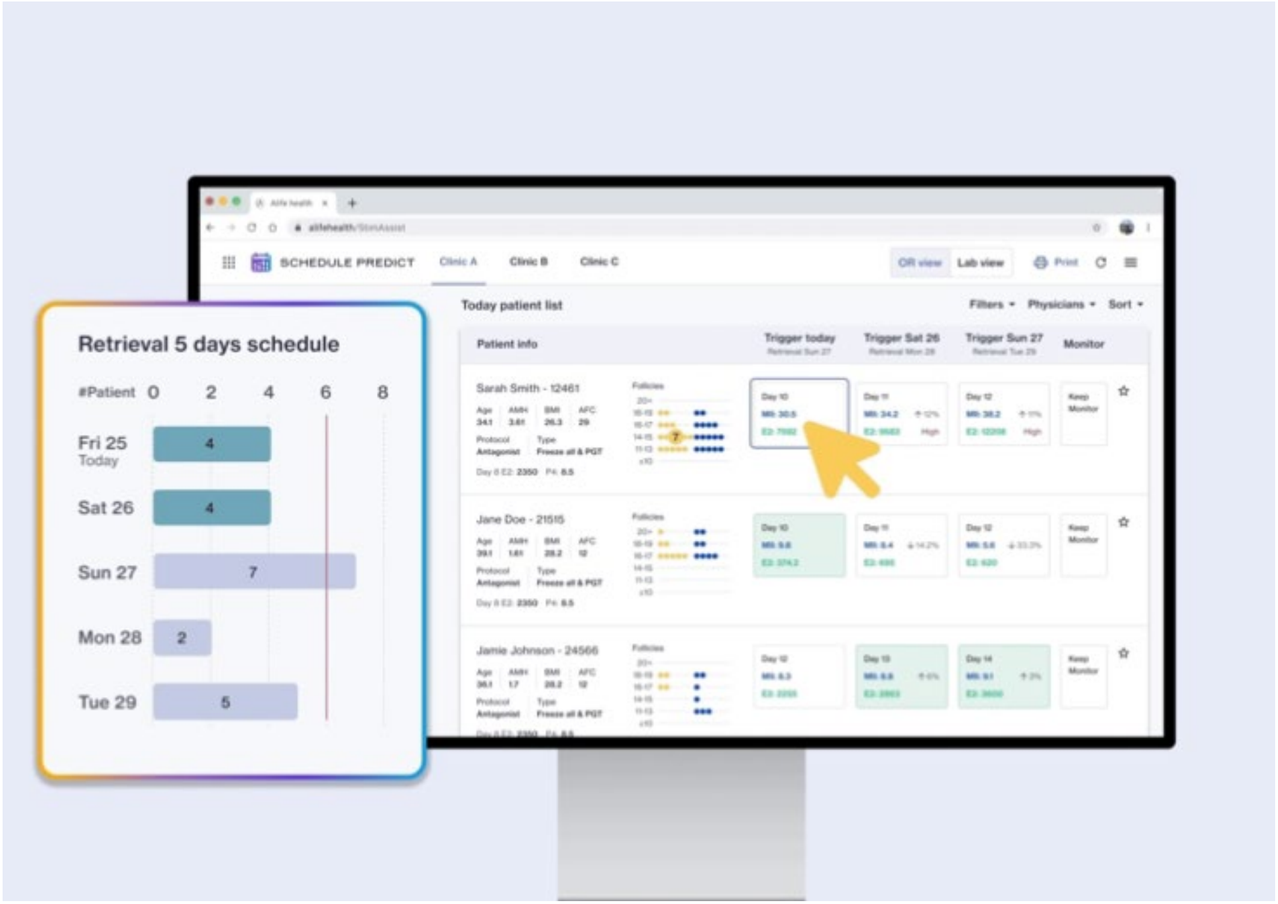
High clinician trust suggests the tool was safe, acceptable, and feasible for integration in everyday IVF workflow

Level Loading

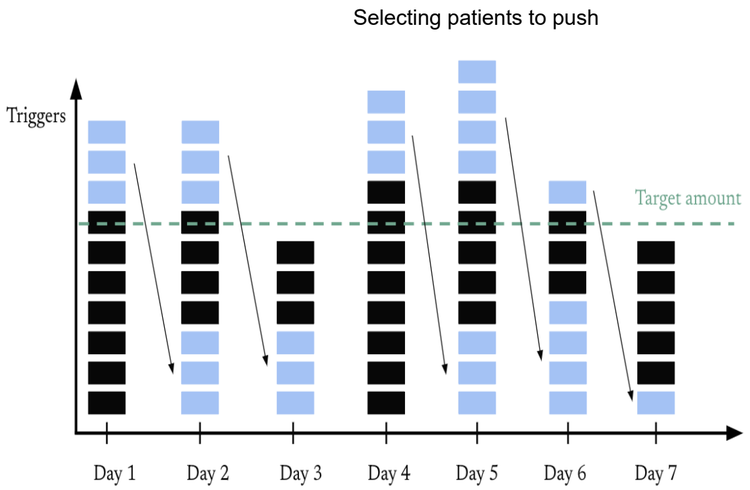
- AI has been proposed to assist with optimizing monitoring appointments, predicting cycle length, and reducing “level loading” the OR
- Use the trigger review board to determine which patients need to be triggered (especially if tomorrow is going to be extra busy), and which can be pushed to tomorrow.
- Trigger a consistent amount of patients each day with no impact to patient outcomes

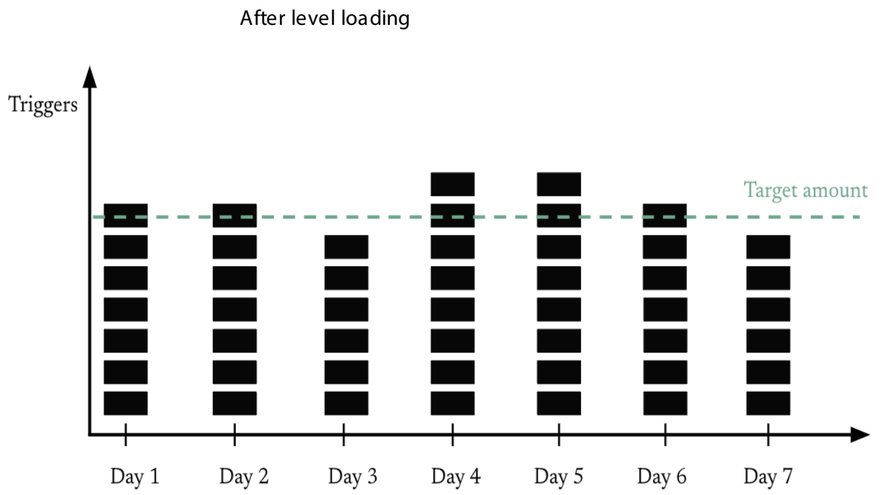


Level Loading

Level Loading Method

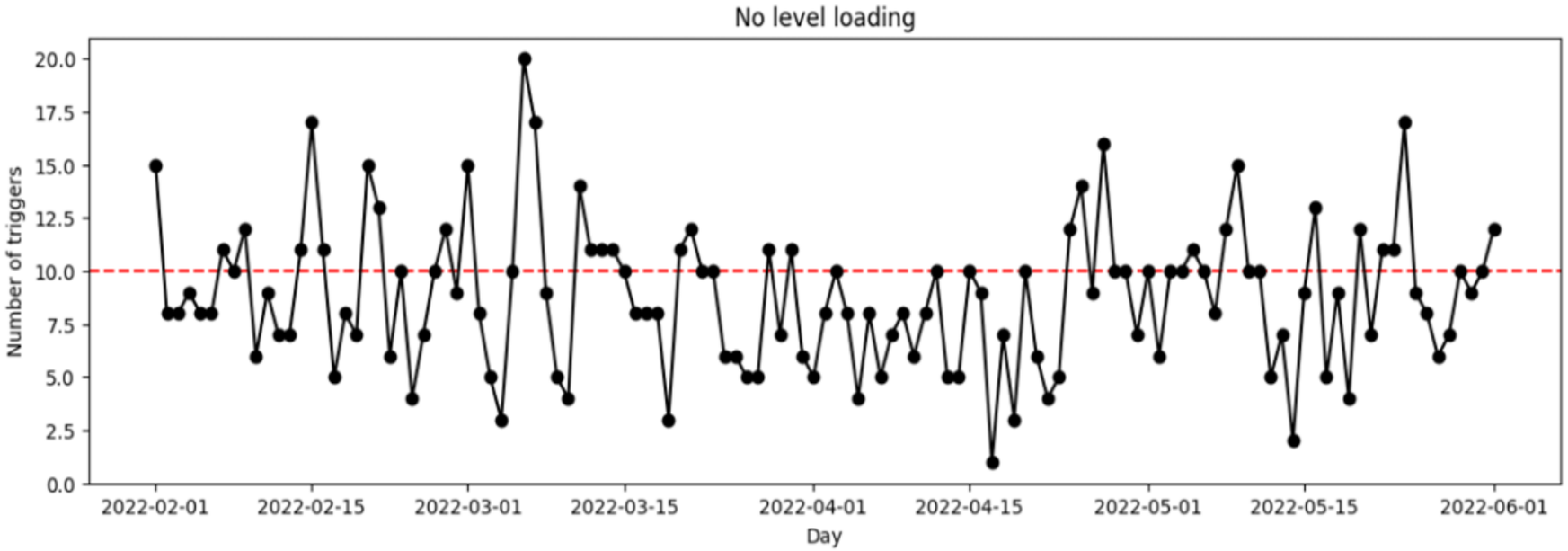
1. Using MII and E2 predictions, determine who could have been pushed to trigger tomorrow
2. Push patients according to priority until you have a target quantity of triggers that day
3. Repeat for each day in your data set





Level Loading

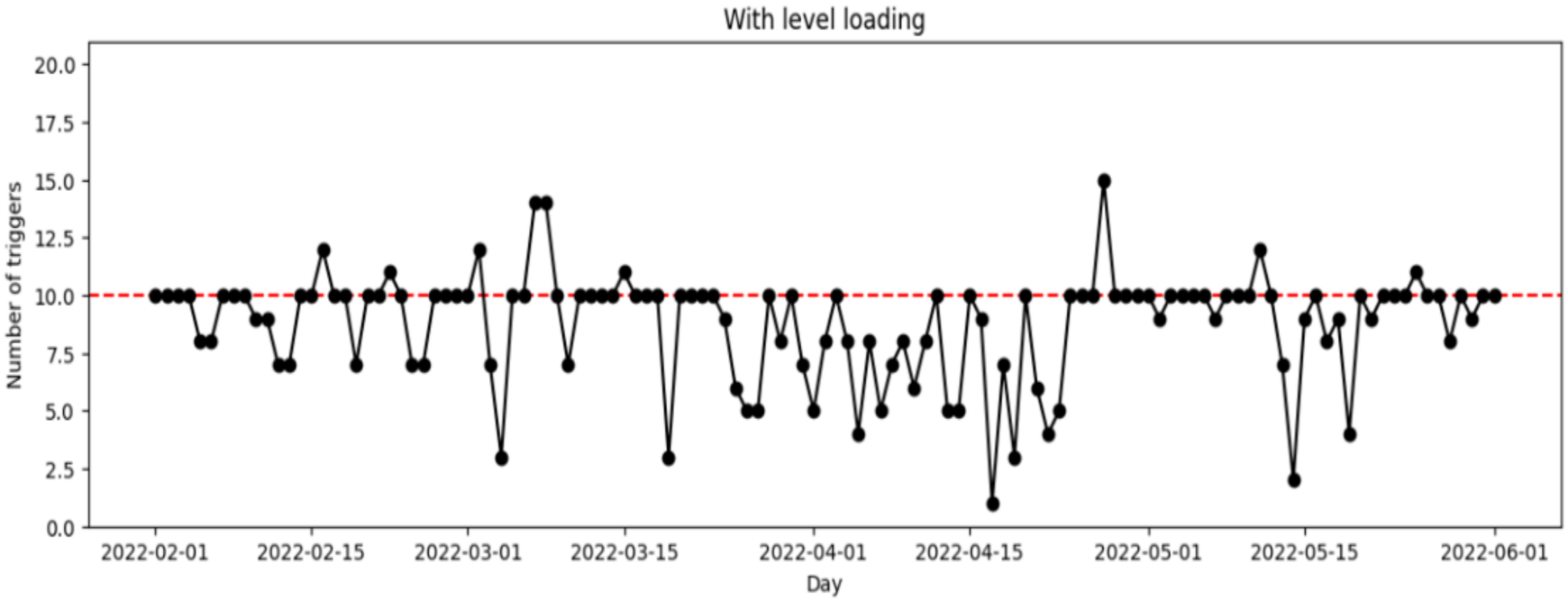
If we set our ideal trigger quantity at **10**, we see that it is crossed a total of **32 times** over a 4 month time period.



Based on a real clinic's data

Level Loading

Using level loading, we cross that ideal threshold **only 9 times**



The Role of AI in the Future

- **The Promise of AI in ART**
  - AI has the potential to transform the IVF clinic (and the embryology lab)
  - Improved outcomes, operational efficiency, and decision support
- **Separating Hype from Reality**
  - It's easy to make claims
  - AI must be rigorously validated
  - Validation could an include internal and/or external testing, randomized control trials, and in some cases regulatory approval
- **The Business Case for AI**
  - Alignment needed from multiple different stakeholders
  - Must consider costs/feasibility to implement in workflow and data privacy
  - Return on investment still needs to be proven out, but promising

This is the most exciting time to be in ART!

- The goal isn’t to replace physicians with technology. It’s to **amplify our expertise** so that far more patients, in far more places, can access fertility care

Imagine a world where…

Jack & Jill

- 34-year-old couple living in rural Idaho with no local fertility clinic
- Trying to conceive and hoping for two children

Early evaluation pathway

- History of treated chlamydia in college triggers early fertility workup
- PCP evaluation identifies mild oligospermia and low testosterone
- Male partner started on clomiphene
- Referred to Ob/Gyn clinic for further management

Initial treatment

- Ovarian reserve, tubes, carrier screening normal
- 3 cycles of OI/IUI managed by APP and supervised by OB/GYN
- Last cycle results in pregnancy but ends in 6 weeks miscarriage

Imagine a world where…

Escalation to ART

- Referred to fertility center for IVF
- Remote monitoring performed at home and reviewed by fertility clinic
- Only one trip to lab required for egg retrieval
- First FET results in pregnancy but leads to a second miscarriage
- Clinical team starts RPL workup and escalates to supervising REI for RPL management
- Balanced translocation identified and counseling provided
- Repeat cycle performed with PGT-SR

Outcome

- Successful singleton live birth
- Two euploid balanced embryos cryopreserved for future pregnancy

Today, geography alone might prevent this couple from ever accessing fertility care, but the system we're building can make this pathway possible for millions of patients like Jack and Jill

The future is (almost) here!

SimpleIVF by Sama x CNY: At-Home IVF starting at just $6000

High-Quality, Evidence-Based IVF for Just $6,000 + Medications

A fraction of the cost (1/3rd of traditional IVF) and monitoring fully at home.

📱 Guided entirely through our app

✅ Ask about our No Baby, No Payment Financing Plans

🚀 Designed for accessibility and success

The future is (almost) here!

SimpleFreezing by Sama x CNY: At-Home Egg Preservation starting at just $5000

High-Quality, Evidence-Based Egg Freezing for Just $5,000 + Medications

A fraction of the cost (1/3rd of traditional Egg Freezing) and monitoring fully at home.

📱 Guided entirely through our app

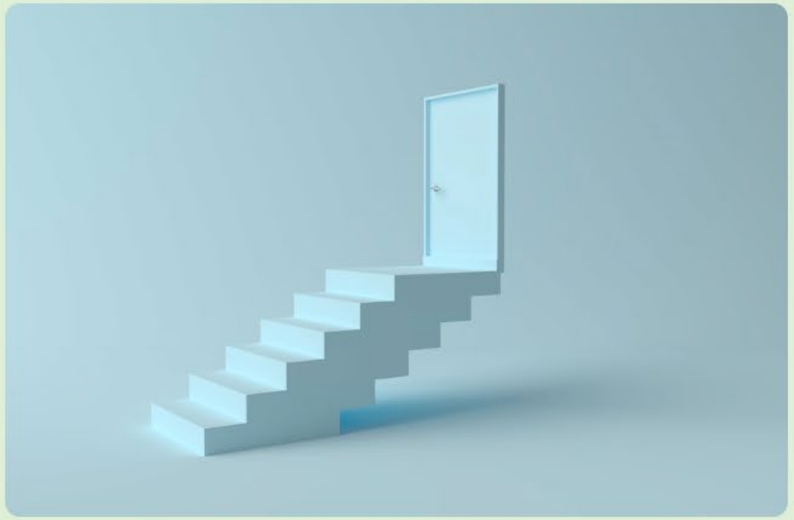
🚀 Designed for accessibility and success

The future is (almost) here!

Self-Start Your Journey

Skip the wait, start now
Complete a short intake form, bloodwork at LabCorp, and a local ultrasound
A fertility doctor reviews your results and creates your treatment plan
Meet with a fertility nurse to review the plan and get your prescriptions —and get started

Get Started



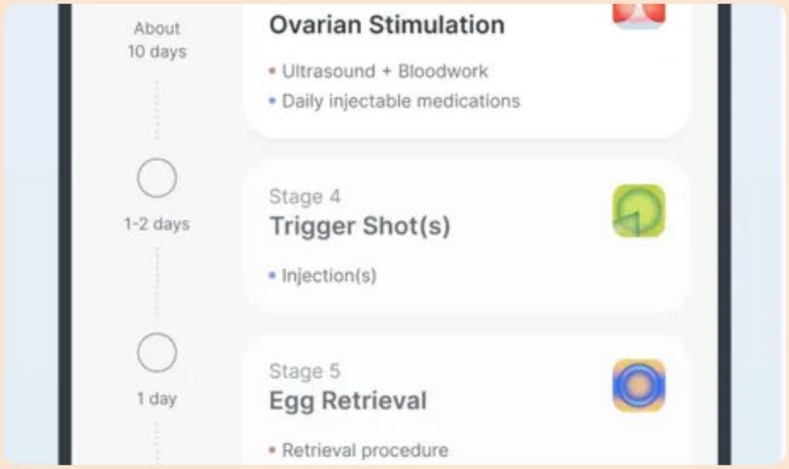
Booking	Treatment Start
5 min	0 weeks

The future is (almost) here!

Personalized Protocol & App-Based Guidance

Your treatment is fully mapped out, following an AI-optimized protocol
Daily instructions and reminders through the **Sama Fertility App**
Medication and monitoring are delivered at your doorstep and **self-administered at home**

Get Started



Availability
24/7

Avg Response
15 min

The future is (almost) here!

Proprietary Sama Anywhere Monitoring & Stimulation at Home

Self-administered ultrasounds with remote guidance from our specialists
Medication protocol tailored to your response
Worlds first bloodless IVF protocol

Get Started

Total Scans	Trips to the Clinic
3	0

The future is (almost) here!

Egg Retrieval

Travel to a CNY location (Sama's SimpleIVF partner) for a brief egg retrieval procedure

CNY **Fertility**

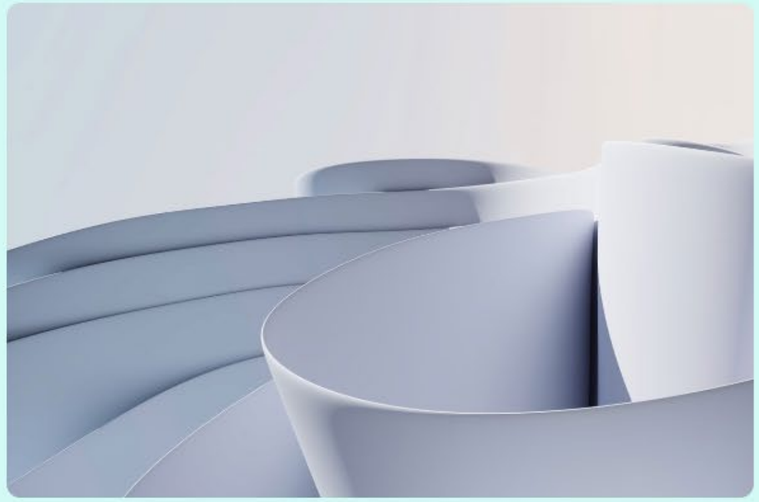
Get Started

Retrieval Centers	Babies born at CNY
5	30,000+

The future is (almost) here!

Embryo Transfer & Success Guarantee

Transfer takes place at a **CNY Fertility location**
No Baby, No Payment Guarantee plans available: If you don't take home a baby, you get your money back



Failed Cycle

$0

User Satisfaction

95%

Get Started

The future is (almost) here!

How Simple IVF Works

Feature	Simple IVF	Traditional IVF
Cost	$6,000 + Meds for ~$2500	$15,000 - $25,000
Convenience	Fully at-home monitoring	Frequent clinic visits
Ultrasound Monitoring	Self-administered at home	In-clinic ultrasounds
Bloodwork Monitoring	None	6-7 painful blood draws
Guidance	App-based, 24/7 support	In-person doctor visits
Success Guarantee	No Baby, No Payment Plans	No refunds

The future is (almost) here!

Who is Simple IVF For?

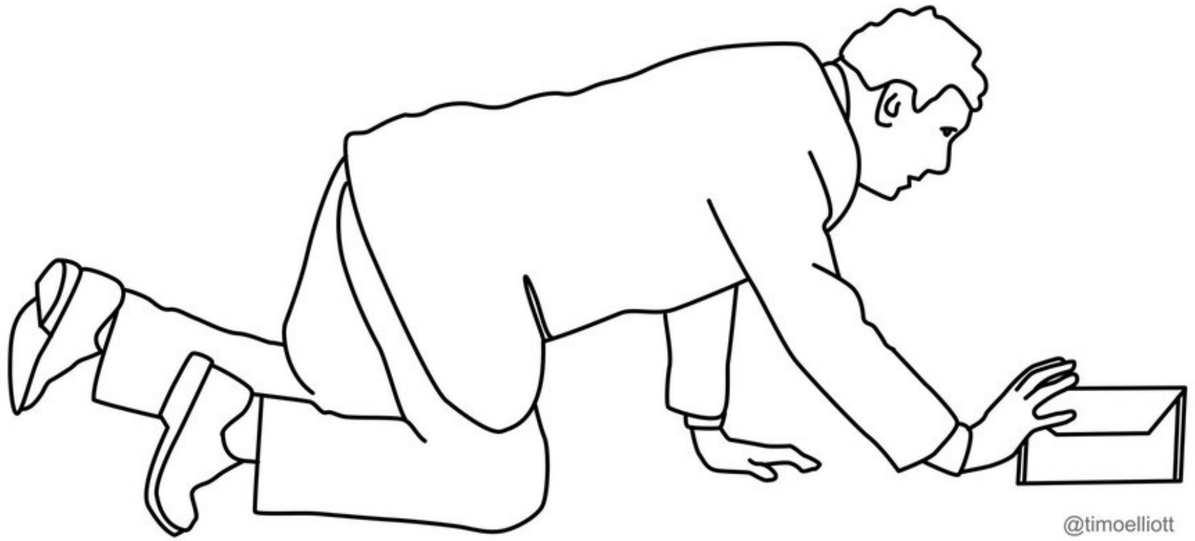
- ✔ Females/Women under 42
- ✔ Need affordable and convenient care
- ✔ Comfortable with remote care
- ✔ Willing to do guided self-monitoring
- ✘ Complex infertility cases
- ✘ Extreme diminished ovarian reserve
- ✘ Those requiring specialized lab procedures

Not Sure If You Qualify? Book a consult to find out.

Predictions for The Next Decade of Fertility Care

- • **Demand for fertility care will continue to rise** as awareness, coverage, and social acceptance grow
- • Fertility care will shift to **team-based delivery models**, allowing physicians to focus on the most complex decisions
- • **Data and clinical decision support** will reduce variability and raise the baseline quality of care
- • **Operational innovation and automation** will lower the cost per cycle and expand access
- • As science advances, **outcomes will continue to improve**

Thank you!



For the final innovation exercise, the instructor asked everybody to practice pushing the envelope.

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