Viewpoint: In the post Roe v Wade world, what changes should a biology textbook writer make to address the medical repercussions of Dobbs?

The Republican Party has created quite a political and scientific mess in its chaotic and contradictory legislative maneuverings in the wake of the overturning of Roe v Wade. Sen. Lindsey Graham spent much of the last week defending his proposed federal ban on all abortions after 15 weeks—a law that also allows any state to set even more restrictive standard, including refusing to allow a woman to terminate a pregnancy in cases of incest or to protect her health.

The proposal was seen by many as an attempt to deflect growing concerns that Republicans are out of step with most Americans who want to preserve some version of choice in every state.

Graham’s proposal to try to deflate the backlash against Dobbs has drawn criticism and even ridicule from the right and the left, both of whom call it ham-handed but for different reasons.

Senate Minority Leader Republican Mitch McConnell, referencing the ban, said that “most of the members of my conference prefer that this be dealt with at the state level”— which in Republican-dominated states mostly means complete bans even in cases of incest or health complications.

Democrats were no less incensed. House speaker Nancy Pelosi called Graham’s proposal “the latest, clearest signal of extreme MAGA Republicans’ intent to criminalize women’s health freedom in all 50 states and arrest doctors for providing basic care. Make no mistake: if Republicans get the chance, they will work to pass laws even more draconian than this [Graham] bill – just like the bans they have enacted in states like Texas, Mississippi and Oklahoma.”

The over-riding issue for most Americans is ‘government overreach’, once a sacred conservative principle: Republicans are increasingly inserting of the government into the private relationship between patients and their clinicians in guiding health decisions, says the American College of Obstetrics and Gynecology in a joint statement representing more than 75 health care organizations:

Abortion care is safe and essential reproductive health care. Keeping the patient–clinician relationship safe and private is essential not only to quality individualized care but also to the fabric of our communities and the integrity of our health care infrastructure. As leading medical and health care organizations dedicated to patient care and public health, we condemn this and all interference in the patient–clinician relationship.

I’ve published 38 editions of several college life science textbooks since 1982. All have covered human prenatal development and assisted reproductive technologies (ARTs).

My books have chronicled the progress in reproductive medicine: from Louise Joy Brown, the first “test tube baby,” through the fading of amniocentesis as checking circulating fetal DNA offered a far less invasive way to detect extra chromosomes; to selecting the earliest embryos for one or two free of a family’s disease-causing mutation, circumventing a lethal legacy.
I'm now revising the final chapter of the fourteenth edition of my human genetics textbook, entitled “Reproductive Technologies.” It’s a crazy time to be doing that.

I read most of the decision, to reach my own conclusions. I was astonished at how profoundly the justices skirt the health field that bloomed into existence with Louise Joy Brown four decades ago. I don’t pretend to know anything about the law. How can the justices presume medical expertise in telling a woman what she can and cannot do to her body, with such hubris?

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Dissecting the language
The tone of the Supreme Court decision stunningly evokes the thinking of another century – and I don’t mean the twentieth.

About halfway through the 213 pages, seeing no words from modern reproductive medicine, I started doing word searches to speed things up.

A search for in vitro fertilization called up one mention, but in the dissent. Actual. Medical. Facts.

Further, the Court may face questions about the application of abortion regulations to medical care most people view as quite different from abortion. What about the morning-after pill? IUDs? In vitro fertilization? And how about the use of dilation and evacuation or medication for miscarriage management?

Next I searched for a fundamental distinction in developmental biology: embryo versus fetus.

“Embryo” gets 3 hits in the decision. The first is part of “embryology” in a footnote. More telling is the second mention, part of a quote within a quote (“In contemplation of law life commences at the moment of quickening, at that moment when the embryo gives the first physical proof of life, no matter when it first received it,’ emphasis added”). That’s from an 1872 decision The third mention of “embryo” is as part of Embryos in the title of a paper cited in a footnote. Not a lot of coverage.

Embryos by definition do not yet have rudiments of all body parts. The period of the embryo extends from fertilization (aka conception) to the end of the 8th week. Obstetricians and politicians count the weeks from the last menstrual period, which tacks on two non-pregnant weeks at the start. Maybe that’s because “40 weeks” is easier to remember than “38 weeks.” More likely, perhaps the erroneous timetable is a legacy from when most obstetricians and politicians were people who could not become pregnant.
In the decision, a word search for “fetus” brings 54 hits, compared to the 3 indirect ones for embryo, although most abortions are in fact done on embryos. The 2019 [CDC Abortion Surveillance](https://www.cdc.gov) finds that “the majority of abortions … took place early in gestation: 92.7% … performed at ≤13 weeks’ gestation; a smaller number of abortions (6.2%) … at 14–20 weeks’ gestation, and even fewer (<1.0%) … at ≤21 weeks’ gestation.”

**Errors of omission**

Next I searched for terms familiar to people seeking reproductive health care. It was enlightening.

First, I looked for mention of some stages of early development beyond the familiar embryo and fetus:

0 hits each for zygote, blastocyst, and inner cell mass.

Then I looked for ARTs other than the lone IVF mention:

0 hits each for gamete intrafallopian transfer (GIFT), preimplantation genetic diagnosis (PGD), and zygote
intrafallopian transfer (ZIFT).

I began to think of Dean Wormer’s comment to John Belushi’s character Bluto Blutarsky in *Animal House* about his grade point average: “Mr. Blutarsky. ZERO POINT ZERO.”

The decision mentions the stages of prenatal development in very vague terms, focusing at great length on “quickening,” when a woman first feels fetal movement. It’s all from an historical perspective. And that is a part of pregnancy that a man might imagine. He might wax less sentimental over the barfing, exhaustion, back pain, and labor.

What terrifies me the most is that repealing Roe v Wade doesn’t affect just those seeking abortion services. Consider a woman having a miscarriage.

**Spontaneous v induced abortion**

My word search for “miscarriage” brought up 66 references to the phrase “procure the miscarriage.” The two instances of “produce abortion or miscarriage” reveal that “procure the miscarriage” is doublespeak for “abortion.” That’s dangerous, because the two drugs used to safely manage a miscarriage are the same used to induce abortion. Ditto the scraping of the uterine lining. The dissent reminds of these facts.

What effect will the decision have on a woman experiencing a spontaneous abortion in a state that doesn’t allow the treatment she needs? Will a woman in those states entering a clinic with bleeding and cramping become a criminal suspect? In Alabama, for example, performing an abortion is a Class A felony – a provider faces from 10 to 99 years in prison. In Texas, treating infection in a pregnant woman may be
delayed because doctors fear punishment, even if they know that live birth is impossible, risking septicemia or even death of the woman.

“No one facing a medical crisis should have to fear their physician pausing, or even halting, when in the midst of doing what the patient needs in order to resolve or avoid the threat of prosecution,” said Jen Villavicencio, MD, representing the American College of Obstetricians and Gynecologists. Imagine that happening during cardiac bypass or an appendix removal. Or vasectomies, which are unsurprisingly on the rise in the wake of the decision.

Villavicencio also questions the judges’ expertise to rule on medical matters, reaching the same conclusions that I did:

> The individuals writing these laws are not medical experts. Laws like abortion restrictions and bans are not based in science or evidence and, therefore, the language does not coincide within the practice of the highest quality, evidence-based care. The language is often incorrect, not clinically meaningful, and therefore confusing to those practicing medicine … Pregnancy, complications of pregnancy, and the treatment of those complexities require nuanced, individualized care—something that is very difficult when faced with unscientific, non-medical laws.

**IVF extras**

*In vitro* fertilization is also complex, requiring nuanced, individualized care. It’s painful (daily injections) and drawn out over weeks, with a few months “off” between attempts. Several embryos must be created in order for one or sometimes two to divide enough times to transfer to a woman’s uterus. The embryo then is a blastocyst, a hollow ball of cells – not the comma-shaped tiny humanoid that some might envision, nor the magnified, mangled fetuses that festoon anti-abortion placards meant to terrorize women at a traumatic time of their lives.

In an increasingly common procedure done with IVF to up the odds of success, a blastocyst cell is removed and tested for mutant genes. If it’s free of the mutation, the remaining still-microscopic blob is transferred to the woman’s uterus. This procedure is called preimplantation genetic diagnosis, or PGD.

The first case of IVF with PGD enabled a family to conceive a child who did not inherit the cystic fibrosis that both parents carried. That was 30 years ago.

Extra embryos generated through IVF, with or without PGD, may be donated to other women, for research, discarded, or frozen. More than a million human embryos are currently frozen. What’s to be done with the ones in states where women can’t choose what happens to their bodies? Charge the women with a crime? Charge the men, who contributed one genome copy to each cell of each embryo on ice? Fine them? Lock them up? Or defrost thousands of embryos in suspended animation? Then what?

**Donating doomed IVF embryos**
Katie Moser has the mutation that causes Huntington’s disease. She wants to have a child that doesn’t inherit the mutant gene, and IVF with PGD could make that happen.

*The New York Times* has chronicled Katie’s experience and she’s told her story as an advocate for people with movement disorders. She’ll likely develop symptoms before age 50. She turns 41 on July 14 – also Woody Guthrie’s birthday, perhaps the most famous person to have HD. In 2011, Katie underwent two rounds of IVF. Eighteen embryos resulted, eight viable. But they all had inherited the HD gene.

HD is dominant, so the embryos aren’t just carriers. They’re destined, and so hold clues to the earliest manifestations of the disease. That’s why Katie donated them for research – a decade ago – to researchers in another state. How will the abortion decision affect the transport of genetically-doomed frozen IVF embryos? Will flights need to be rerouted over states with more liberal laws, like people carrying cannabis on planes, avoiding the “forbidden zones?” That may sound like the Planet of the Apes, but it’s what the US is becoming, in terms of reproductive rights: a mosaic of forbidden zones.

### Detecting a devastating condition during pregnancy

Katie Moser had genetic *testing* because she knew she has a family history of a single-gene disease. Millions of pregnant women have genetic *screening*, which means without such a history, with a simple blood test, **NIPT** (noninvasive prenatal testing).

NIPT is done after 9 weeks, in obstetric-speak. If the number of fetal DNA pieces corresponding to a chromosome far exceeds or is below the number of maternal pieces, then the fetus has an extra or missing chromosome, respectively.

The test has replaced much more invasive amniocentesis and chorionic villus sampling. A bad result – an extra chromosome 13 or 18, for example, which rarely leads to a live birth – brings up the choice to end the pregnancy. Will overturning Roe force women in some states to endure a pregnancy with a near 100 percent likelihood of ending in tragedy? Yes.

The dissenting opinion from justices Breyer, Sotomayor, and Kagan directly addresses the issue of a fetus with a hopeless diagnosis:

> So too, after today’s ruling, some States may compel women to carry to term a fetus with severe physical anomalies—for example, one afflicted with Tay-Sachs disease, sure to die within a few years of birth.

Again, medical facts and details.

### How will I revise my textbook?

I looked through the final chapter of my human genetics textbook, *Reproductive Technologies*. I will not
allow the Roe v Wade reversal to impact my coverage of this essential information.

The chapter opening case history is true, about a couple seeking IVF with PGD to select an embryo free from the devastating brain disease for which they are each carriers, as well as for a clotting abnormality the man has. If they select a disease-free embryo, what will happen to the others?

The first section of the chapter discusses “savior siblings,” relating the famous story of Adam Nash. He was chosen, as an 8-celled-embryo, to be transferred to his mother-to-be’s uterus so that he could eventually donate umbilical cord stem cells to save his 6-year-old sister Molly from Fanconi anemia. Adam did not inherit the mutant genes and was a perfect tissue match for Molly. He was born in 2000 – this technology is hardly too new for the justices to be unaware.

After the section on IVF, my book covers the aforementioned GIFT and ZIFT. Both are used to treat infertility.

In GIFT, a few eggs are retrieved and introduced with sperm into a fallopian tube, past a blockage. Fertilization takes place in vivo, so there’s nothing to outlaw. (And of course donating eggs is painful; donating sperm, well, not so much.)

In ZIFT, sperm meet eggs in a dish, like regular IVF, and then a fertilized ovum is placed into the tube. In regular IVF, it divides a few times first.

So, a physician who fumbles and drops the pipette bearing the precious cargo of GIFT is just making a mess. But a physician who drops the pipette bearing a fertilized ovum is committing murder, ending the life of an “unborn child,” albeit one who is just one cell.

The slippery slope that comes with this archaic, religion-tainted Supreme Court decision is going to cost many postnatal lives.

The dissenting opinion sums up the situation:

*The majority’s refusal even to consider the life-altering consequences of reversing Roe and Casey is a stunning indictment of its decision. … With sorrow—for this Court, but more, for the many millions of American women who have today lost a fundamental constitutional protection—we dissent.*

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