
**Title Slide**

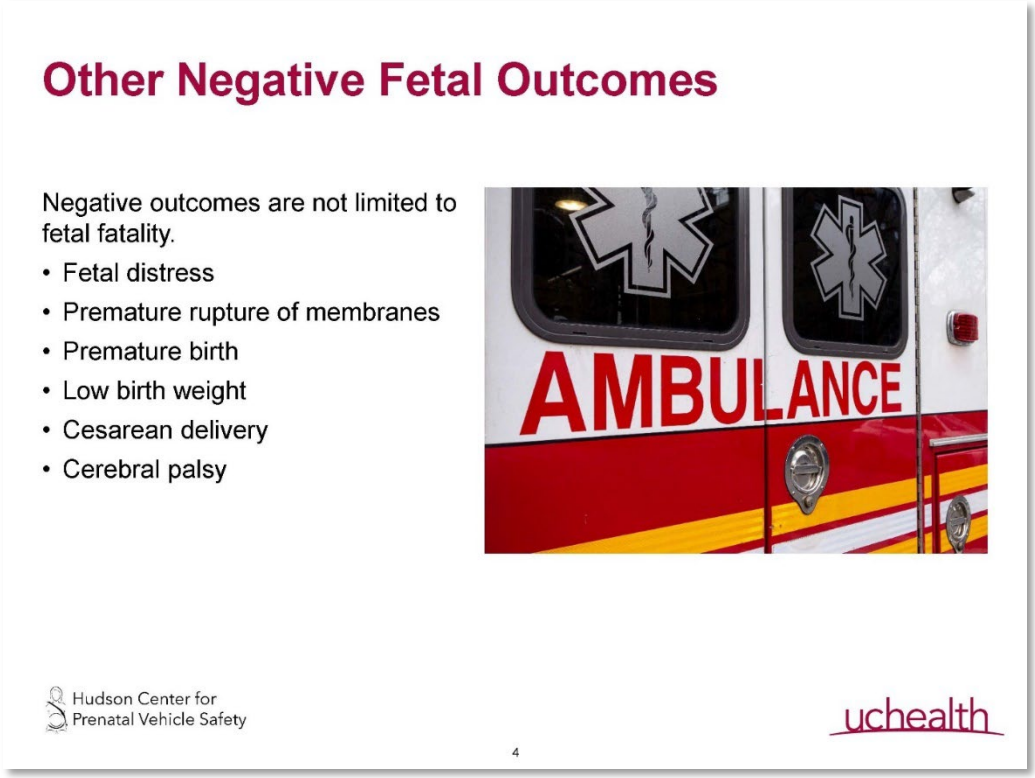
- Introduction.


**Language and Terminology**

- The reason we say "driver" instead of "occupant" is to remind CPSTs to expand their focus. When we are talking about child occupant protection, is it simply child *passenger* safety. The main discussion is crash survival. In pregnant occupant protection we have the element of crash survival, but we also add crash prevention. This includes vehicle control and distractions.
- I will also shorten "prenatal vehicle safety" to PVS.
- I have worked at Poudre Valley Hospital, or PVH, for the past eleven years so I may slip and say that when I mean PVS.

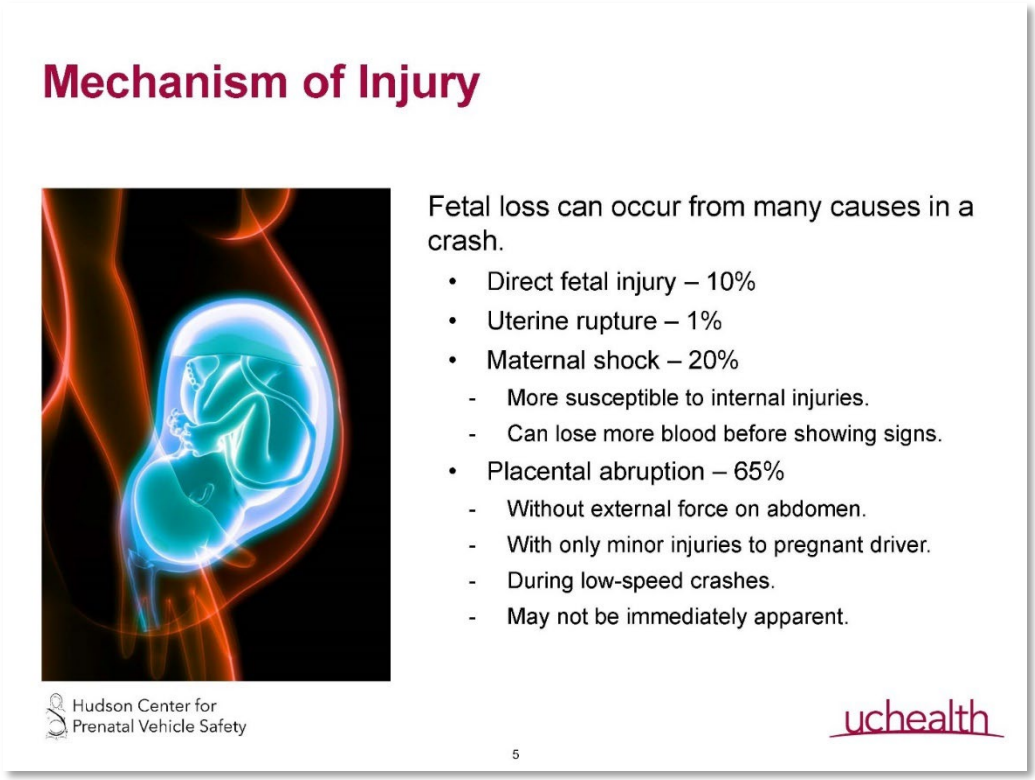

**Fatalities by Age**

- Why is PVS so important?
- This is the average number of crash fatalities in the United States from 2017-2021 divided out by age.
- The gray columns are ages 0-25 and beyond divided by year.
- As you can see, fatalities start off low, stay low through childhood, climb into the teenage years, peaking at 21, then taper off into adulthood.
- The very tall red column is the average number of fetal losses due to crashes.
- 1,405. Almost twice as high as the highest other ages and 20 times higher than infant fatalities.
- That means the baby on the left is 20 times more likely become a traffic fatality than the infant on the right.
- Or if you want to phrase it differently the baby on the right is 20 times safer than the baby on the left.



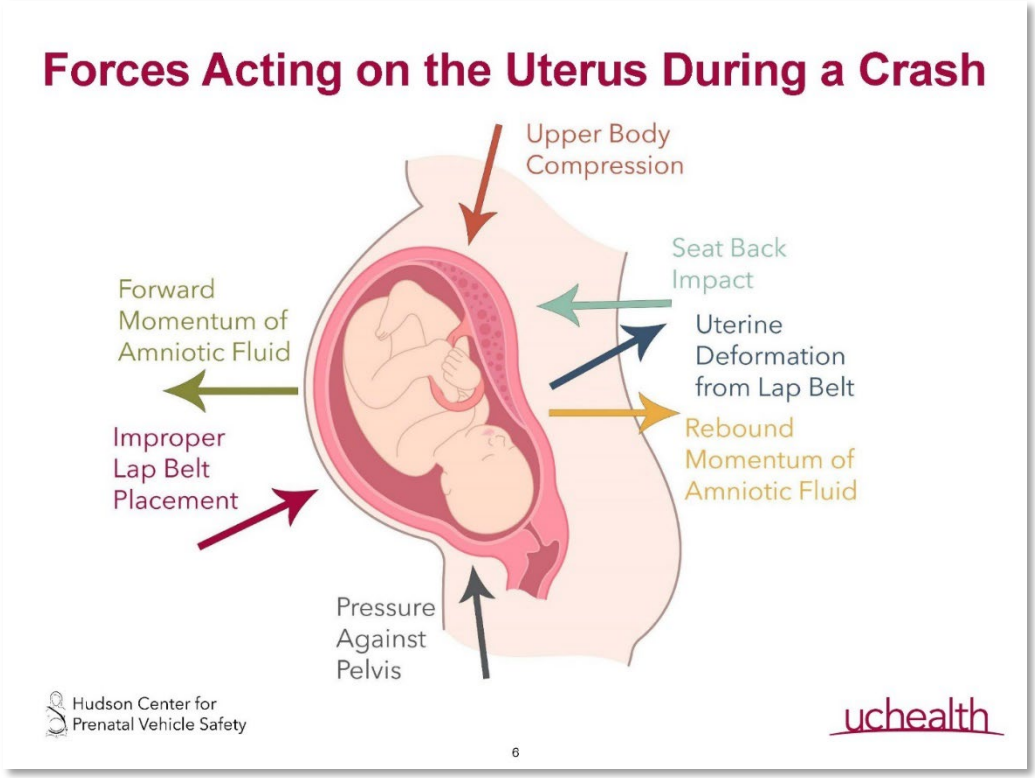

**Other Negative Fetal Outcomes**

- While fatalities are the easiest figure to compare to other ages, negative fetal outcomes are not limited to fetal losses.
- Other negative outcomes include:
    - Fetal distress
    - Premature rupture of membranes
    - Premature birth
    - Low birth weight
    - Cesarean delivery
- A study even found an increased incidence of cerebral palsy in children that were in crashes in utero.




**Mechanism of Injury**

- It is very important to talk about what injuries we are trying to prevent.
- They may not be what people think. It was not what I thought when I started looking into this.
- Direct fetal injury is what usually comes to mind first. Something hits the belly, baby is inside the belly, baby gets hurt. But that's only the cause for about 10% of losses.
- Uterine rupture is a popular topic in case studies and is catastrophic when it happens. But the reason there are case studies on this is because it is so rare.
- Getting into the main causes of fetal loss from crashes we have maternal shock.
    - The pregnant person loses enough blood that the oxygen flow to the fetus is compromised.
    - This is a big risk for pregnant patients because they are more susceptible to the liver and spleen injuries that can cause massive bleeding. Their liver and spleen are pushed closer to the thoracic wall by the expanding uterus and there is less space for them to compress into.
    - On top of that a pregnant patient can lose up to 1.5 liters of blood before the signs of shock are obvious.
- Placental abruption is the main cause of fetal loss from crashes. That is where the placenta unsticks from the wall of the uterus and compromises oxygen flow to the fetus.
    - Abruption can occur without external force on the abdomen.
    - It can happen with only minor injuries to the pregnant patient.
    - It can result form low speed crashes.
    - And the symptoms may not be immediately obvious, delaying treatment.




**Forces Acting on the Uterus During a Crash**

- To see why placental abruption can happen in all of these situations we need to look at the forces acting on a uterus during a crash.
- As you can see there a many different forces acting on the uterus. Some are external and some are internal.
- There are three phases of a crash. Vehicle stops, body stops, organs stop.
- People get stuck on the body stopping. What happens when the belly hits the lap belt, airbag, or steering wheel? Only two of these arrows happens during the second stage.
- Most of these forces happen during the third and hardest to manage stage.
- Crash tests done with an accelerometer on an artificial fetus actually recorded the sharpest spike in acceleration when the dummy rebounded back and hit the vehicle seat back.
- Abruption can also happen no matter where the placenta is on the uterus.
- Mechanism of injury is a complex system and it takes a complex system to manage it. Simply place the lap belt low is not enough.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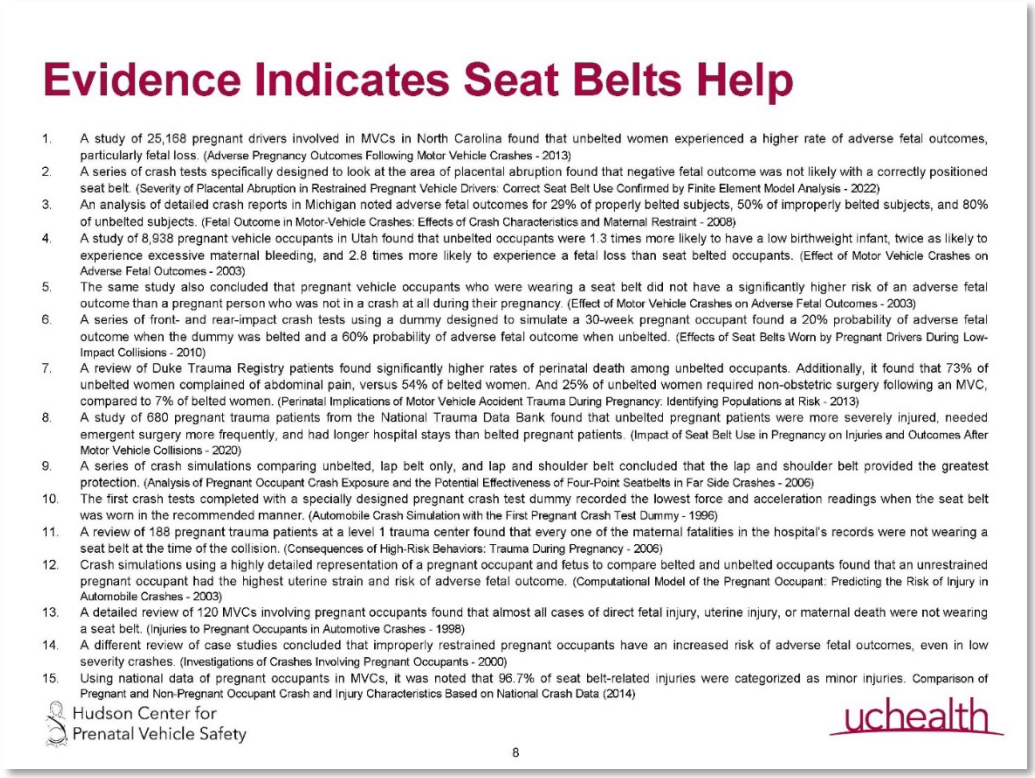
**Seat Belts Save Two Lives**

- I have great news.
- Proper seat belt use reduces the risk of adverse fetal outcomes by 84%.
- Every passenger vehicle has seat belts.
- We simply just need people to use them correctly.
- Three-point seat belts became mandatory in the front seat in 1968.

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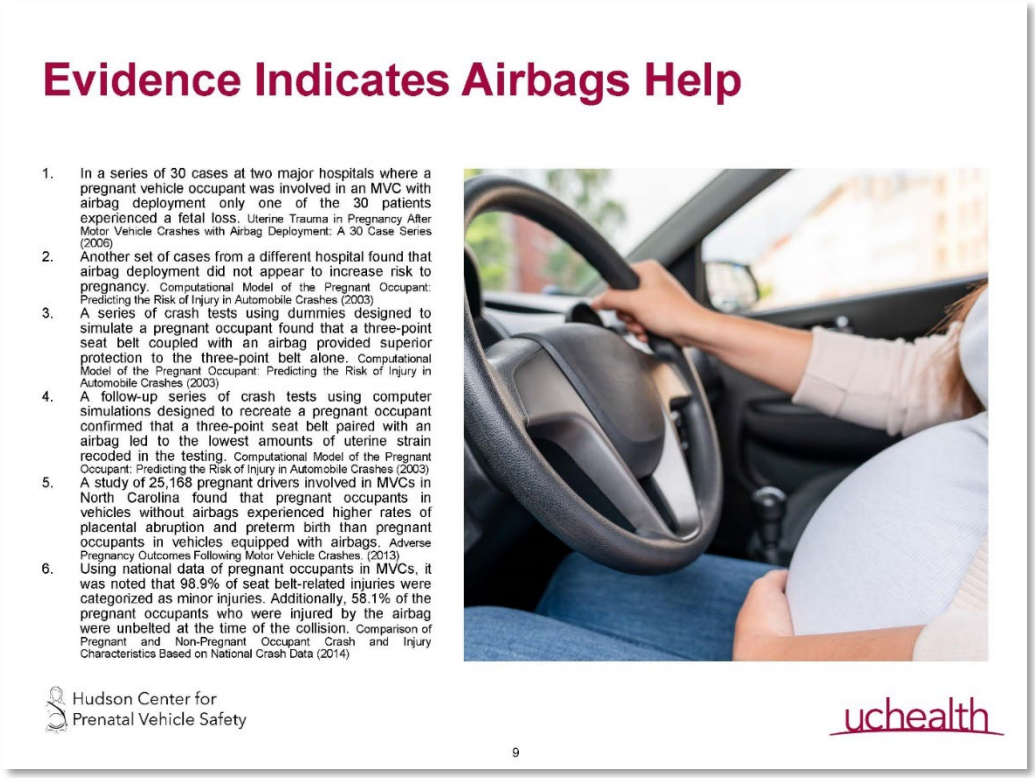
**Evidence Indicates Seat Belts Help**

- There is abundant evidence that seat belts help a pregnant driver in a crash.
- I had to use size 8 font to get it to fit on a slide.
- Don't worry about reading it. It has it's own page on the website.

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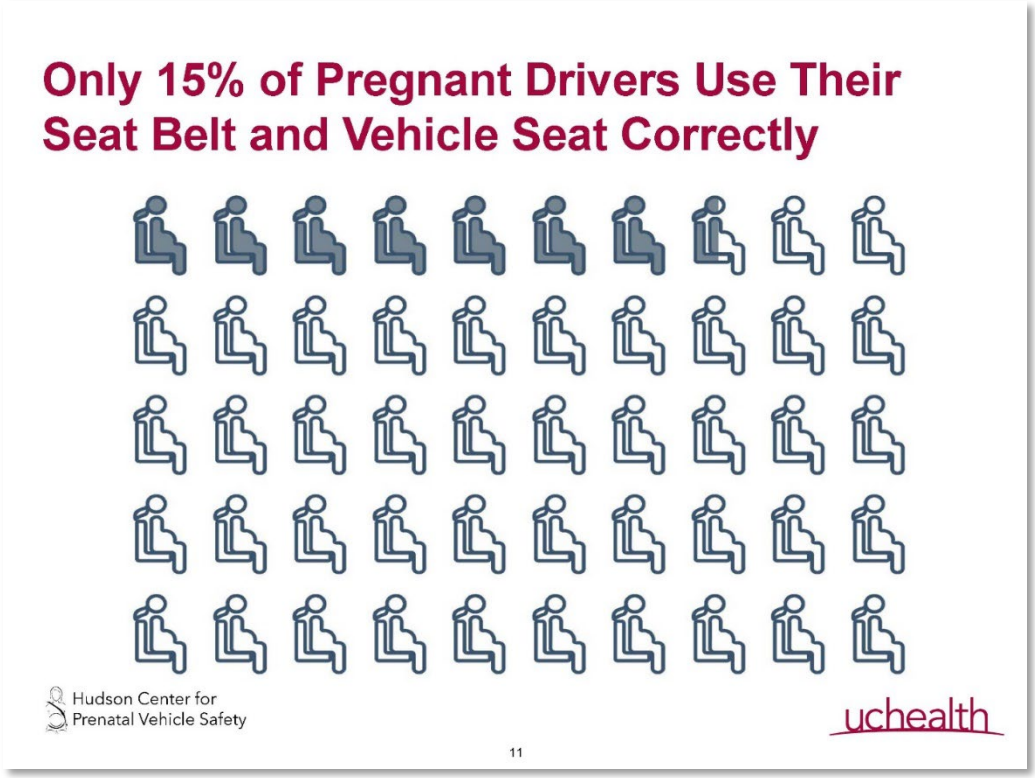
**Evidence Indicates Airbags Help**

- We also have strong evidence that airbags help a pregnant driver in a crash.
- There aren't as many crash test based studies to cite so my slide looks less impressive.
- Now, despite us knowing about all of this evidence 40% of pregnant drivers are still hesitant about their seat belt and airbags.
- Please tell pregnant drivers about all of this evidence we have.

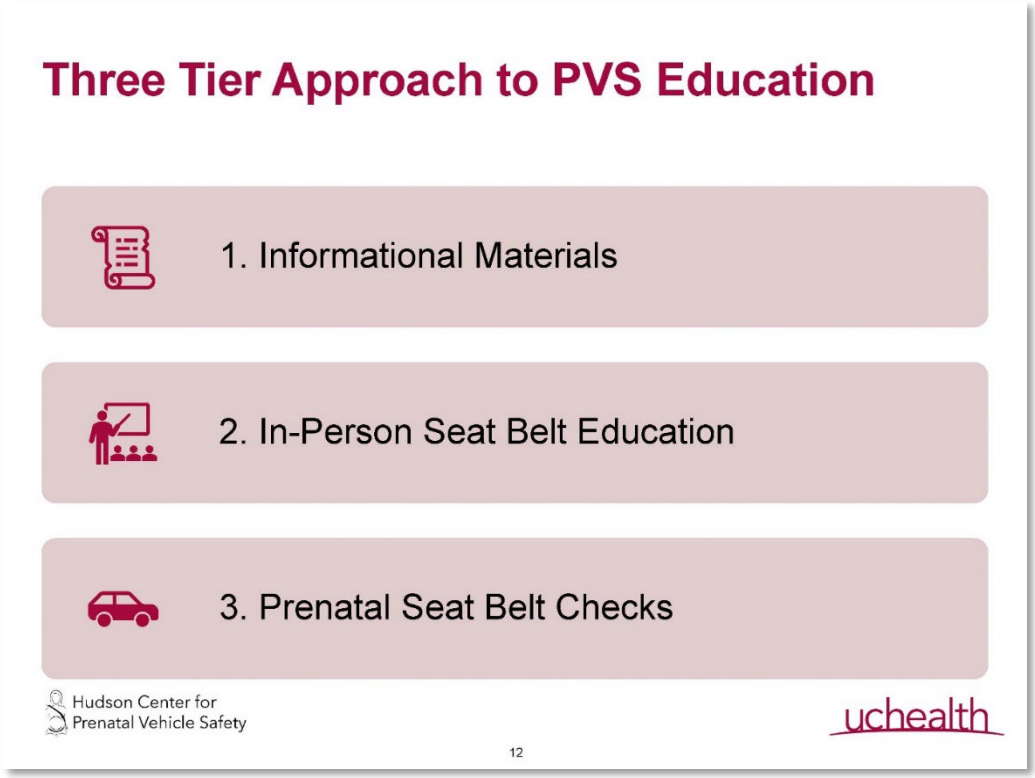

**Incorrect Seat Belt Use Can Be Dangerous**

- To be fair, that 40% of pregnant drivers isn't entirely wrong.
- Seat belts are awesome and save lives, but they do pose risks if used improperly.
- The risk of placental abruption increases 50 times if the driver has their lap belt too high on their belly like this stock photo model does.
- This is not to say that seat belts are dangerous as a whole or we should change the seat belt. This underscores the importance of wearing the seat belt properly.
- So, if wearing the seat belt properly is so important, how many pregnant drivers wear their belt properly?



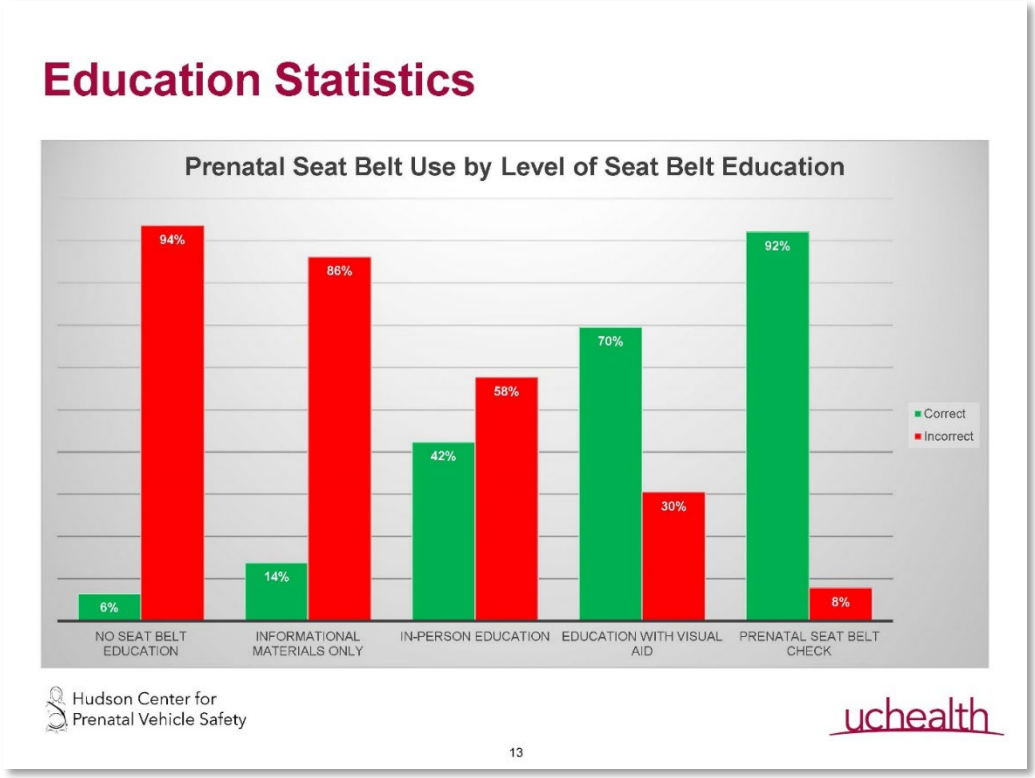

**Only 15% of Pregnant Drivers Use Their Seat Belt and Vehicle Seat Correctly**

- 15%. Only 15% of pregnant drivers wear their seat belt and adjust their seat correctly.
- Fewer than one in five pregnant drivers are getting the full benefit of their vehicle's safety devices.
- We can change this with education.



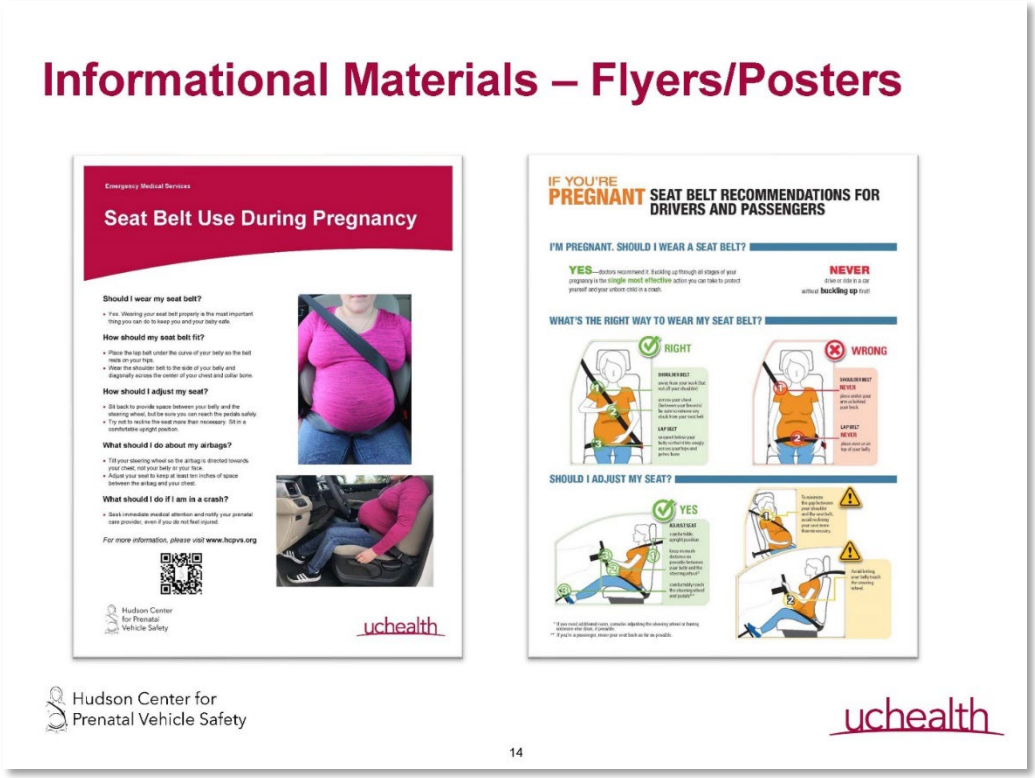

**Three Tier Approach to PVS Education**

- We use a three-tiered approach to PVS education.
- The first is informational materials like flyers, posters, or websites.
- The second tier that provides more education is in-person seat belt education. Actually sitting down with a pregnant driver to talk about their seat belt.
- The highest tier and most effective education is a prenatal seat belt check where someone goes to the pregnant driver's vehicle with them and systematically goes over their seat belt similar to a car seat check.




**Education Statistics**

- This is the correct use of seat belts divided out by level of PVS education.
- The green represents correct use and the red represents incorrect use.
- Starting on the left we have no seat belt education. The driver was not spoken to by someone, they did not receive a flyer, see a poster, etc.
    - Only 6% of drivers who received no education wear their belt and adjust their seat correctly.
- Moving to the right we have informational materials only. They got a flyer or saw a poster, but were not spoken to in-person about their seat belt.
    - Informational materials definitely help. They more than double the rate of correct use. If nothing else, we need to get informational materials in front of pregnant drivers.
    - The rate of correct use is still only 14% though so we need more education if possible.
- Next we have in-person education. This is any amount of education. The driver may have just been told to put the lap belt under their belly.
    - There is a huge jump in proper use. We really need to talk to pregnant drivers.
- To the right again we have education with visual aid. These were drivers that we could confirm were educated by someone trained how to educate pregnant drivers and using a visual aid.
    - We are all the way up to 70% correct use. Clearly not just in-person, but high quality education is necessary. And this education can be done by anyone. They do not have to be a CPST by any means.
- Finally we have the highest level of education. A prenatal seat belt check out at the driver's car with a technician similar to a car seat check.
    - This is the best way to ensure a pregnant driver is maximizing their safety devices.

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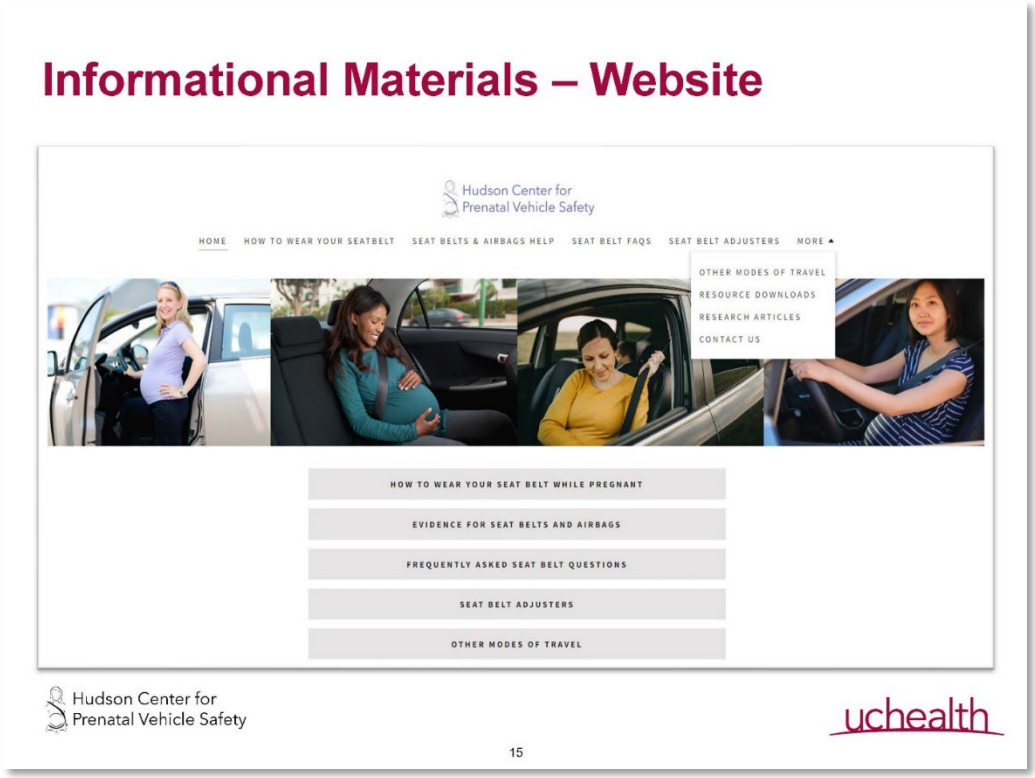
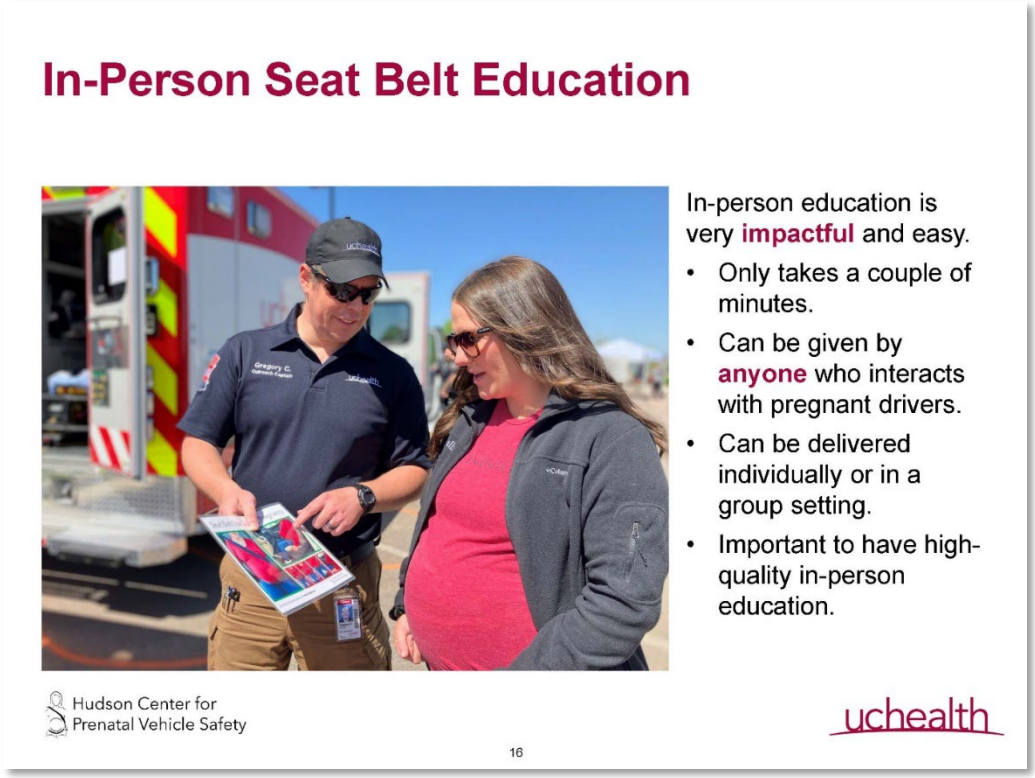
**Informational Materials – Flyers/Posters**

- Going through the different levels of education we first have informational materials.
- There are a number of great flyers out there.
- NHTSA has a nice flyer you can download. It lays things out in an easy to understand way and is available in English and Spanish.
- We put together a flyer that has everything for a pregnant driver on the left and a buckled up pregnant driver on the right. It is currently available in 16 languages and can be customized with your logo.
- You can download it on the website I will talk about in a minute.




**Informational Materials – Website**

- I put together a website with information for both pregnant drivers and professionals.
- For pregnant drivers it has how to wear your seat belt, the list of evidence that supports seat belt and airbag use that I showed you earlier, and what to do on a plane, in an RV, etc. and information on seat belt adjusters.
- For professionals there are downloadable versions of all of the resources. There are also links to 88 research articles if you would like to research this on your own.

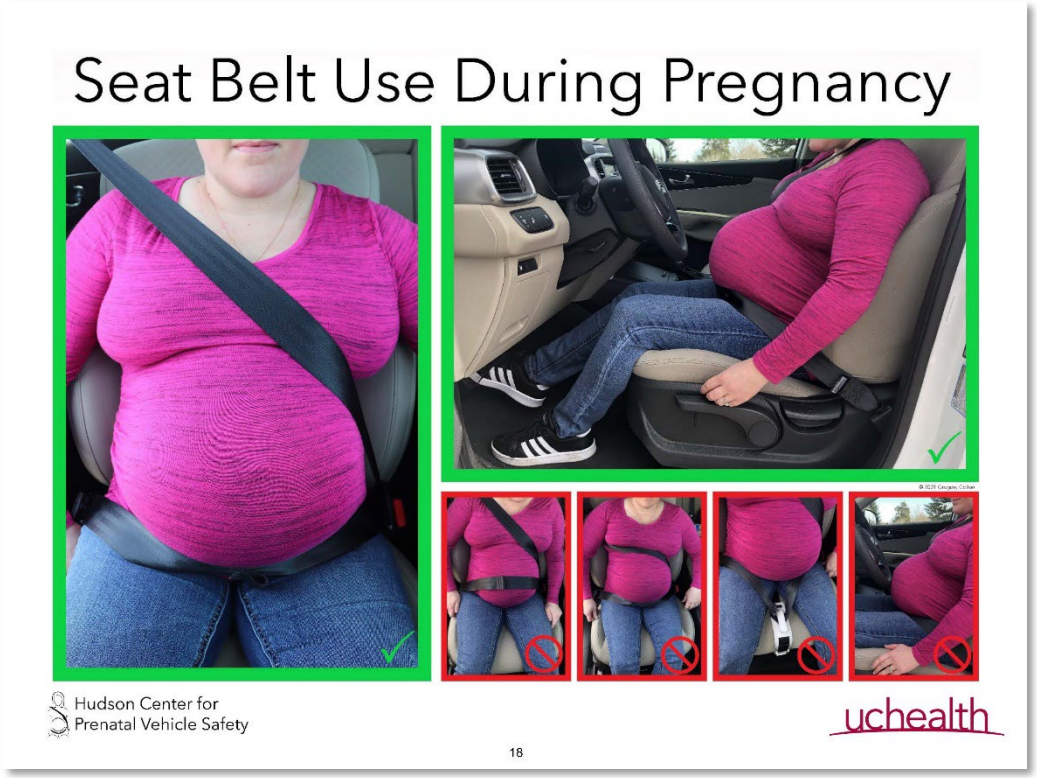



**In-Person Seat Belt Education**

- In-person education is the best way for non-CPSTs to increase the safety of pregnant drivers and their babies on the road.
- Very impactful and very easy.
- Only takes a couple of minutes.
- Can be given by anyone who interacts with pregnant drivers.
    - CPSTs
    - Providers
    - Medical staff
    - Childbirth educators
    - Prenatal yoga instructors
    - Anyone
- Can be delivered individually or in a group setting.
- As we saw from the data it is important to have high quality in-person education.


**Seat Belt Use During Pregnancy Teaching Tool**

- To help people provide in-person education we made a seat belt use during pregnancy teaching tool.
- On the front it has what to do and what not to do.
- On the back it has all of the talking points for the person providing the education and information on the website.
- You can hand this to someone with no training or background on PVS, they can read the back, then they can educate a pregnant driver.

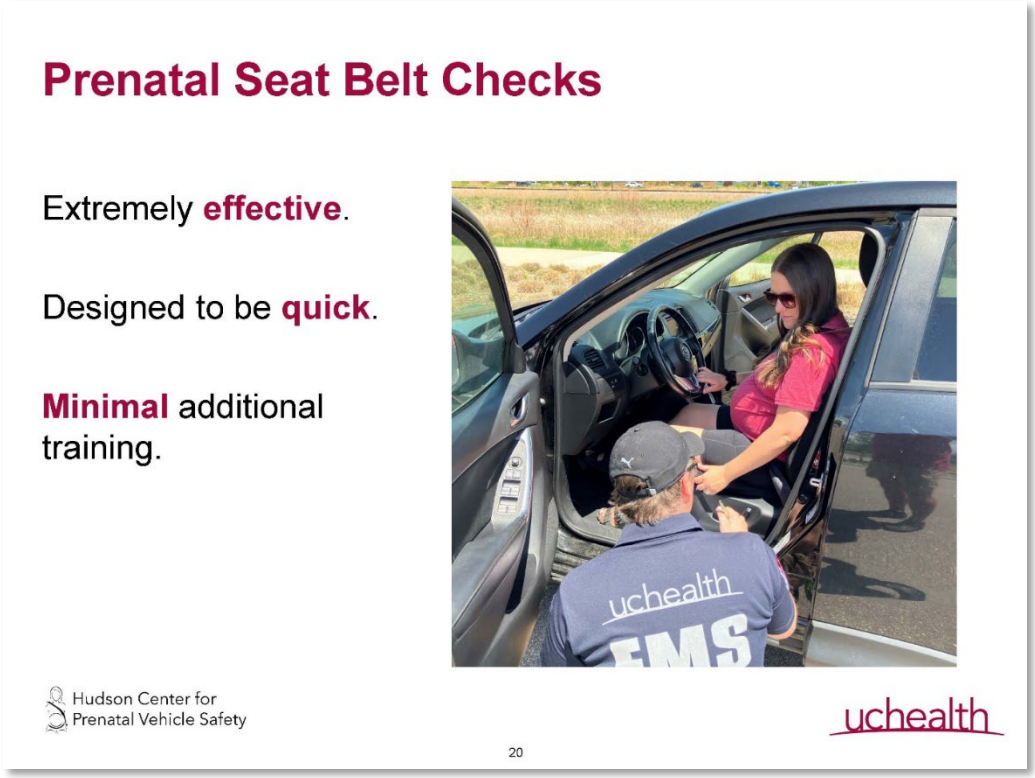



**In-Person Teaching Example**

- To show you how quick and easy in-person education can be I will give you the actual spiel I give pregnant drivers.
- Place the lap belt below the curve of your belly so it rests on your hips.
- For a lot of pregnant drivers it helps to turn the lap belt over as it passes under your belly.
- Wear the shoulder belt to the side of your belly and across the center of your chest and collar bone.
- Sit in a comfortable upright position.
- Adjust your seat so you can press the brake pedal all the way to the floor with the ball of your foot on the pedal and grab the top of the steering wheel with your arm slightly bent.
- Tilt your steering wheel so the airbag is directed towards your chest, not your belly or your face.
- Make sure there are at least ten inches of space between the steering wheel and your chest so the airbag has time to fully inflate before you contact it.
- Done.

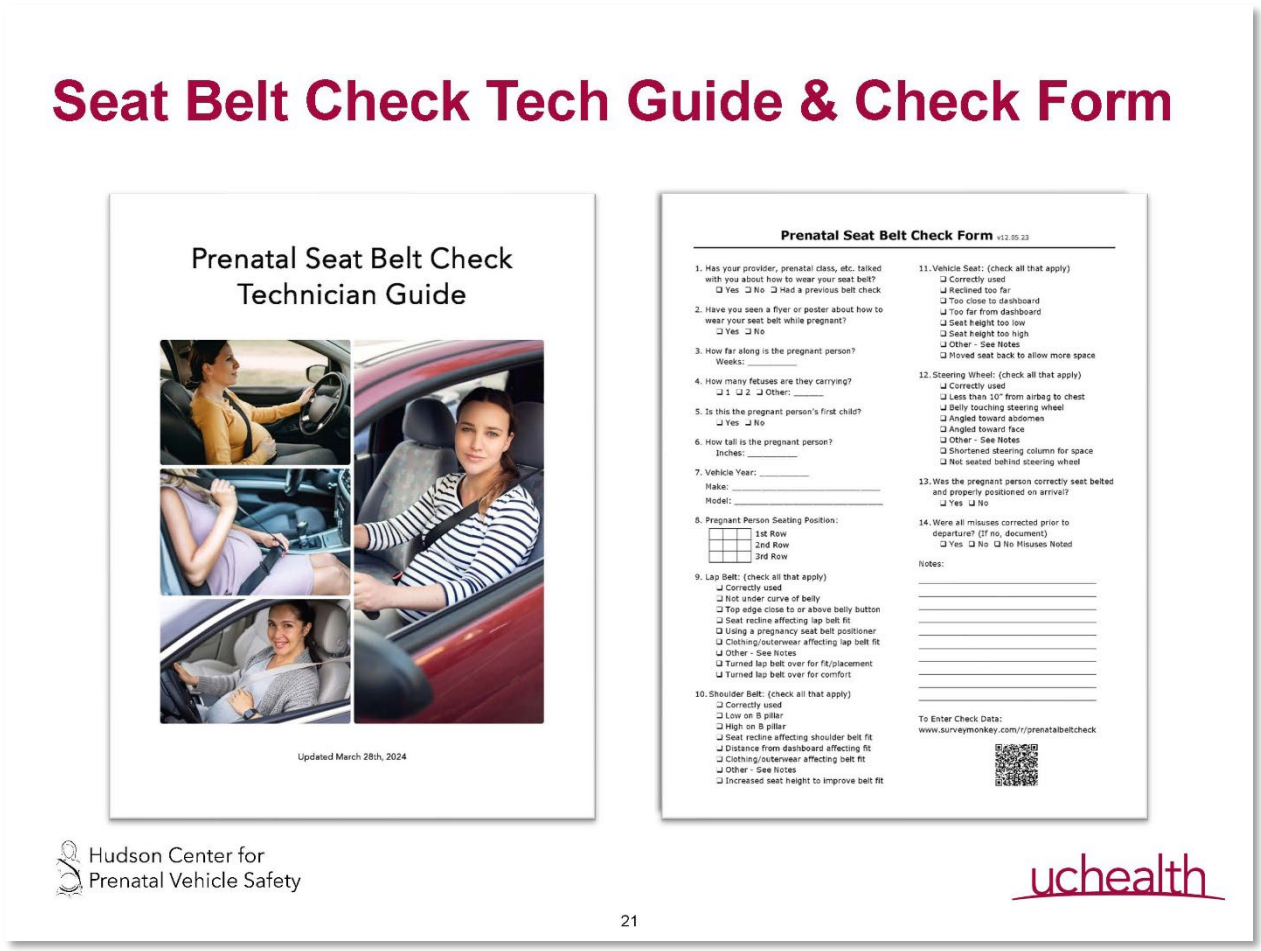

**Other PVS Education Tools**

- To further help with in-person I worked with Huggable Images to create a prenatal training doll. It is available on their website.
- I also worked with Seat Belt Planet to create a seat belt trainer that can be used on any chair without needing a special training chair. Let me know if you are interested in one and I can give you the information.
- Seat Belt Planet also makes loops of seat belt.
    - Tool I use the most often.
- I do not earn commission from you getting these.




**Prenatal Seat Belt Checks**

- The most effective form of PVS education.
- Specifically designed to be quick and easy to tack onto a car seat check.
- The additional training required for a CPST is minimal, especially for anyone who has come to this presentation.

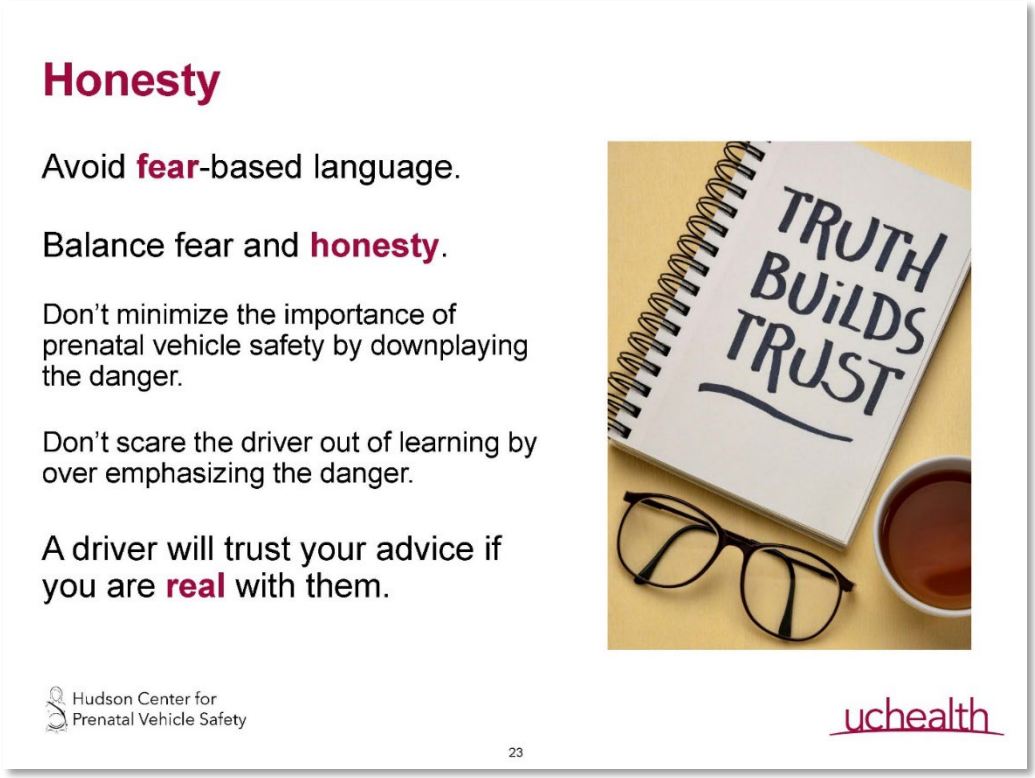



**Seat Belt Check Tech Guide & Check Form**

- I have put together a technician guide and check form for the prenatal belt check process.
- Please let me know if you would like me to train your group how to do these checks.


**Communicating with Pregnant Drivers**

- We need a pregnant driver to be on board with prenatal vehicle safety and receptive to the advice you are giving them.
- Effective communication centers on maintaining that on board and receptive mindset.
- We are trying to get people to think intentionally about an automatic everyday activity.
- There are four principles of PVS communication. Honesty, compassion, support, and good, better, best.




**Honesty**

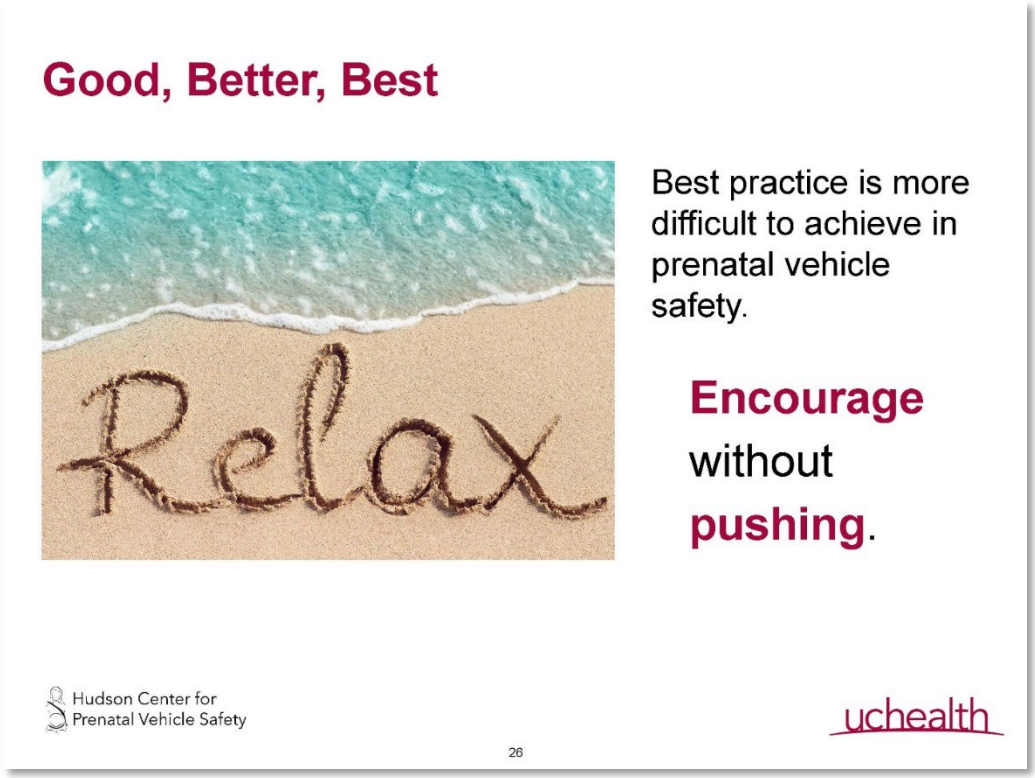
- We have to generate concern. Buckling up is an automatic process and drivers wonder how hard it can really be.
- It's about balance, fear and honesty.
- One of the struggles with PVS is generating concern.
    - Seat belts are automatic.
    - How hard can it be?
- Avoid fear-based language.
    - Can alienate the driver and turn them off to learning.
    - Harder to learn when you're scared.
    - People avoid what they fear. Could lead a driver to not want to talk about belt.
- It is easy to over correct and sugar coat things.
- Balance fear and honesty.
    - Don't minimize the importance of PVS by downplaying the danger.
    - Don't scare the driver out of learning by over emphasizing the danger.
- A driver will trust your advice if you are real with them.


**Compassion**

- Try to come from a place of compassion and understanding.
- Pregnant drivers can be uncomfortable and self-conscious.
    - Pregnancy is uncomfortable.
    - Their body is changing and they may not be confident about it. Now you are having a detailed conversation about how their pregnant body affects their seat belt.
- They are trying their best.
    - We are not here to grade them on their performance.
    - We are here to help them do the best they can.
- Pregnant drivers will do what they need to.
    - If they can't breathe sitting upright they will lean back.
    - If the shoulder belt rubs their neck they will adjust it how they need to.

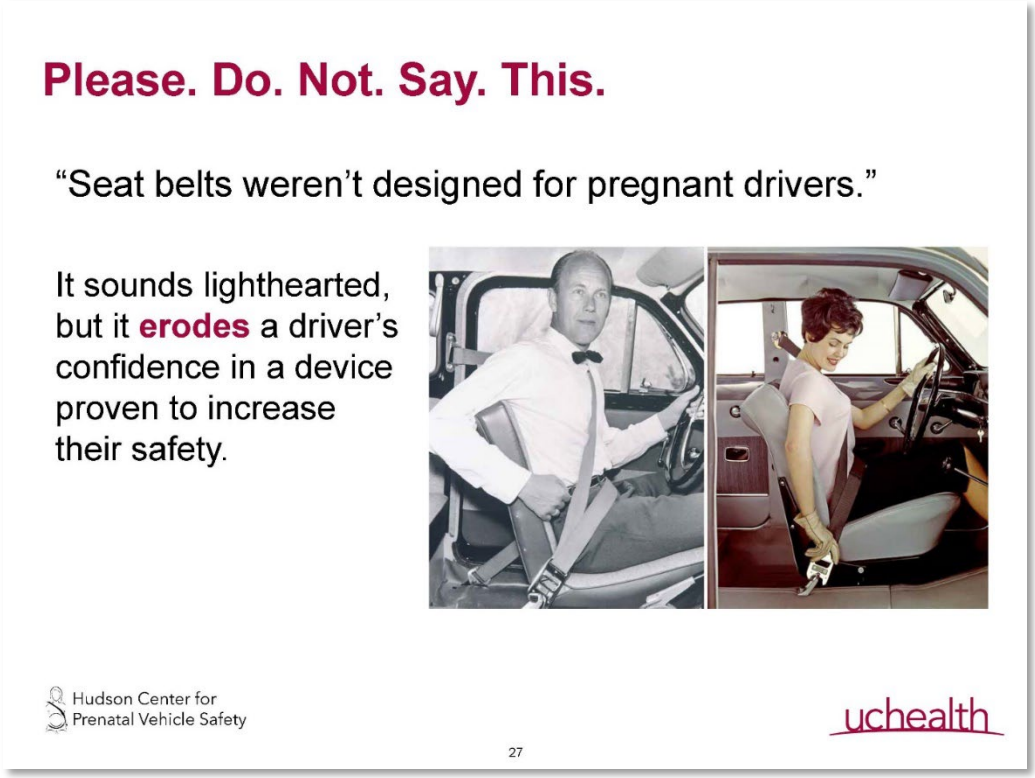

**Support**

- Be supportive.
- Highlight what they are already doing.
    - Just wearing the seat belt is a huge step in the right direction.
- Ask questions without criticism.
    - Gathering information on why they place the shoulder belt under their arm will help you improve their belt use, but don't make them feel criticized for doing it.
- Help them improve where possible.
    - Be supportive where there are areas that can't be improved.
- Be kind when they are already doing the best they can.



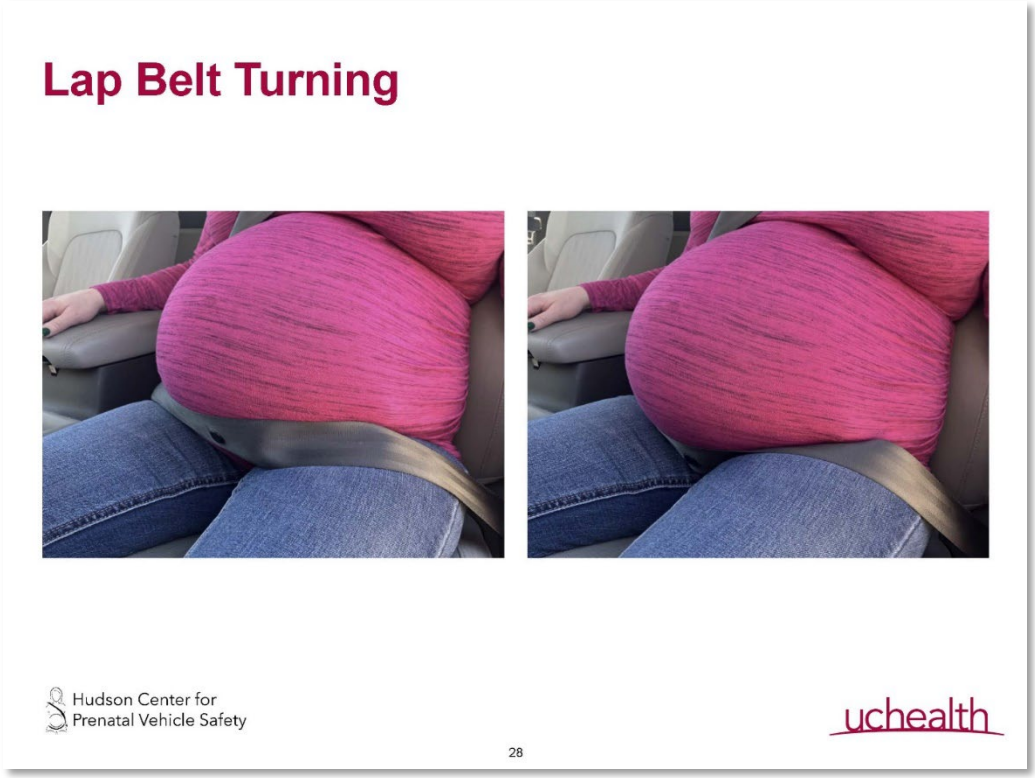

**Good, Better, Best**

- There is a reason that good, better, best is the fourth principle.
- Best practice is more difficult to achieve in PVS.
- It is extremely important to be compassionate and supportive.
- We are aiming for what is feasible and comfortable.
- Encourage without pushing.
- Pushing can alienate the driver and/or force them into a situation where discomfort is distracting them from driving.
- It's not best or bust.



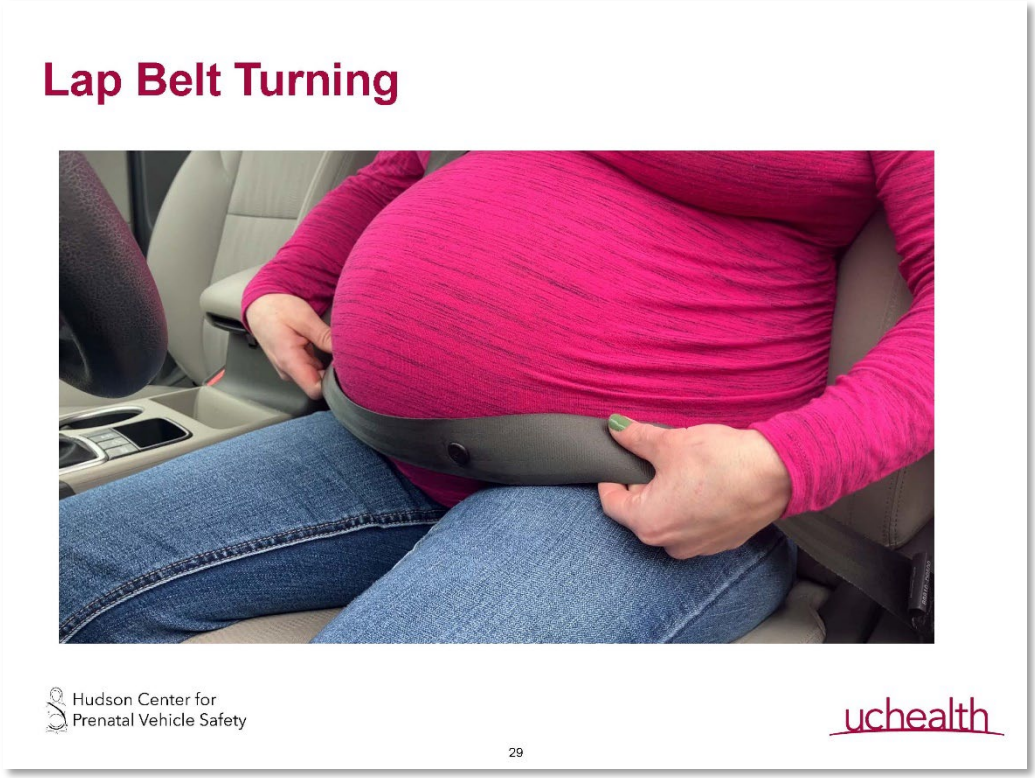

**Please. Do. Not. Say. This**

- "Seat belts weren't designed for pregnant drivers."
- It sounds lighthearted, but it erodes a drivers confidence in a device proven to increase their safety.
- Was Nils Bohlin thinking about pregnant drivers when he invented the three point seat belt? Maybe not. But does it help pregnant drivers? Absolutely.



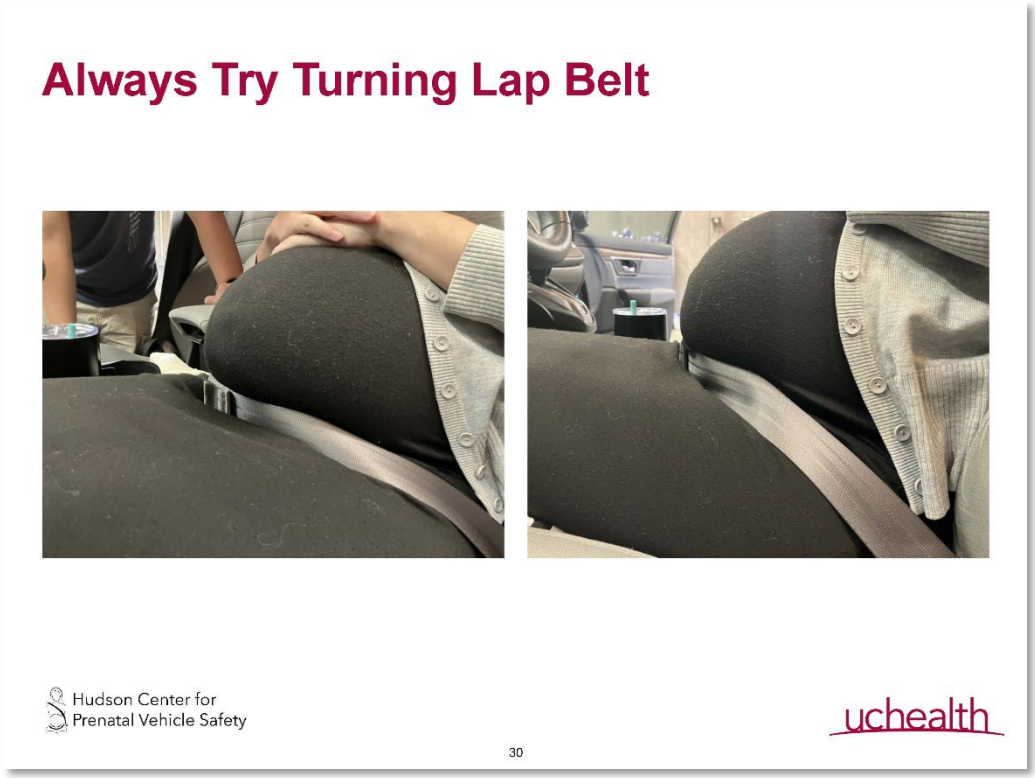

**Lap Belt Turning**

- I would like to leave you with a tip that helps a lot of pregnant drivers.
- For many drivers the lap belt fits much better if they turn the lap belt over as it passes underneath their belly.



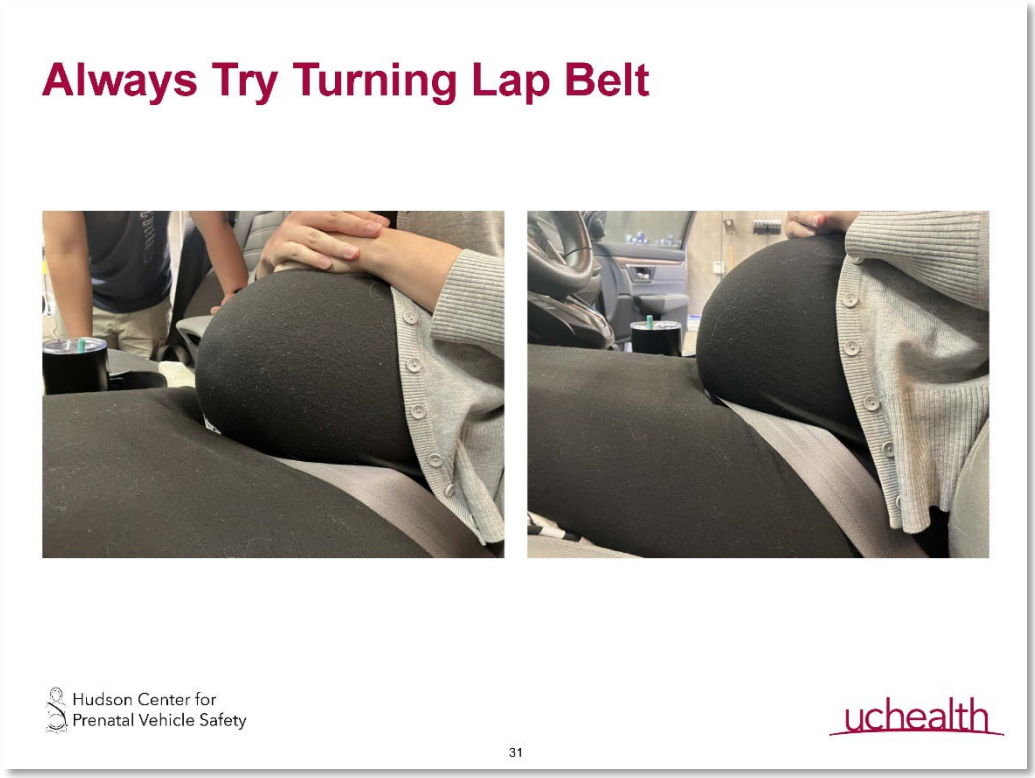

**Lap Belt Turning Video**

- Play video.
- She takes the center three or four inches of belt, turns the top edge back towards herself, then slides it under her belly.
- She also lifts her belly a little to place it.




**Always Try Turning Belt Before**

- I recommend always trying out the lap belt turn, even if their belt looks good at first.
- This was a check I did.
- I thought the driver had the belt under the curve of their belly and on their hips at first.
- Then I told them to turn the belt to see if it would make it more comfortable.

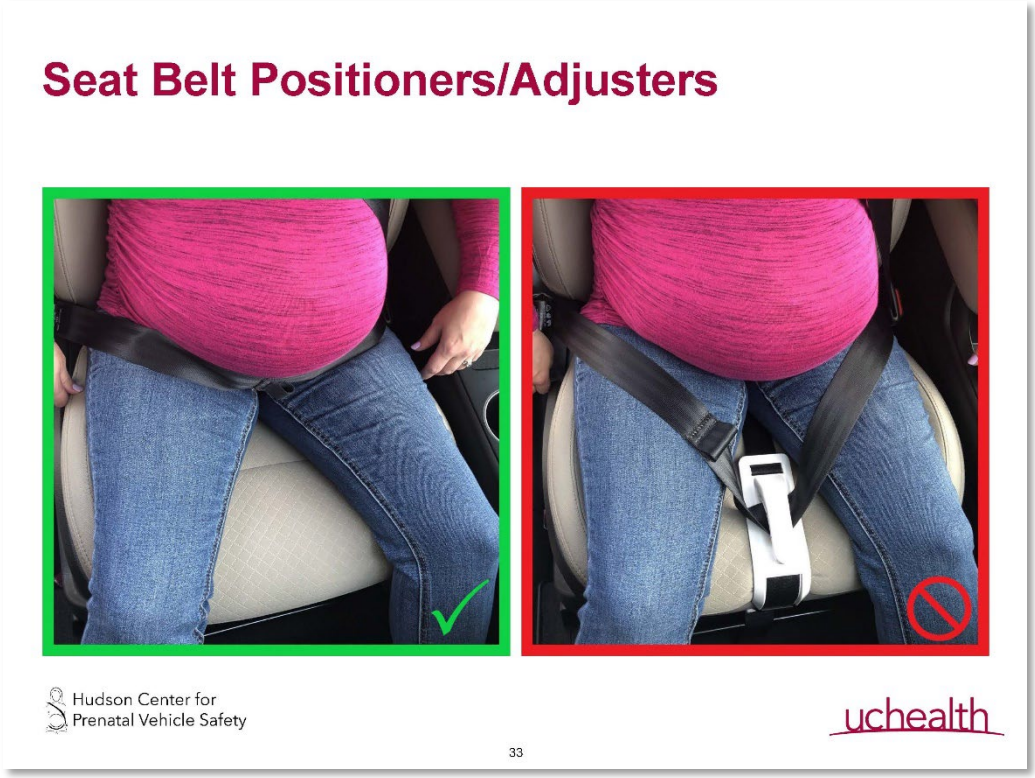



**Always Try Turning Lap Belt After**

- The belt disappeared under their belly.
- It made a significant difference.


**Thank You For Your Time**

- Thank you for your time today.
- If you have any questions we have a few minutes.
- Also feel free to reach out any time and I have a table in the hall.




**Seat Belt Adjusters**

- Seat belt adjusters are a device that modifies the seat belt routing so the lap belt is no longer resting on the belly.
- They are very aggressively marketed.
- They are not recommended.
- It is a non-approved device and dangerous for all of the reasons a non-approved device is dangerous for a car seat.
- We do not know what this will do in a crash.
    - Manufacturers claim they are crash tested, but do not publish crash test information.
    - We do not have data from crashes or case studies.
- We know without doubt that the seat belt used as recommended will increase their safety.
- We don't know this will do. All we know is that the seat belt will not function like it is designed to.