

Problem of Miscarriages

Need: A way to help pregnant women who've experience a miscarriage before, carry a fetus to full term of a pregnancy.

Background:

Problem

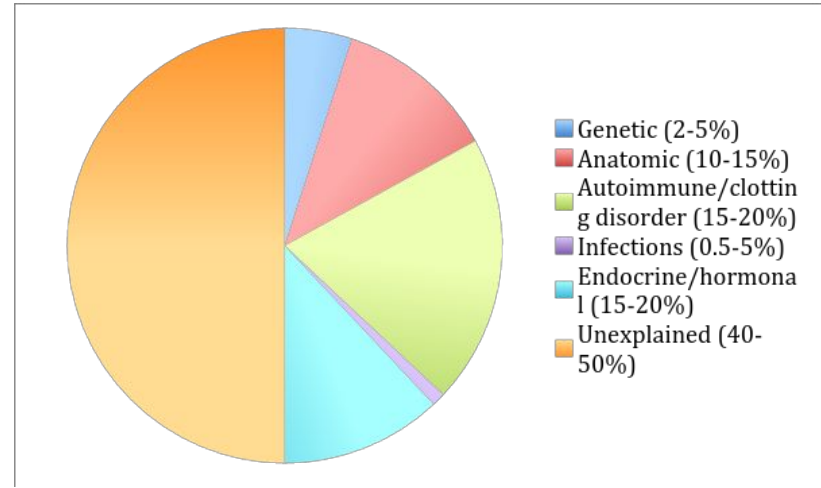


1 in 4 women will experience
a miscarriage in their lifetime

- 10-15% miscarriages occur before a woman is aware of her pregnancy.
- 2 or more miscarriages increase the chance of miscarrying.
- Most occurs before the 20th week, almost 80% with the first three months of pregnancy.
- Great emotional toll on the woman and her family

Background:

Causes/Cost

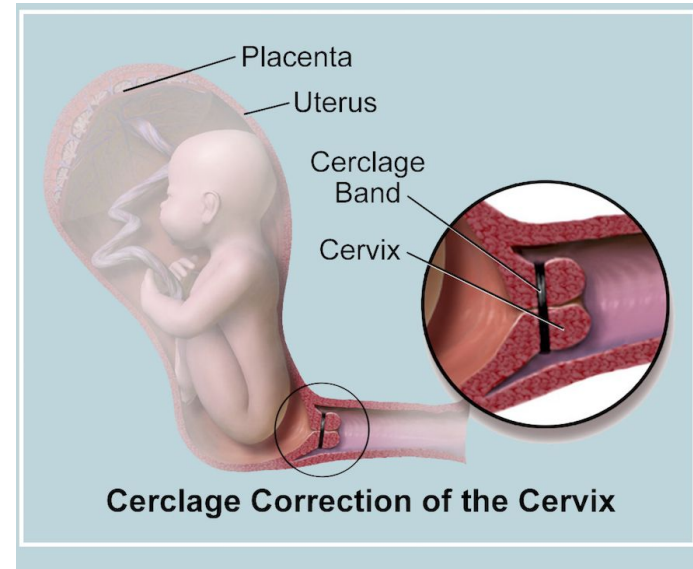


- Price Varies due to the variety of procedure and treatment in different hospital along with insurance coverage
- Average is between \$250 - \$1200

Existing Solutions and Treatments

Prevention

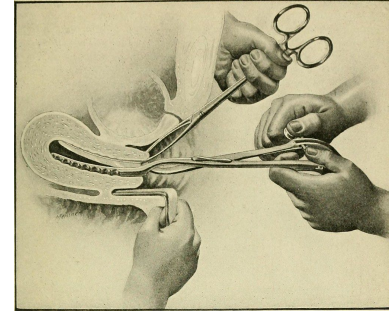
- Maintenance of a healthy lifestyle
- Identifiable causes such as antiphospholipid syndrome or weakened cervix are treated
- Progesterone pills can be given to thicken the uterine wall



Existing Solutions and Treatments

After

- Dilation and curettage (D&C)
- Medication



Diagnostics:

- Ultrasound/hysteroscopy
- Hormone tests
- Chromosome tests
- Blood tests
- Pelvic exams

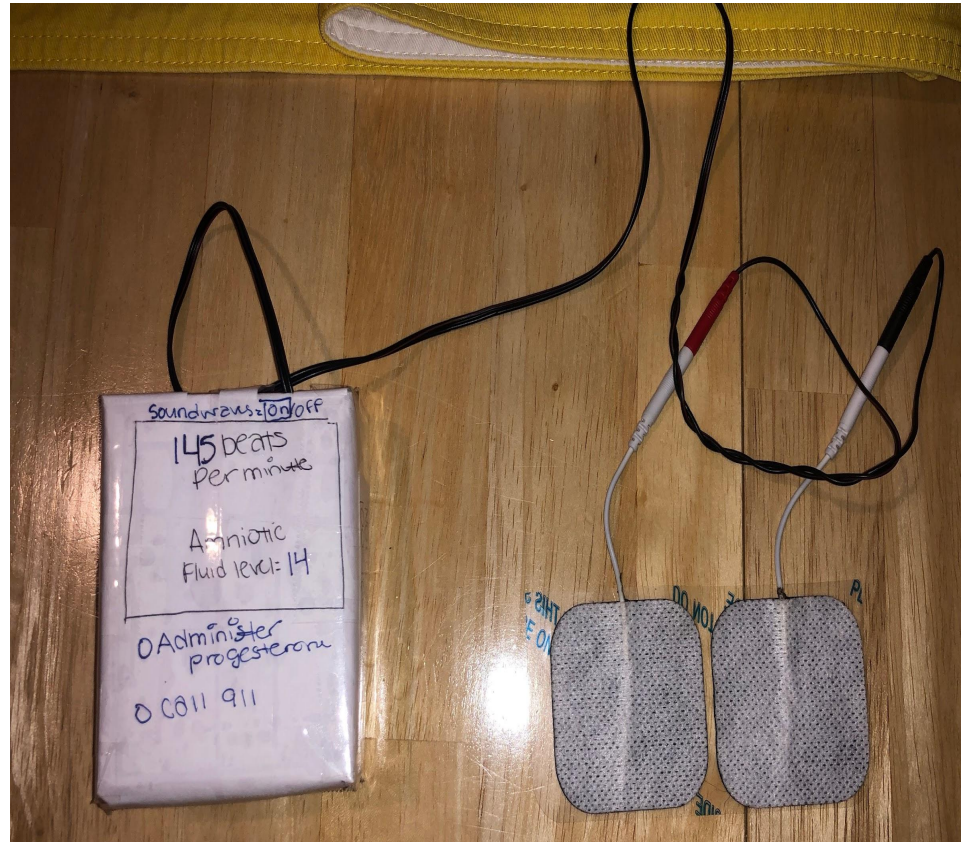
Need Criteria

Must-Haves:

- Harms less than 5% of mothers and fetuses involved
- Does not cause birth defects (less than 10% birth defects)
- More efficient than current techniques (50% less miscarriages)
- Must use sound waves which work under the current guidelines for healthcare

Nice to Haves:

- Inexpensive (less than \$1,500)
- Minimally invasive (100% of users place device externally)
- No difference between a natural born child and a child born from this practice (less than 1% difference within newborns health)



Prototype Device

V.1

- Base: a small plastic rectangular box that can be placed on the waistline of pants.
- Screen: displays the fetuses heart beat per minute and the amniotic fluid level
- “Administer Progesterone”: lights up to alert the mother that she needs to administer a shot of progesterone in order to keep her and the fetus safe
- “Call 911”: alerts the mother that she needs to get help because her amniotic fluid levels are too low, the heart rate is too low or almost non-existent, in order to save the fetus
- Wires and electrode pads: allow the base to send sound waves where the baby is located in the uterus, allowing the device and mother to monitor the health of the fetus

Significance/Novelty

- Sound waves do not harm the fetus or the mother
- Sound waves allow for the fetus to be monitored from electrodes on the outside of the mother, meaning this is a minimally invasive device
- The sound waves are able to monitor the fetuses health and condition inside of the uterus
- The sound waves monitor the woman's amniotic level because the fluid dictates if the baby is born healthy or with defects
- The amniotic fluid helps the baby move in the womb and lets the lungs develop properly and to protect the baby from outside trauma and injuries
- The sound waves detects the baby's heart rate and the amniotic fluid, which allows the mother and doctors to know if the baby is healthy or needs help
- The amniotic fluid protects the baby within the uterus, so it is important to have sufficient levels

Limitations/Future Work

- Not every woman who has the potential to have a miscarriage has access to the device, due to cost
- The device needs to be approved by the FDA to be used on living humans
- Some woman may have an allergic reaction to the electrode materials
- The device should have multiple sensors to detect even more medical aspects such as breathing movements, muscle tone, and body movements
- A future plan is to reduce the size of the base, allowing it to be built into a watch or another type of wearable. The electrodes can sit on the skin and wirelessly transmit the data to the watch
- The device is personalized to each women if there is a known history of miscarriages

References and notable resources for information

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