



Birth Progression Monitoring Device

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Background

The United States experienced its highest rate of maternal mortality in over thirty years as indicated in *Figure 1* (CDC, 2021). The increase in cesarean sections (C-sections) and associated blood loss are among the highest risks factors contributing to maternal mortality. As indicated by *Figure 2*, there has been an overall increase in C-section rates for women without a previous cesarean from 2016-2021 (CDC, 2021). While there are certainly appropriate uses for C-sections, a decrease in C-section rates may contribute to an overall decrease in maternal morbidity and mortality.

Introduction

To help combat the rise in unplanned cesarian sections we have developed a device that will give physicians and other medical professionals more information about where the fetus is in the birth canal in real time. The purpose of this current study is to test the accuracy and usability of the prototype birth progression monitor on birth simulations. This device is used to monitor the mother's contractions, the fetal heart rate, and position. Feedback from this device will guide the medical professionals on how to coach the mother through the labor process.

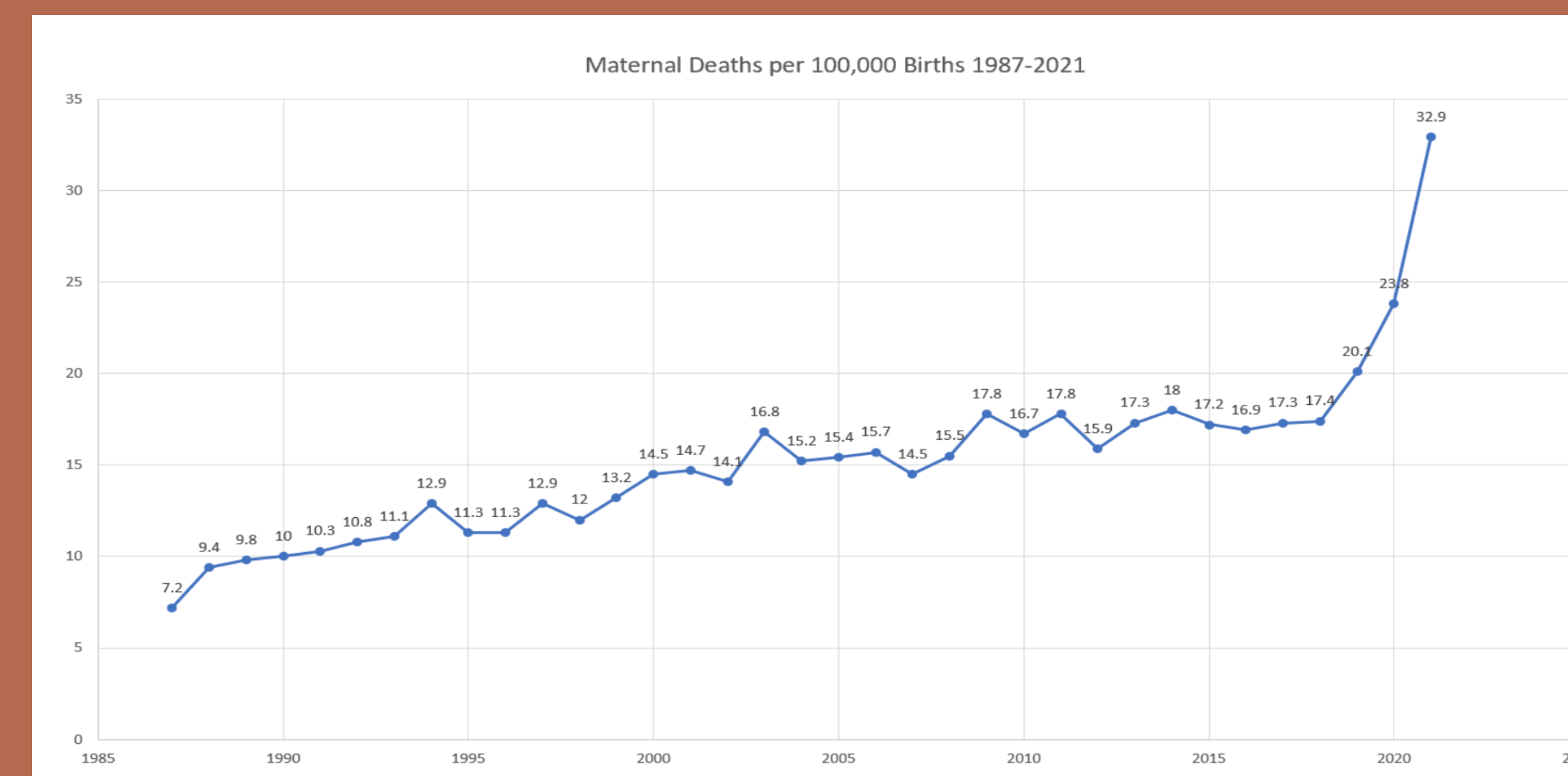


Figure 1: Maternal Deaths per 100,000 births. Source: (CDC, 2021).

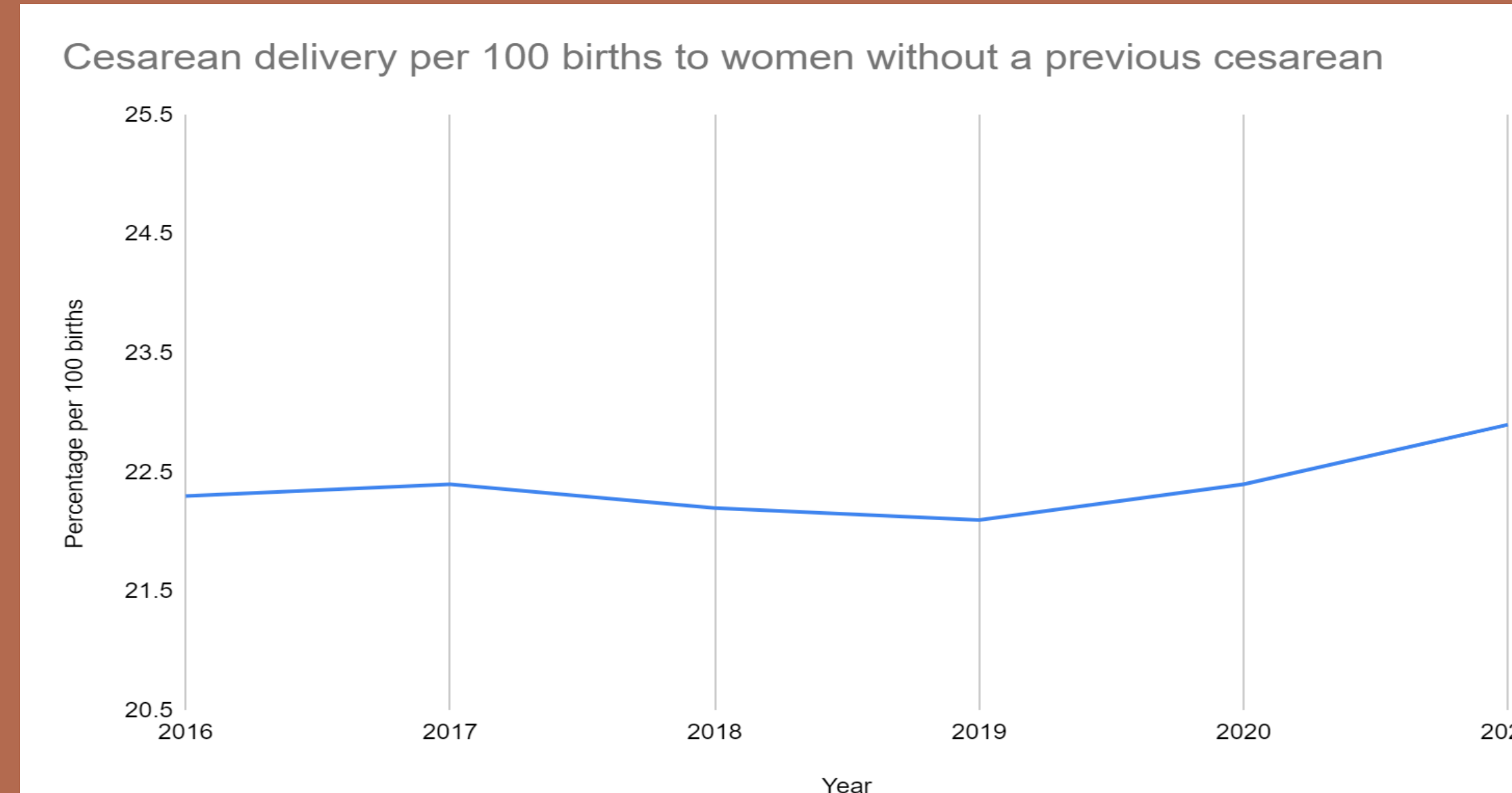
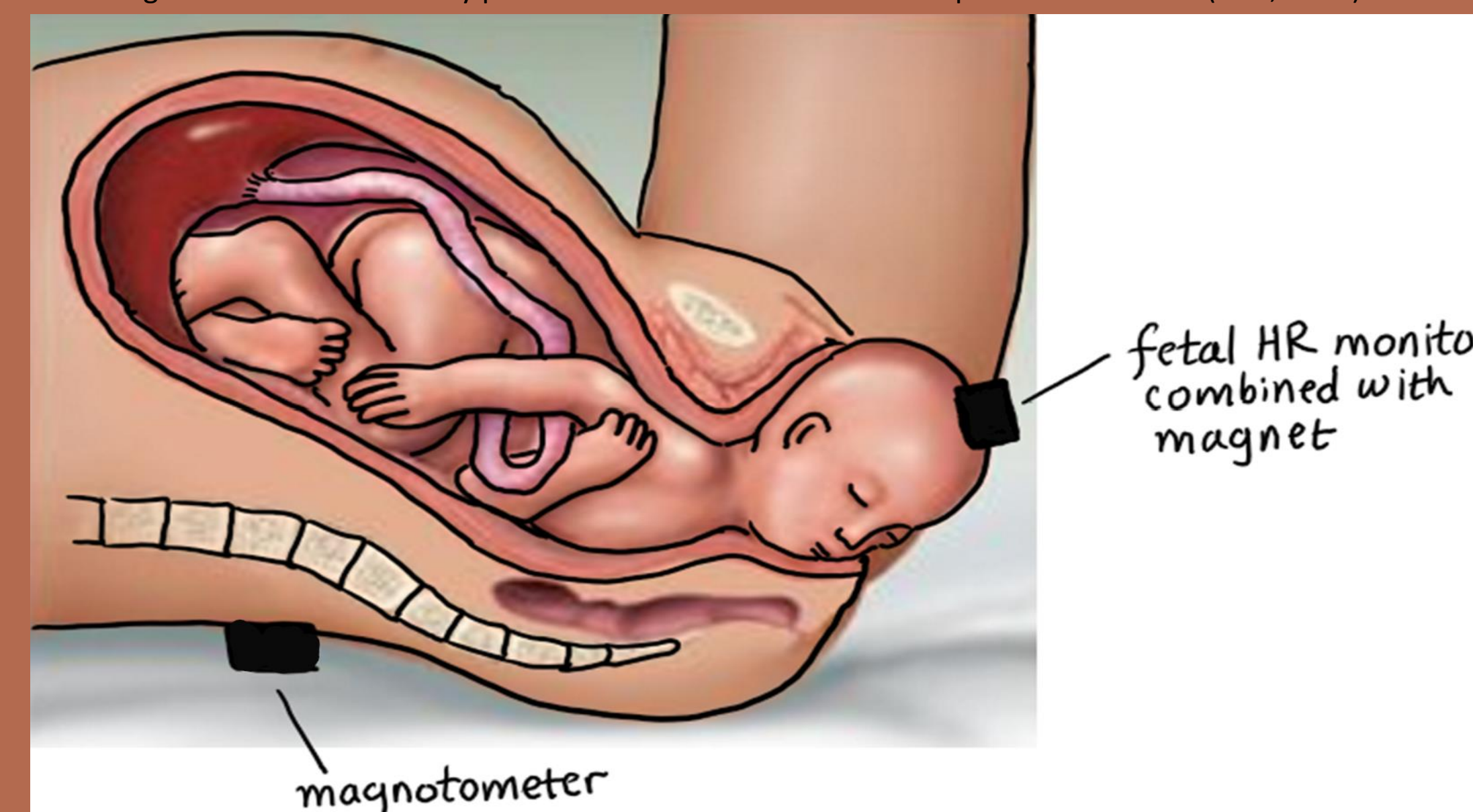


Figure 2: Cesarean delivery per 100 births to women without a previous cesarean (CDC, 2021).



Hypothesis

The device will give us accurate positioning measurements as it moves down the simulation birth canal.

Methods

Using birth simulators, we will conduct 36 trials using the prototype monitor to track the vertical descent of the fetus's head with various orientations (e.g. right occiput anterior, right occiput transverse, etc.). The movement from the +5 station through the -5 station will be tracked along with effects of simulated pushes to assess the positional accuracy of the device.

Next Steps

Calibrate and test the accuracy of the magnet and magnetometer devices using a birth simulating task trainer

References

1. Maternal mortality rates in the United States, 2021. Centers for Disease Control and Prevention. March 16, 2023. Accessed February 12, 2024. <https://www.cdc.gov/nchs/data/hestat/maternal-mortality/2021/maternal-mortality-rates-2021.htm>.

