Implementation of Virtual Reality for the Laboring Patient: A Quality Improvement Project

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Implementation of Virtual Reality for the Laboring Patient:

A Quality Improvement Project

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Completing this project was not met without obstacles and challenges. Without the support and encouragement from my mentors and family, this project would not have been possible. To Dr. Patti Puccilli, for pushing me along even when things were at a standstill. To Dr. Nancy Mizzoni, for your unwavering support of this project at our hospital. This work was far more difficult than I had anticipated and without your guidance on navigating the waters, it would not have happened. To my classmates, Jessica Mcbee and Michele Lovell, who without our weekly conversations, frustrations, laughs, and text chains, this program would not have been the same. And to my family, most especially my husband Tim and my three children, Adeline, Nicholas, and Mackenzie. You have listened to me vent at the kitchen table, watched me work at my computer for hours, read data points to me while on long car drives, cheered me on when I needed it most, and supported me from the start. Thank you.
Abstract

BACKGROUND: Having a baby can be one of the most challenging and painful experiences a woman has in their lifetime. Being able to choose between a variety of pharmacological and non-pharmacological pain-control methods is important to improve the patient experience and outcomes. This quality improvement project aimed to introduce a virtual reality device into the labor and delivery setting as a non-pharmacological pain control method. The goal was to decrease pain and anxiety levels, decrease the rate of epidural anesthesia use, and decrease the length of time epidural anesthesia medication was running before delivery.

METHODS: The four key components of a quality improvement project were used. An initial educational module was created for nursing staff before the implementation of the device. Additionally, a retrospective chart review was performed to determine epidural rates, duration of running times of epidural anesthesia, and intravenous pain medication rates. Implementation of a virtual reality device was trialed for 8 weeks in the labor and delivery setting. Pain and anxiety measures were taken as well as data on epidural anesthesia use and IV pain medication administration.

RESULTS: Eight participants used the virtual reality device during the implementation period. A slight decrease in pain levels was experienced by the participants, and a more significant decrease in anxiety levels was determined. The retrospective chart reviews showed higher than the national average epidural anesthesia rates for four of the five months. The length of time epidural anesthesia ran before delivery varied from 11.2 hours to 18.3 hours for cesarean section deliveries and 6.8 hours to 9.4 hours for vaginal deliveries. The rate of IV pain medication varied from 4.9% to 9.8%. The rate of epidural anesthesia for the virtual reality participants was 75%, higher than the national average but the average running time of epidural anesthesia was
6.2 hours. The recommendation to continue to use a virtual reality device on the unit by staff was 100%.

CONCLUSIONS: A virtual reality device is an effective non-pharmacological pain control method in the labor and delivery setting. It can decrease pain and anxiety levels for this patient population and decrease epidural anesthesia rates and running time. With further utilization, virtual reality has the potential to decrease labor interventions and/or cesarean section rates. Continuing to use a virtual reality device for this clinical setting is recommended.

Keywords: virtual reality, labor and delivery, pain levels, anxiety levels, pharmacological pain control methods, non-pharmacological pain control methods
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Implementation of Virtual Reality for the Laboring Patient to Decrease Pharmacological Pain Control Methods and Improve Patient Outcomes

Women who have a vaginal delivery are likely to experience the most intense and excruciating pain of their lifetime. Roughly 2.53 million babies were born vaginally in 2021 in the United States (CDC, 2023) and of those, 67% received epidural anesthesia to alleviate labor pain (World Population Review, 2023). Finding alternative non-pharmacological pain control options for women in labor is important to decrease the incidence of complications for both the mother and the fetus and to enhance the patient experience by having more options available (Beyable et al., 2022). Healthcare technology, like virtual reality, is being introduced to patients in a variety of clinical settings to help decrease pain and anxiety. Introducing a virtual reality device into the labor and delivery setting allows for a non-pharmacological pain control method for women which removes the risks other pain control methods can cause and increases the patient’s overall satisfaction of their labor experience.

Problem Statement

Laboring patients at a small, community hospital in the Northeast have limited non-pharmacological pain control options: water immersion and nitrous oxide. This leaves only pharmacological methods for patients looking for something other than these two methods. Epidural anesthesia (EA) and intravenous (IV) medication are the two pharmacological methods most used at this small hospital to alleviate labor pains, both have risks and side effects for the patient and fetus. A new technology, virtual reality (VR), exists as an alternative non-pharmacological method for laboring patients. It is a handheld device that enables the user or patient to see 360-degree pictures of nature with accompanying sounds while sitting right in your hospital bed (Healing Healthcare, 2023). Through immersion, the VR system acts as a non-
pharmacologic form of analgesia by “exerting an array of emotional affective, emotion-based cognitive, and attentional processes on the body's intricate pain modulation system” allowing pain sensation and anxiety levels to decrease through distraction (Li et al., 2011, p. 147). By introducing VR into the labor and delivery unit at a small, community hospital, patients had a new pain control method that provided decreased pain and anxiety levels and posed few side effects to the patient or the fetus.

Available Knowledge

The pain and anxiety women experience during labor are some of the most difficult and anticipated pain a person may experience in their lives. Women worry and fear the pain associated with uterine contractions and delivery throughout their entire pregnancy (Beyable, 2022). Twenty percent of women have anxiety about their delivery and fear for the health of their baby, which can contribute to poor patient experiences (Fairbrother, 2022). Labor pain consists of both visceral and somatic pain and is associated with the intensity, duration, and frequency of uterine contractions (Hulsbosch et al., 2020). Visceral pain occurs in the early stages of labor and is typically more vague and feels like pressure (Labor & Maguire, 2008). Somatic pain occurs in the late part of the first stage and in the second part of labor, when the woman is pushing. This is a more intense pain and is felt in the bones, muscles, and skin (Labor and Maguire, 2008). As a woman’s labor progresses and her cervix becomes more dilated, the intensity and severity of the pain increase. How pain is managed during labor can alter the women’s experience and perception of their childbirth experience (Hulsbosch et al., 2020). If women feel their pain was not managed effectively or strayed from their intended plan, they perceive their experience as poor (Hulsbosch et al., 2020).
The patient’s perception of pain management in the hospital is questioned on the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey. Two questions on pain from the HCAPHS survey are publicly published on the Hospital Compare website, allowing future patients to read these results prior to choosing a particular hospital for their care (The HCAPHS Survey, n.d.). Additionally, the World Health Organization has included pain management as a standard of quality of care (McCauley et al., 2018). All these points highlight the importance of managing childbirth pain effectively and efficiently. Providing women with education on pain management options in the prenatal period is important to ensure women can make informed decisions about what options would work best for their labor experience.

Pharmacological pain control methods are the most utilized methods chosen by women across the globe. Epidural anesthesia (EA) is considered the gold standard for childbirth pain relief and is most widely used. Pharmacological methods are also the most effective at relieving pain for women in labor, partially explaining why women most often choose this method (Herrera-Gomez et al., 2018). Unfortunately, pharmacological methods have side effects for both the mother and the fetus such as decreased blood pressure for the mother, nausea or vomiting, headache or back pain, decreased fetal heart rate, decreased fetal respiratory effort, a longer labor experience, prolonged pushing time, and an increased risk of needing an operative vaginal delivery or cesarean section (Mayo Clinic, 2022). Non-pharmacological methods pose lesser or no risks to the mother or fetus. EA involves using an anesthetic injected into the epidural space in the lower part of the body, blocking the nerves that carry pain signals from the body to the brain (National Library of Medicine, 2018). The use of EA varies from country to country, with the average rate of use in the United States being 67% as of 2023 (World Population Review, 2023). Some countries, like Finland, have a rate of 89% whereas China has
a rate of less than 5% (Wu et al., 2020). This variation is based on the culture around childbirth and accessibility. The evidence remains the same regardless of the incidence of use for risks associated with EA.

In a study by Herrera-Gomez et al., (2018), the use of EA increased the risk of instrumental deliveries, reduced the percentage of spontaneous vaginal deliveries, increased the percentage of episiotomies, and stalled out labor, therefore, increasing the use of pitocin. Pitocin is a synthetic hormone used to stimulate contractions. The most common side effects of pitocin are hyperstimulation which can result in decreased fetal heart rate, increased risk for cesarean section, lower APGAR scores, higher rates of neonatal intensive care unit admissions for the baby, and uterine rupture (Weiss, 2022) (ABS News, 2013). In a second study by Hatamleh et al. (2019), the use of EA increased the rate of cesarean sections and instrumental deliveries, increased the need to augment or induce labor with pitocin, increased episiotomies, increased the length of the second stage, and caused complications for the mom including hypotension and hyperthermia. A longer pushing stage (or a prolonged second stage) and the need for augmentation of labor was eight times higher than those women who did not receive EA, due to the interference EA has on maternal hormones. The main hormone associated with childbirth is oxytocin which causes uterine contractions. EA administration reduces the amount of oxytocin produced by the woman making contractions less frequent and intense. This increases the need for pitocin administration to continue labor progression (Herrera-Gomez et al., 2018). Due to the high rate of use of EA, more interventions are performed on mothers during labor because of the side effects. Hypotension is experienced by 80% of women who receive EA and 1% of women experience a wet tap, a complication requiring additional interventions after delivery to alleviate the symptoms (Panesar, 2014). EA also limits the mother’s ability to move around or ambulate.
After EA administration, patients are restricted to their beds and must be continuously monitored, another side effect of this medication.

Cost is another factor with EA due to the cost for the patient. Looking at the cost of EA for vaginal deliveries in Massachusetts, the in-network price is $3,242 and the out-of-network cost is $4,985 (Fair Health Consumer, 2020). Some patients may receive a surprise medical bill for their EA. In 2014, two mothers went to the same hospital with the same insurance to deliver their babies. Unfortunately, one patient received a surprise bill of $1600 for her EA because the anesthesiologists were out of network (Bomnin & Gosk, 2019). These surprise medical bills are common for anesthesia services they may not be associated with the in-network hospital (Fair Health, 2023). For some, this cost could inhibit their ability to use EA during labor affecting their overall experience of childbirth due to inadequate pain control. If labor patients were made aware of the associated cost of EA, they may opt for a different pain control method.

Fentanyl is one of the most widely used IV medications for alleviating labor pain (Show et al., 2022). Fentanyl is a short-acting opioid acting quickly on the spinal cord and brain receptors blocking pain signals from the uterus and vagina. The most common side effects are decreased heart rate, itching, nausea, and vomiting for the mother. In a study by Show et al. (2022), only 17.6% of women were satisfied with pain relief after receiving fentanyl, 54.9% experienced nausea and vomiting, 51% experienced itching, and 47% experienced sedation. Additionally, 64.7% reported changes in fetal heart rate after the mother received fentanyl, slowing down the heart rate and decreasing variability. Fentanyl crosses the placental barrier thereby affecting the fetus and can cause bradycardia and lower APGAR scores upon delivery (Shum et al., 2021).
A study at Brigham and Women’s Hospital determined that babies whose mothers had EA in place for more than 10 hours tested positive for fentanyl through a urine drug screen (AACN, 2020). Of the 82 babies in the study tested whose mothers had EA, 24 of them tested positive, and all 14 babies whose mothers did not have EA tested negative. This reaffirms the risks fentanyl has for the fetus, whether the mother receives it IV or EA. Fentanyl is regarded as being effective for pain control, but it presents side effects to both the mother and the fetus.

Two other IV pain medications common in labor are stadol and nubain. These are both considered opiates and act similarly to fentanyl and morphine. These both help minimize moderate to severe pain by decreasing the transmission of pain impulses in the brain (Florence & Palmer, 2003). A side effect of these two medications is a decreased respiratory rate for the mother and an increased rate of nausea and vomiting. They are equally as potent as morphine and if administered within 1 to 4 hours of delivery, a decrease in respiratory effort for the newborn has been seen (Florence & Palmer, 2003). These effects can be reversed if narcan is administered to the baby soon after delivery, but this would only be administered if the baby shows respiratory depression.

Non-pharmacological pain control methods do not pose the same side effects as pharmacological methods. Nitrous oxide, water immersion, breathing techniques, massage, and acupuncture are some of the more common non-pharmacological methods. Brown et al. (2001), reviewed the variety of non-pharmacological methods with laboring patients and overall satisfaction. Breathing and relaxation techniques were used the most within this study, with 78% of women stating these methods were very effective or somewhat effective in relieving their pain. In contrast, only 5 participants used water immersion and reported low levels of satisfaction. By the conclusion of the participants' labors, 71.7% used pain medication prior to
delivery proving none of these non-pharmacological methods were overwhelmingly effective at controlling labor pain. But none of these methods had side effects for the mother or fetus, making them a safer, risk-free option.

Virtual reality systems are a newer non-pharmacological pain control method being implemented and studied in various healthcare settings to alleviate anxiety and pain for patients. It also poses no side effects for the mother or fetus. In several studies, there were no reports of negative side effects, including headaches, nausea, vomiting, or dizziness (Birrenbach et al., 2022; Faber et al., 2013; Guenther et al., 2022; Kissel et al., 2021; Perdue et al., 2022; Qizhi Liu et al., 2022). The study also found patients who used VR for pain relief had a high level of satisfaction, regardless of whether they noticed decreased pain sensations. Guenther et al. (2022), found 82.5% of the participants would use VR again and rated their experience as good or very good. In a similar study by Kissel et al. (2021), 92.5% of VR participants reported their sense of comfort and relaxation was improved. Participants in the study quoted “it was a great distraction, it took my mind off of my pain, it felt like a dream” (p.11). With no side effects and an overall satisfaction, VR is a good pain control option for laboring mothers.

**Rationale**

Although pharmacological methods have been proven to be highly effective for pain relief for laboring mothers, side effects are present for both the patient and the fetus. VR is new to healthcare and therefore less research is available on its ability to work effectively for this patient population. VR was first introduced in 1960 and was created for military personnel to simulate dangerous situations for training (Virtual Reality Society, n.d.). Since then, Sega gaming systems and other technology companies have created newer, more sophisticated VR systems, but it was not until 2016 that VR started to immerse more in healthcare. In 2021, a
huge advancement was made when the FDA authorized the marketing of EaseVRx (a medical
VR system) to help with chronic back pain (US Food and Drug Administration, 2021). This was
the first home-approved VR system and is hoped to accelerate its use in healthcare settings.

VR is being utilized more prominently in specific healthcare settings, most especially for
burn victims and during other painful medical procedures. In a single-blinded trial by Qizhi Liu
et al. (2022), 59 participants undergoing a colonoscopy wore a VR system during the procedure
while 58 were in the control group. The hypothesis that pain levels would be lower for the
interventional group was supported during this study. The provider noted the procedure in the
control group was more difficult to perform as compared to the VR group, related to decreased
levels of pain and anxiety for the interventional group.

A study of 36 burn victims was performed by Faber et al. (2013), to determine if the use
of VR during frequent dressing changes alleviated or lowered pain levels. Narcotics are the
treatment of choice during dressing changes for these patients because no non-pharmaceutical
options have been proven effective. Pain medication continued to be administered during this
study, but VR was introduced in addition except for baseline day one, and pain levels were
measured on each subsequent day. The results proved VR did help lower pain levels during
dressing changes for burn victims as compared to the control group.

EaseVRx was created for patients experiencing chronic pain who needed treatment
options at home. To influence this approval, Godman (2022) performed a randomized controlled
study of 179 participants. From this, 46% of the intervention group reported a decrease in pain
by almost half, compared to the control group, where only 26% reported decreased pain levels.

Other studies have been performed in specialized settings including the intensive care
unit, palliative care, and the emergency room. All of these studies examined if VR would
decrease pain and increase comfort for their specific patient population (Birrenbach et al., 2022; Guenther et al., 2022; Kissel et al., 2021). Each study utilized a different framework to complete its work, but the findings were consistent throughout. Despite the varied clinical settings or interventions performed, the VR group consistently had lower pain levels, increased comfort for the patient, and decreased anxiety levels as compared to the control group. These further support VR use in healthcare and the need for expanded use.

Related to labor and delivery and VR specifically, only 58 articles were found in PubMed for this specific patient population, and even fewer studies have been published. A study performed on 40 laboring patients was done by Wong et al. (2021). They determined the use of VR for laboring patients was as effective or better in controlling labor pains than the use of hydromorphone (a pharmacological pain medication). In a randomized controlled study of 42 laboring patients, 95% of women in the intervention VR group had decreased levels of pain and anxiety as compared to the control group (Carus et al., 2022). This led to a better, overall patient experience for the VR group. Further support of VR for labor patients was found in a systematic review by Baradwan et al. (2022), who included 8 randomized controlled studies examining the use of VR for 466 labor patients and its efficacy. Both pain scales and anxiety levels were lower for the VR group, thereby improving the overall satisfaction of the labor experience. In a 6-month randomized controlled study, labor patients who reported a pain level of greater than 4/10 with contractions were offered a VR device to investigate whether it lowered their pain level (Frey et al., 2019). It was concluded pain and anxiety levels were lower in the VR group and 82% of the participants would use the device in the future.

Studies are emerging to support the use of VR for patients to decrease pain and anxiety levels. It is an alternative treatment option for laboring patients who are looking for ways to
cope with pain without using IV pain medication or EA. By adopting the use of VR in the clinical setting, patients can prolong the need for pharmacological pain options or perhaps avoid them completely during the labor process.

Specific Aims

The quality improvement project described in this article was performed to determine if adopting the use of VR in the labor and delivery setting at a small, community hospital in the Northeast region, reduced pain, and anxiety levels for laboring mothers, therefore reducing the need for pharmacological pain control methods. It was expected labor patients would find VR eased labor pain and anxiety and reduced the rates of IV medication or EA and/or the amount of time EA was running prior to delivery. A retrospective review of the data was included to determine the rates of EA for a five-month period in addition to the length of time EA was running prior to delivery, and intravenous pain medication rates.

Methods

Context

The facility was a small, community hospital located in Massachusetts. It is a 179-bed hospital, serving 25 surrounding towns which treats over 300,000 patients annually. It has affiliations with Massachusetts General Hospital Children’s Hospital, Massachusetts General Oncology Center, Lahey Hospital, Brigham and Women’s Hospital, and Tufts Care Dimensions program, and has specialty care centers including the NAKA Infusion Center, the Dr. Robert C. Cantu Concussion Center, the Clough Surgical Center, and the Clough Birthing Center. It is committed to the health and well-being of the community and has a five-star rating from the Centers for Medicare and Medicaid. Additionally, it strives to be a trusted healthcare provider
and a valued community partner in the area while helping people strive to reach their full potential for health and wellness.

The birthing center delivers roughly 1200-1400 babies each year with a level two special care nursery for sick newborns. There are two obstetrician practices affiliated with this hospital consisting of 10 obstetricians and 9 nurse midwives. The birthing unit has a director and manager of the labor and delivery unit, postpartum unit, and special care nursery, 2 clinical educators, and 1 quality data nurse. There are 29 full and part-time registered nurses and 14 per diem nurses employed on the labor and delivery unit. This quality improvement project took place on the labor and delivery unit and required both the providers and nurses to be trained on the use of VR, implement the device with laboring mothers, and complete the documentation requested.

The cost-benefit analysis for implementing a VR system on the labor and delivery unit is outlined below. There is no charge to the patient for using the VR device. If the VR device alleviated the patient’s pain and prevented them from requesting IV pain medication or EA, the overall cost of their hospital stay was significantly lower based on the table below.

<table>
<thead>
<tr>
<th>Interventions</th>
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<tbody>
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<td>For this project, a CAREVRx system was used. The device was preloaded with software focusing on immersive nature scenes with music and sounds (Healing Healthcare Systems, 2023). It was loaded with 8 nature scenes to include the beach, desert, mountains, and lakes. It used gaze-based navigation removing the need to have a remote in hand to operate. Patients had</td>
</tr>
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the ability to choose which scene to watch and could change to a different scene during their immersion experience without difficulty. Four guided imagery experiences were also included in the software package, helping the patient with focused breathing, relaxation, and meditation.

Participants with the following conditions were not allowed to participate in the project or were used with special considerations. This included a history of psychiatric disorders, visual or auditory disabilities, an inability to indicate pain intensity or complete project measures, hearing or vision deficits, seizure history, or anyone with trauma to the face or head (Frey et al., 2019, Carus et al., 2022, & Healing Healthcare Systems, 2023). Patients who had a history of motion sickness, headaches, dizziness, and migraines used the device with the understanding VR can cause these conditions to worsen. These patients were recommended to take a break every 20-30 minutes to minimize side effects from occurring. Patients included in this project were those who did not have a history of any of the above, were pregnant and admitted to the labor and delivery unit, and consented to be part of the project.

The initial phase of this quality improvement project was the approval process to use VR during labor. The members involved in this process were the clinical educator, unit director, director of quality and safety, medical director of labor and delivery, and the chief nursing officer (CNO). The entirety of the project was approved by the above people and funding was found through the PNQUIN grant to purchase the device. After the approval process, it was determined by the CNO and unit director no policy development was needed due to the lack of side effects to the patient, but a consent form was needed for patient participation. The consent form (Appendix A) was based on a current consent form for nitrous oxide use and after review, was approved by the unit director and CNO.
The second phase involved all nurses on the labor and delivery unit. Training consisted of an educational Healthstream module created by this author and clinical site mentor explaining what VR is and how it is used for patient use. The module explained the benefits of VR use and why this technology is important to introduce to our patients. Lastly, the cleaning process, the documentation to be completed on patients using the device, and patients who could not participate in the project were included in the module. Upon completion of the module, all nurses were required to complete and score 100% on a 10-question quiz created by this author, reviewing and reinforcing what was just presented. This phase took place from May to June 2023, prior to the implementation of the project. Nurses had 2 weeks to complete the Healthstream module. It was given to newly hired nurses in September for two weeks. There were 40 staff members in total who were assigned the module. As of October 10, 2023, the completion rate was 92.5%. The post-test scores were required to be 100% and Healthstream does not populate how many attempts each staff member took, therefore the pass score was 100% for everyone. Staff members who were late in completion accounted for 15% of staff members and 7.5% never completed the module. This information is seen in the table below.

Figure 1

_Diagram of Healthstream Module Staff Completion Rates_
Additionally, an educational flyer about VR use (Appendix B) during labor was created and placed in the OB offices affiliated with this hospital and the observation rooms on the labor and delivery unit. This allowed patients to be aware of the device implementation before being admitted to the hospital for labor. It included a QR code patients could scan to watch a video specifically about the Cares VRx device and an email address of the author to ask further questions. Approval from the medical director, the unit director, and the office managers was required before the placement of materials. Following approval, signs were placed in the medical offices in July 2023 and on the unit in August 2023, remaining in place during the duration of the project.

The third phase was the implementation of the VR system which occurred from August 23, 2023, to October 20, 2023. Ten nurses were identified to be champions of the project. These nurses were the experts on the device. All nurses on the unit were allowed to self-select to be a champion and there were 5 from the day shift and 5 from the night shift. Patients who met the inclusion criteria were asked by the champion nurses if they wanted to use VR during their labor. They provided information on how VR works, the suggested time limit of 20-30 minutes for patients who have a history of headaches, migraines, or motion sickness, and explained the survey questions they would be asked about pain and anxiety levels before and during VR use. To help with questions the patients had, the champion nurse had access to a simple informational sheet created by this author outlining both the device and process of the project (Appendix C). The champion nurses completed the form for all involved VR participants (Appendix D). Upon completion of use, the form was placed in a designated folder and the device was cleaned for the next use.
Four weeks into the implementation phase, the participant letter was handed out to all non-stress test patients and triage patients from October 2 – October 14 to encourage and educate prospective patients to use the VR device. All staff on labor and delivery were made aware of this change for this period of time. Additionally, the postpartum staff were made aware the VR device could be used for postpartum patients if they believed it would be useful during their inpatient stay as of October 3, 2023.

**Study of the Intervention**

A review of the statistical data collected from the VR patient survey was performed by this author to determine if the outcome was successful. A quasi-experimental design was used as the participants were not randomly assigned to either the control or intervention group. The control group included participants who did not want to use the VR device. Participants were self-selected to be part of the project and use the VR system. The data determined if VR was effective for pain relief and anxiety levels, if fewer patients received IV medication or EA, or if the period in which they had EA was less than the control group. The collection of information was done as forms were being submitted and after the implementation period of 8 weeks.

In addition, a retrospective chart review was completed before the start of the intervention to determine current epidural rates for each month and the length of time the epidural was running before delivery. This data was obtained by looking through the birth log on the unit and a spreadsheet was created to include all those patients who received an epidural, the date and time of delivery, the type of delivery, and the start time of the EA. This data was collected for June – September 2023. If the EA start time was not included in the birth log, chart reviews through OBTV were conducted to fill in the missing data points.
EMR chart reviews were performed on IV pain medication use during the same months as above. The pharmacy provided this author with Omnicell reports to include when stadol or nubain was removed from the Omnicell on the labor and delivery unit. These medications are given only during the intrapartum phase, therefore only the number of times the medications were removed was needed.

A final comparison of data was performed comparing the intervention group to the retrospective data and control group. The control group consisted of data gathered during the intervention period including IV pain medication rates, EA rates, and length of time EA was running. A bar chart was created to show the differences between the control and intervention groups. Two charts (seen in the results section) were created to reflect pain levels and anxiety levels for the intervention group. In addition, the rates of IV medication, EA use, and the length of EA use for intervention groups were determined. The difference seen between the intervention group and control group proves the efficacy of VR for laboring patients in managing pain and anxiety but more data is needed to determine if lower rates of IV medication and EA use or duration of treatment occurred.

A threat within the facility that had the potential to affect the validity of data was self-selection. A second threat was the patient’s obstetrical experience. These factors were taken into consideration when analyzing the outcomes. Additionally, this author relied on the nurse champions to complete the patient VR survey accurately each time the system was used. Ensuring education was provided and the validated scales being used was essential. There were no external threats to the validity of the data.
Measures

A numeric pain scale was the validated scale used for the measurement of pain. Using a numeric pain scale accounted for differences in culture, experience, and age which are all factors influencing a patient's perception of pain (Aziato, 2015). The use of the numeric pain scale (see Appendix E) elicited valid data from the nurses collecting the information from participants. This scale was being used at this hospital on the labor and delivery unit making it easy for both the participants and nurses to understand.

Using a validated tool to measure anxiety that was specific to pregnant mothers was important to include. A number of the questions used on generalized anxiety measurement tools include items like sleep disturbances or heart palpitations which are common in pregnancy and could inflate the patient’s overall score (Sinesi, 2019). The perinatal anxiety screening scale (PASS) (see Appendix F) was used to measure anxiety for this project, due to the overall use of ease for the champion nurse and easy to understand for the patient. Using an anxiety screening tool that is specific to the perinatal and antenatal period is important to ensure diagnosis and treatment is appropriate. PASS was developed in 2013 by Somerville et al. and includes 31 items specific to this patient population. Yazici et al., (2018) performed a study on various anxiety tools for pregnant and post-partum patients and found PASS was the most reliable and accurate screening tool available. For further support of this tool, the social worker at this hospital was familiar with PASS and during discussions in the planning phase, suggested PASS be the tool used by the champion nurses.

Analysis

Descriptive statistics were used to analyze pain and anxiety levels before and during the use of the VR device. The rates of IV medication use and EA were descriptive statistics to
determine if lower rates of use occurred with VR use. The means were determined from this information allowing for a better understanding of the project outcomes. Qualitative data was collected at the end of the experience including narrative data from the patient’s experience and staff feedback. After a careful review of the data points and construction of a bar chart, a conclusion on whether VR use was an effective non-pharmacological pain method was determined. In addition, conclusions were made on whether VR proved effective at specific phases of the labor process based on documentation of cervical dilation when the VR device was used.

**Ethical Considerations**

Participation in this project was voluntary for all patients meeting the inclusion criteria. There were no penalties or repercussions for patients who chose not to use VR during their labor and were not treated differently for opting out. Patients who opted into the project were allowed to opt out at any time and there was no delay in receiving pharmacological pain medications. There were no extrinsic factors for participants who did participate. All nurses on the labor and delivery unit were required to complete the Healthstream module. The champions were selected by this author and no repercussions were made for those who did not wish to participate. No video recordings or photographs were taken of the patients using the VR system by medical staff. There was no identifiable information on the project forms. The results are not being published with anything identifiable, including names or medical record numbers as this information was not gathered during this project. IRB approval was not needed for this project.
Results

There were two parts to this project to determine whether virtual reality was an effective tool for laboring patients. The first was to collect retrospective and current data on epidural rates as well as IV pain medication rates during the intrapartum period. This would allow for a comparison to the intervention group. The second piece was to analyze the survey results from the participants who used the VR device (intervention group) during labor to include both qualitative and quantitative data.

Quantitative data

The chart reviews showed this labor and delivery unit had higher epidural rates than the national average of 67% for four of the five months reviewed, with the highest rate in July 2023 of 89.2%. August was lower than the national average by 1.1% therefore, not statistically significant. The results are seen in the table below, comparing the monthly rates to the national average.

Figure 2

Vaginal Epidural Rates vs National Average

Determining the length of time EA runs before delivery was also done through the retrospective chart reviews. The average running rates of EA for cesarean section patients were
much higher than vaginal deliveries but overall, both exceeded 8 or more hours from the start of the epidural anesthesia to delivery time. Cesarean-section patients had EA running rates on average greater than 11 hours for the month of June, the lowest month, and as high as 18 hours for the month of July. For vaginal deliveries, the average running rate was between 6.8 hours in September and close to 10 hours in August. As discussed, having EA running for more than 10 hours has a negative effect on the newborn, as fentanyl has been found in babies when this has occurred cases (AACN, 2020).

Figure 3

*Average epidural running time (vaginal deliveries)*

![Average Epidural Running Time Vaginal (Hours)](image)

Figure 4

*Average epidural running time (c-section patients)*

![Average Epidural Running Time C/S (Hours)](image)
Intravenous pain medication rates were examined and showed a much lower rate of use than EA, with rates between 4.9% - 9.8%. Stadol was used for June and July, but as of July 26, 2023, the pharmacy replaced stadol with nubain due to a national shortage. The data reflects the changes in medications, which does not affect the validity of the data. The method of delivery was not taken into consideration for this project.

Figure 5

*Intravenous pain medication rates*

Data from the VR intervention group showed a slight decrease in pain levels from before use to during/after use. Most significant were anxiety levels that decreased for the intervention group from before use to during/after use. This was reflected using the visual analog scale for pain and anxiety and is seen in the charts below.
The length of time epidural anesthesia was running was determined for participants who also used the VR device. Of the 8 participants, 6 of them received EA after using VR resulting in a 75% EA rate. The length of time EA was running for these participants was determined
similarly to the chart reviews. On average, the EA run time was 10.7 hours for the intervention group but one patient had a running rate higher than the total of the other 5 patients. Removing this outlier, the average running rate of EA dropped to 6.2 hours, much less than the EA running time in the control groups. There was only one cesarean section delivery for the participants who used VR and no one received IV pain medication.

**Qualitative data**

For the data points with no decrease in pain or anxiety reported for the intervention group, the comments reported by the patients continued to support its use. For patient 6 with a pain rating of 10 before and during, she stated “I really liked it. I wish I had tried it before my contractions were so close. It would have been beneficial to use it for vaginal exams, but my contractions are too intense now.” Similar comments were made by patients, one stating it felt like a nap and another stating she wished she had used it sooner in her labor process. Patient 7 reported a higher pain score while using the VR device, but the narrative included the device was used for a sterile vaginal exam, a painful intervention, but it was less painful for the patient than without the device. The remainder of this data can be seen in Appendix G.

**Discussion**

**Summary**

During the 8-week implementation period, it was shown virtual reality is an effective tool to decrease pain and anxiety levels for patients in labor. It proved to be a useful method for patients in a facility with high epidural anesthesia rates and lacks non-pharmacological tools. In addition, using VR for pain and anxiety incurred no cost to the patient, and patients were able to receive other pain control methods upon request after using the device.

The data collected represented the efficacy of this device for this particular patient population despite the small sample size. Patients reported pain scales ranging from 2.5-10 prior
to use and 1-10 during or after using the device. Anxiety scales ranged from 3-8 prior to use to
1-6 during or after use. Additionally, one patient went from 5-6 centimeters to fully dilated and
pushing within 4 minutes of using the device. This first-time labor patient was planning to
receive epidural anesthesia and used the device in the interim period while waiting for anesthesia
to arrive. The patient delivered before EA could be administered. The quantitative data explains
the patient’s positive experiences with the VR device as well. With few studies researching the
effects of VR in the labor and delivery setting, this project is unique in its findings and can be
attributed to other hospitals or clinical settings.

The ability to provide patients in this labor and delivery unit with a different way to
manage pain and anxiety during their labor experience is a strength of this project. This unit
only has water immersion available for patients who do not want medication and often times this
method is unavailable due to high patient census. Giving the patients and nurses another tool
available to help with pain and anxiety during labor allows for an increased variety of methods
both non-pharmacological and pharmacological resulting in an overall better patient experience.
It also shows promise in decreasing EA rates and running time which decreases risks to both the
mom and fetus during labor.

**Interpretation**

The results of this project allowed patients and nurses in the labor and delivery setting to
have a new technological tool to help decrease pain and anxiety levels. Prior to this project, the
nurses on the unit had little knowledge about the efficacy of VR in healthcare and only learned
of it through the Healthstream module and using the device with patients. As the project
progressed, nurses were offering it to their patients more readily as they saw firsthand its
efficacy. The patients did not have any prior knowledge of VR for pain and anxiety and were
only educated on admission to the unit or in reviewing the participant letter or VR flyer.

Emerging studies on the usefulness of VR in healthcare are being published and continuing to expand each year. It is estimated the global VR healthcare market will increase from $3.11 billion in 2023 to over $25 billion in 2030 (Fortune Business Insights, 2023). This project introduced this advanced technology to patients in this setting, allowing them to have another option for pain control during the labor process.

Furthermore, having a VR device on this unit allowed for a potential decrease in EA rates and running times. As previously discussed, EA has risks for both the patient and the fetus, especially when the medication is running for more than 10 hours. VR devices pose no risk to the patient or fetus and are overall a safer method of pain control. By distracting 50% of the brain receptors responsible for recognizing pain, VR can be an effective tool for pain and anxiety, reducing the need for further medication (Ouyang, 2022). Of the patients who used the device, 7 out of 8 ended up with an epidural, but felt the benefits of the VR were worthwhile in the earlier phases of their labor. Additionally, the average running rate for the intervention group was lower than the control groups examined despite the small sample size. One patient used the device only for vaginal exams and felt it was an effective distraction device for this anxiety-provoking procedure.

It was reported by the nurses that 5 patients signed the consent form to use the VR device but ended up receiving EA at the time they were requesting something for pain relief. With more expertise from the nursing staff and further education of the patients, VR use may have been beneficial to these patients at an earlier stage of labor when the pain was less intense and frequent.
With little research on VR and its usefulness in the labor and delivery setting, there is no direct comparison of information to be made. The data did coincide with other studies in other clinical settings for reducing pain and anxiety, but there was no study found on whether VR decreases EA rates and running times. It can be assumed with increased patient knowledge of the device and increased ease of use for the staff, VR would be used more frequently in this facility and a stronger conclusion could be drawn about its correlation to EA. Regardless, both the qualitative and quantitative data are strong in supporting the need to have this technology in the labor and delivery setting.

**Limitations**

This project was completed over an 8-week period when the labor and delivery census was high. This had the potential to affect the data obtained because of short staffing and the inability of the champion nurses to explain this new pain control method to patients because of time constraints. This was addressed by placing the informational flyer in the OB offices so patients were made aware of the intervention prior to admission to the unit. Additionally, each patient had their own definition of pain and anxiety which altered the results of the intervention as well as the differences in labor progression for each patient. This was mitigated by including a cervical dilation number each time the VR system was used, as labor pain increases as cervical dilation approaches 10 centimeters.

Funding for the device posed a problem for this project, delaying and shortening the period for implementation. Grant funding was not made available until October rather than June, as expected. The original date of implementation was June 1, 2023 – September 30, 2023, but was shortened to 8 weeks. To compound the delay, once an alternative way to fund was determined and an order was placed for a device, the manufacturing company encountered a
supply issue and devices were back ordered for three months. This resulted in a small sample size due to a lack of time to implement the project.

The champion nurses found it difficult to persuade patients to try the device for pain and anxiety because it is a new option for pain control. Patients often come into the hospital with plans for pain control and tend not to deviate, making it challenging to ask them to try something new in labor. This was attempted to be alleviated by posting the educational flyers, posting the QR code, and having a participant letter to hand out to patients to provide more information. In addition, tours of the birthing unit began during the implementation period. This author asked if the participant letter could be handed out to patients who came for booked tours to help alleviate the unknown factor of the device. Unfortunately, the estimated due dates of the patients coming in for tours were after the implementation period. Lastly, it was asked if the participant letter could be offered to patients who came to the labor and delivery unit for testing during their pregnancy. This was allowed but only for 2 weeks prior to completion of the project. Therefore, these limitations were attributed to the small sample size for this project.

When analyzing the data on each survey, it was found the nurses did not use the perinatal anxiety screening scale (PASS) attached to the VR survey as planned. After further investigation, the nurses used a rating system similar to the visual analog pain scale for anxiety, rating the patient’s anxiety from 0-10 for each patient. Although this was not the intention of this measure, the surveys were consistent in how each nurse asked the patient about their anxiety, allowing for the data to be included and analyzed for final comparisons and conclusions.

Conclusion

Overall VR had high user satisfaction and no cost associated for the patients with its use, proving its usability and efficacy for laboring patients. Having a tool available that has no side
effects as compared to other pharmacological methods available on this unit is necessary to support those labor patients who want to have natural childbirth or prolonged pharmacological methods. VR is an easy-to-use device that operates within minutes and does not restrict the patient’s ability to move around after use. It also can be easily turned off with no residual effects on the patient, differing from EA, nitrous oxide, or IV medications.

Upon completion of this project, staff were left without this device and it is unclear whether leadership will purchase one for continued use. To support having this device permanently on the unit, this author sent out a survey to the nursing staff to gather feedback about the project (see Appendix H). The feedback from 20 staff members concluded having a VR device on the unit would be beneficial to their patients and that over time, educating and using the VR device with patients was easier. They also concluded VR would be used more frequently by patients as they become more aware of its usefulness and effectiveness. There was additional quantitative feedback from this survey which can be seen in Appendix I to further support the device. This survey data along with the project data will be presented to the leadership team in hopes of purchasing the Cares VRx system.

If cost becomes an issue to keep the device available, a billing code could be created to charge the patient for its use. This could help defer the financial burden. This charge would be substantially lower than the cost of EA but is a possible solution to allowing the device to be available in the future. Additionally, no surrounding hospitals are offering VR for labor patients. This allows this hospital to be able to market this device to the community and has the potential to increase births for this facility, therefore increasing revenue.

Having more time for this project would allow further support for VR’s efficacy in this clinical setting due to the small sample size collected. Additional data would also allow for a
concrete conclusion on whether VR does reduce EA rates and running time. Research on how VR affects the patient’s course of labor and the number of interventions would be important to analyze in the future. If this device can decrease EA use, cesarean section rates, and labor interventions, it would provide a better, safer patient experience. Allowing patients to have more methods in reducing labor pain and anxiety increases patient satisfaction, which could be seen on HCAPS surveys upon discharge. The potential for VR for this setting is apparent and it is strongly suggested to advocate for this device for the labor setting to provide more low-risk non-pharmacological methods for laboring patients.
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Appendix A

Consent for Use of Virtual Reality

I authorize Emerson Hospital to provide me with a virtual reality device for the purpose of decreasing pain and anxiety levels during labor or other painful procedures. The consenter has reviewed the risks, benefits, and alternatives associated with using virtual reality to manage pain symptoms.

- I understand I may discontinue the use of virtual reality at any time.
- I understand the use of virtual reality has no risks to myself or the baby.
- I understand I may not ambulate when using virtual reality.
- I understand taking a break from using the device after 20-30 minutes of use will be recommended if I have a history of migraines or motion sickness.
- I understand that if I experience any symptoms of motion sickness or headache, I should stop using the virtual reality device.
- I understand I will be asked about my pain and anxiety levels before and after the use of the virtual reality device.

Patient signature: _________________________________ Date:_____________

Consenter signature:_______________________________ Date:_____________
Virtual Reality For Pain and Anxiety For Labor Patients

Starting in August 2023, patients admitted to L&D will have the option to use virtual reality goggles to help optimize pain and anxiety.

How does VR work?

- A handheld device that enables the user or patient to see 360-degree pictures of environments while hearing coordinating sounds, allowing for complete immersion into the setting (Godman, 2022).
- VR system acts as a non-pharmacologic form of analgesia by "exerting an array of emotional affective, emotion-based cognitive, and attentional processes on the body's intricate pain modulation system" allowing pain sensation and anxiety levels to decrease through distraction (Li et al., 2011, p. 147).
- Has been shown to decrease anxiety and pain levels for laboring patients, burn victims, emergency room procedures, and various other medical interventions.

Scan QR code to watch an informational video about VR

Questions? Email for more information
chantal.cole@unh.edu
My name is Chantal Cole and I am a nurse on the labor and delivery unit at Emerson Hospital but am also a student in a doctoral nursing program at the University of New Hampshire. As part of my program, I am doing a project for labor patients and I’m hoping you would like to participate.

**What does it involve?**
I am offering labor patients the option to use a virtual reality device which can be used during labor, IV starts, or anything you perceive as painful and/or increasing anxiety levels.

**What is virtual reality?**
Virtual reality is an advancing technology being used in healthcare to help decrease pain and anxiety levels. It is a 360-degree immersive experience where you wear a set of goggles, allowing you to feel as though you are present in the nature scene. You can wear it for any length of time during your stay on the labor unit.

**What am I asking from you?**
As a participant in my project, you will be asked to sign a consent form as well as answer some questions about anxiety and pain levels before and after using the virtual reality goggles. There will be no information that identifies you from others in the project. It will be non-identifiable data collected for the purpose of this project.

**Is there any risk involved?**
There is no risk to using the goggles. If you have a history of migraines or motion sickness, it will be recommended you take a break from using the goggles after 20-30 minutes of use, but otherwise there is no risk to using virtual reality. You will be asked to stay in bed or on a birthing ball while wearing them to decrease the risk of falling.

**What if I don’t want to participate?**
That’s completely fine! Choosing not to participate does not change any treatment options available to you. If decide today you want to use it and change your mind on admission to labor and delivery, your treatment options will also not change.
I thank you for considering this and if you have any questions, please feel free to email me at Chantal.cole@unh.edu.

Scan this QR code to watch a quick video on the Cares VRx system Emerson Hospital will soon have.
Appendix D

Virtual Reality Patient Form

Patient Demographics:

G_______P_____

Gestational age: __________

PMH: __________________________________________________________

Did the patient receive IV medication: YES NO

If yes, what kind, what dose, and what time? ________________________________

Did the patient receive an epidural? YES NO

If so, what time did it begin? __________________________

Delivery information:

SVD C/S Time of delivery: _________ Date of delivery: ________

Please complete EACH time the patient uses the VR device. Remember, the patient must take a 15-minute break after 20-30 minutes of use if there is a history of migraines, headaches, or motion sickness.
<table>
<thead>
<tr>
<th>VR Use #1:</th>
<th>VR Use #2:</th>
<th>VR Use #3:</th>
<th>VR Use #4:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time of use (20-30 min max):</td>
<td>Time of use (20-30 min max):</td>
<td>Time of use (20-30 min max):</td>
<td>Time of use (20-30 min max):</td>
</tr>
<tr>
<td>Cervical Dilation</td>
<td>Cervical Dilation</td>
<td>Cervical Dilation</td>
<td>Cervical Dilation</td>
</tr>
<tr>
<td>Membranes intact?</td>
<td>Membranes intact?</td>
<td>Membranes intact?</td>
<td>Membranes intact?</td>
</tr>
<tr>
<td>Numeric Pain scale before:</td>
<td>Numeric Pain scale before:</td>
<td>Numeric Pain scale before:</td>
<td>Numeric Pain scale before:</td>
</tr>
<tr>
<td>Numeric Pain scale during:</td>
<td>Numeric Pain scale during:</td>
<td>Numeric Pain scale during:</td>
<td>Numeric Pain scale during:</td>
</tr>
<tr>
<td>Anxiety level before:</td>
<td>Anxiety level before:</td>
<td>Anxiety level before:</td>
<td>Anxiety level before:</td>
</tr>
<tr>
<td>Anxiety level during:</td>
<td>Anxiety level during:</td>
<td>Anxiety level during:</td>
<td>Anxiety level during:</td>
</tr>
</tbody>
</table>

Any additional information or commentary:
Appendix E

Numeric Pain Scale

On a scale of 0 to 10, with 0 being no pain at all and 10 being the worst pain imaginable, how would you rate your pain RIGHT NOW.

<p>| | | | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
</tr>
</tbody>
</table>

No Pain | Worst pain imaginable
Appendix F

PERINATAL ANXIETY SCREENING SCALE (PASS)

☐ ANTENATAL  ☐ POSTNATAL  DATE: ________________

Weeks pregnant (  )  Baby's age (  )

OVER THE PAST MONTH, **How often** have you experienced the following? Please tick the response that most closely describes your experience for **every** question.

<table>
<thead>
<tr>
<th>1. Worry about the baby/pregnancy</th>
<th>Not at all</th>
<th>Some times</th>
<th>Often</th>
<th>Almost Always</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>2. Fear that harm will come to the baby</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>3. A sense of dread that something bad is going to happen</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>4. Worry about many things</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>5. Worry about the future</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>6. Feeling overwhelmed</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>7. Really strong fears about things, eg needles, blood, birth, pain, etc</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>8. Sudden rushes of extreme fear or discomfort</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>9. Repetitive thoughts that are difficult to stop or control</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>10. Difficulty sleeping even when I have the chance to sleep</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>11. Having to do things in a certain way or order</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>12. Wanting things to be perfect</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>12. Needing to be in control of things</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>14. Difficulty stopping checking or doing things over and over</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>15. Feeling jumpy or easily startled</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>16. Concerns about repeated thoughts</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>17. Being 'on guard' or needing to watch out for things</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>18. Upset about repeated memories, dreams or nightmares</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Item</td>
<td>Not at all</td>
<td>Some times</td>
<td>Often</td>
<td>Almost Always</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>------------</td>
<td>------------</td>
<td>-------</td>
<td>---------------</td>
</tr>
<tr>
<td>19. Worry that I will embarrass myself in front of others</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>20. Fear that others will judge me negatively</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>21. Feeling really uneasy in crowds</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>22. Avoiding social activities because I might be nervous</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>23. Avoiding things which concern me</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>24. Feeling detached like you're watching yourself in a movie</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>25. Losing track of time and can't remember what happened</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>26. Difficulty adjusting to recent changes</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>27. Anxiety getting in the way of being able to do things</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>28. Racing thoughts making it hard to concentrate</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>29. Fear of losing control</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>30. Feeling panicky</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>31. Feeling agitated</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

Global Score
Appendix G

Quantitative Data from VR Surveys

- "I felt sleepy and calm"
- "I enjoyed using it, went from 5-6 to fully within 4 minutes of use"
- "It felt like a nap, very thoroughly distracted, very nice!"
- “I really liked it, I wish I had used it before my contractions were so close. It would have been helpful during vaginal exams but now my contractions are too intense"
Appendix H
Qualitative Data from Staff Survey

VR Staff Feedback

- In the future, do you think patients will be more apt to use the device with increased knowledge or awareness?
- Did you find it easier to educate the patients with more practice/time using the device?
- Do you think having a VR device on the unit is something Emerson could market to the community?
- Did you find it easier to use the VR device with your patients as time went on?
- Do you think there is a benefit to having a VR device on our unit in the future?
- If the project time was longer than 2 months, do you think more patients would have used the device?
Appendix I

Quantitative Data from Staff Survey

- Currently, there is not much that we can offer for anxiety (except for VR). Anxiety affects many of our patients. Interventions like narcotics and epidural address pain but don’t do much for anxiety
- Early labor distraction & distraction from uncomfortable procedures such as SVEs and IV placement
- Alternative non medication pain/ anxiety management tool
- Decreased anxiety levels in patients
- I love using VR with my patients! I found many patients said they were interested early on, but then changed their mind or waited until they were too close to epidural time to use it effectively. I tried to encourage early use to get the patient comfortable with the device prior to onset of stronger ctx and increased anxiety, but many were hesitant. Several patients said they were concerned that they would get dizzy or felt claustrophobic even before trying the device. I had several patients say that they wished they had tried it earlier, but felt that at the time they requested it they were already too uncomfortable and couldn’t focus. I’m not sure why so many patients wanted to wait…I feel that if they would try it early on and get accustomed to it there would be much better results. Also I wonder if patients who are attempting NCB would respond more positively…especially those who have had a successful NCB in the past. I feel like these patients have a different mindset that perhaps would make them more likely to reap benefits from VR?
- A drug-free alternative for anxiety/pain relief
• Having a non pharm way to offer pain/anxiety relief to patients. This can only benefit anyone that uses it.

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• Definitely would help with parts of the admission process that make patients anxious or nervous, including but not limited, IV insertion, cook catheter placement, pre-epidural, etc.

• It is an additional/alternative source of pain management /Distraction.