

Reducing Motion Artifact in Neuroimaging in the ECU Neonatal Intensive Care Unit



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BACKGROUND

Brain MRI in newborns is important for diagnosis and prognostication.

However, imaging can be challenging as most of the neonates who get MRIs are clinically stable and therefore not intubated nor sedated.

This leads to a high incidence of "motion artifact" due to patient movement during imaging and thus makes radiologic interpretation difficult.

PROJECT AIM

Decrease the incidence of brain MRI motion artifact distortion by 50% in patients admitted to the NICU over 10 cycles. One cycle represents 5 performed MRIs.

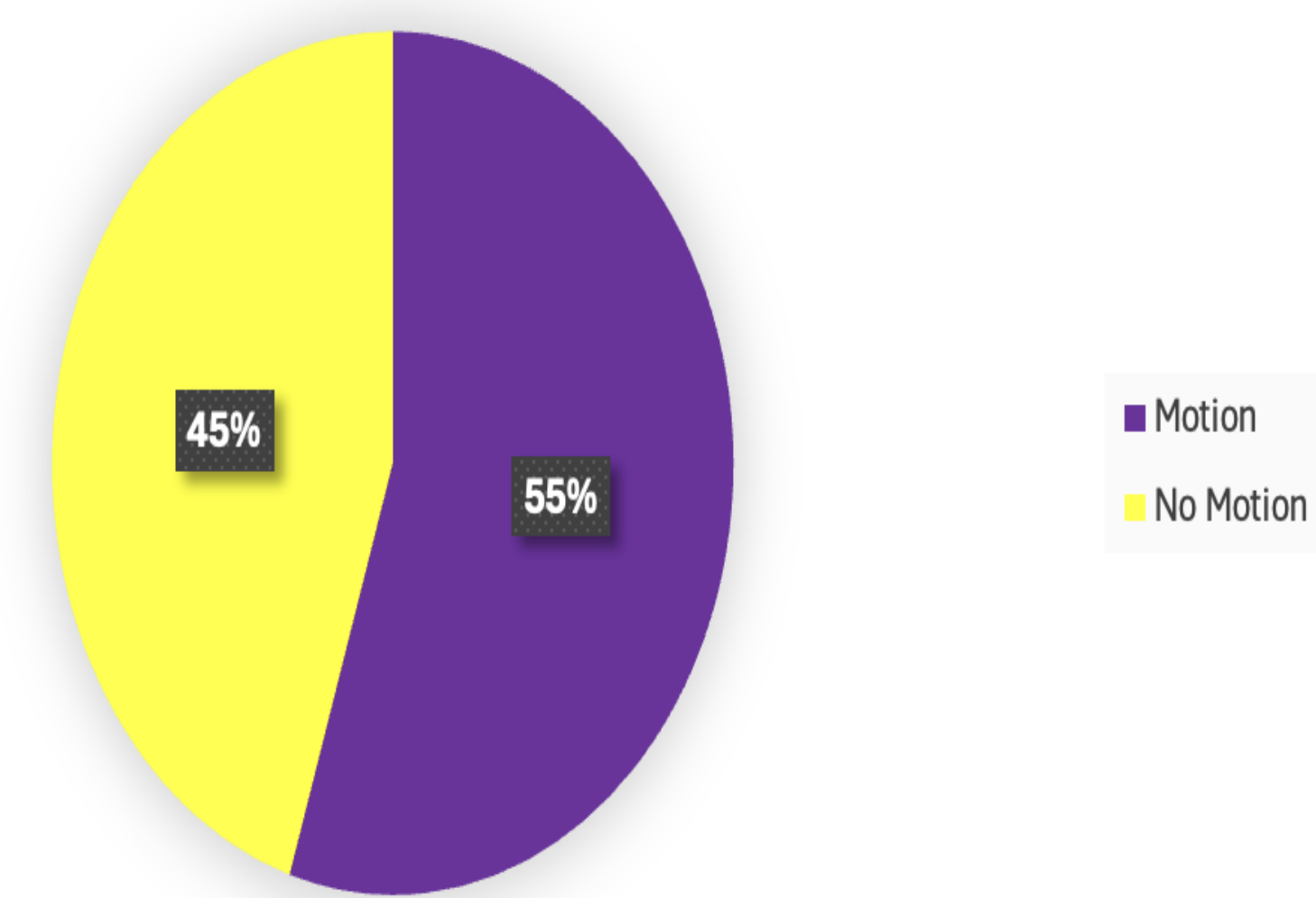
PROJECT DESIGN/STRATEGY

We formed a multi-disciplinary team and collected historical, baseline data from January 1st, 2023, through August 31st, 2024.

Our planned major interventions include purchasing papooses to swaddle the neonates, designing a protocol for papoose use, and refining an effective workflow to ensure infants are properly swaddled prior to neurological imaging.

RESULTS/OUTCOMES

Motion Artifact Impact on MRIs in 2023



Motion Artifact Impact on MRIs in 2024

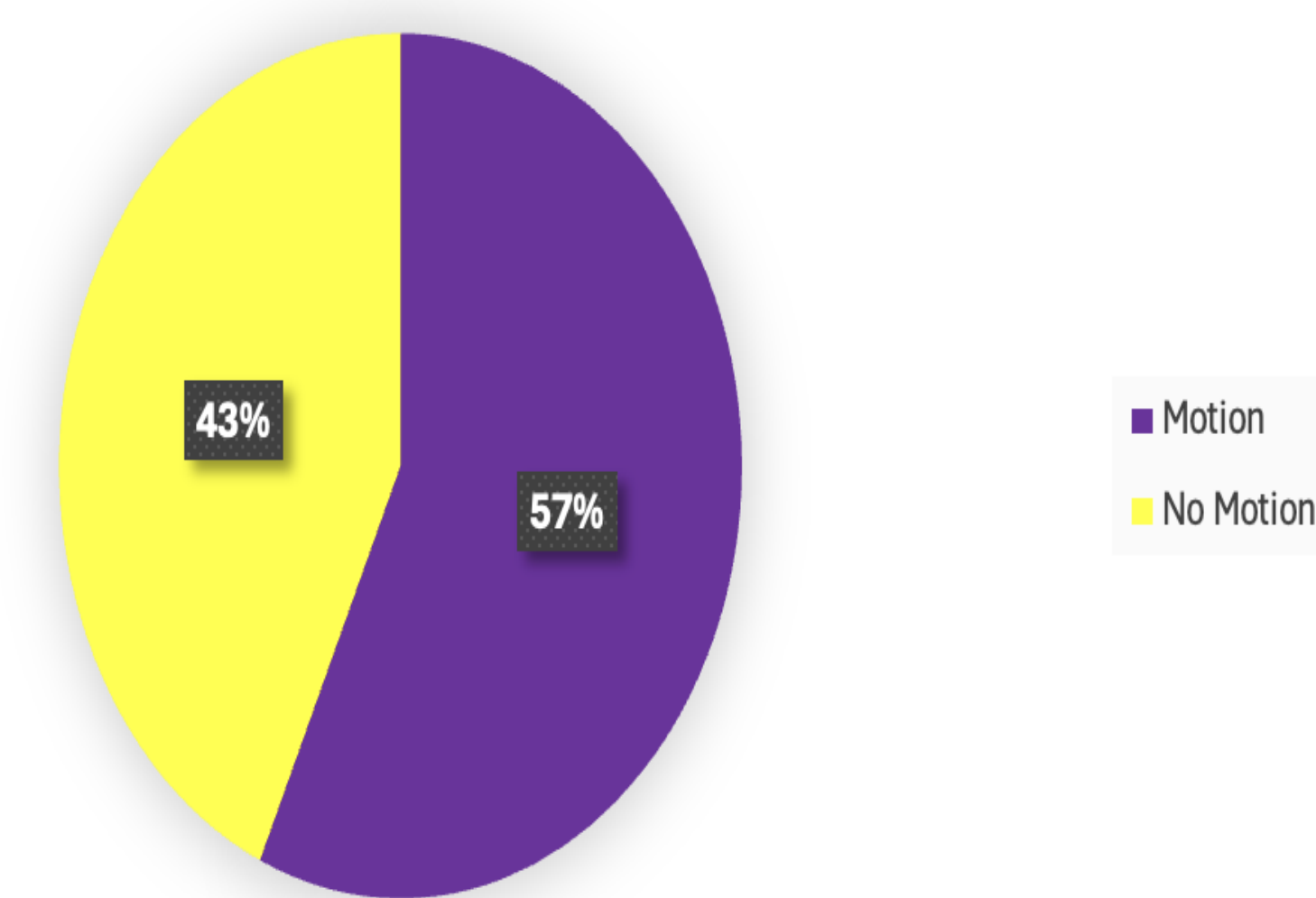


Figure 1. Percentage of MRIs impacted by motion artifact in 2023 and 2024

ECU Health Medical Center's NICU performed 51 brain MRIs in 2023. Images distorted by motion artifact were defined as any radiological read that mentioned "motion limiting interpretation" or its equivalent. Of the 51 ordered brain MRIs, 28 were noted to have motion artifact limiting the radiologic interpretation. Therefore, motion artifact distorted around 55% of all MRIs ordered by the NICU in 2023.

The papooses were ordered by ECU Health in January of 2024. NICU faculty were made aware of the purchase of the papooses and informed they would be available for use. However, neither a protocol nor workflow for papoose use was created at this time. Therefore, the data for 2024 looked very similar to 2023. From January 1st, 2024, until August 31st, 2024, the NICU ordered 37 MRIs, of which 21 were noted to have motion artifact. This led to a slight increase in images distorted by motion artifact from 55% to 57% from 2023 to 2024.

PAPOOSE SYSTEM



Reilly, Lorie & Byrne, Amy & Ely, Elizabeth. (2012). Does the Use of an Immobilizer Provide a Quality MR Image of the Brain in Infants?. Journal of Radiology Nursing, 31, 91-96. 10.1016/j.jradnu.2012.04.002.

LESSONS LEARNED

This project has highlighted many important aspects and difficulties in obtaining high quality brain MRIs in the NICU setting. This work has demonstrated the prevalence of motion artifact in MRIs ordered by the NICU and illustrated the difficulties of papoose implementation. Through this project, we learned the importance of establishing a clear workflow for utilizing swaddle devices and confirmed the inability to schedule neonate feeds due to unpredictable MRI timing in the NICU.

NEXT STEPS

We are currently in the process of designing and implementing an effective papoose workflow. This will help ensure NICU patients are properly swaddled prior to imaging.

ACKNOWLEDGEMENTS

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