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Original Work Proposal

The field of Neurosurgery comprises of multiple specialities including brain deformities in both geriatric and pediatric patients. Brain Tumors are one of the most common tumors in children accounting for over 20% of tumors in a child's brain. One of the most common forms of brain tumors in both adults and children is known as a Glioma which starts in the glial cells of either the brain or the spine. Gliomas can occur in two different grades either being low grade in which the tumor cells diffuse slowly or high grade tumors in which the cells diffuse rapidly. However, most surgeries used to treat these tumors including Chemotherapy, surgery, and radiation therapy remain ineffective as some pediatric patients face fatality approximately two years after surgery. This outcome brings into question the surgical procedures that should be conducted for the varieties of gliomas as well as the diagnosis procedures being utilized. Through this project I aim to look into pediatric high grade and low grade gliomas which account for the most deadly form of cancer in pediatric patients. The objective of the original work is to create a treatment plan assessing different cases of gliomas and the form of surgery that should be clinically conducted in order to lengthen the lifespan of the patient. In addition, I would create a prototype that resembled the different researched surgeries on a brain model and the preliminary results of each surgical procedure on the tumor in order to demonstrate my

understanding of the betterment of results when proper surgical procedures are used on the brain tumor.

Glioma tumors are diagnosed using a microscopical procedure known as histology and take into account multiple aspects of the tumor including the location of the tumor, the method in which it spread/occurred (primary or secondary), and the degree of severity of the tumor. Prior to delving into the clinical research aspect it would require a meta-analysis of research in the topic of high grade and low grade gliomas to understand the differences in their structural components, the location of the tumors, and the surgical procedure that would be in the best interest of the patient without damaging the surrounding tissue in the brain. I will require the aid of a neurosurgeon in order to obtain MRI and CT scans of patients with glioma tumors to analyze the structural components of the tumor and understand which procedures of surgery would yield the best results for the patient. In addition, I would conduct multiple interviews with pediatric neurosurgeons who have a hands on and a fundamental understanding of how to treat these tumors which would initiate a more credible treatment plan. The prototype of the brain would be using a brain model that would be built on with a 3-D display of a tumor that would have makeshift surgical tools placed in it and different portions of the tumor would be surgically removed or burned depending on the type of surgery used to counteract that tumor. The brain model will essentially signify the outcomes of each type of surgery on the brain tumor in order to provide a visual representation of the surgery and the treatment plan.

The process is intensive and may not yield fully formidable results due to the difficulty in obtaining a large sample size of scans of glioma tumors, however, it will expand my knowledge on the topic as well as provide some form of information that can be extensively used for parents

of children with brain cancer who want a fundamental idea of how surgery works prior to opting for the surgery operation. The research is in depth and intuitively examines multiple aspects of glioma surgery instead of one type of tumor or one type of surgery/therapy. Through this research, I hope to obtain a comprehensive idea of how glioma tumors are treated and which types of tumors require surgery versus which types are more fit to be treated with radiation therapy. The results of this research study, if the results yield substantial results, will allow patients to understand the underlying causes of a variety of tumors and why a certain type of surgery/therapy should be used as an effort to prevent pediatric malpractice which remains a large issue in neurosurgical practices. Through this research, I will build a comprehensive analysis of the types of pediatric brain tumors including high grade and low grade gliomas which could include astrocytomas, optic gliomas, tectal gliomas, etc. and the appropriate surgical or clinical procedure that should be addressed when a patient is diagnosed with a tumor through medical scans or a biopsy.

The original work includes extensive research on the topic of pediatric neurosurgery as it looks into one of the most fatal pediatric cancers and requires extensive evaluation and high level thinking in order to understand the correlation between two topics with minute resources. It will effectively combine the usage of a prototype and a treatment plan to serve the purpose of ensuring that patients make accurate choices when choosing a format of combatting a brain tumor and understand the underlying outcomes of surgery in order to avoid pediatric medical malpractice.