**PREDICTORS OF EPILEPSY SURGERY OUTCOME FOR TUBEROUS SCLEROSIS**

**PREDICTORS OF SEIZURE OUTCOMES IN CHILDREN WITH TUBEROUS SCLEROSIS COMPLEX UNDERGOING RESECTION EPILEPSY SURGERY: AN INDIVIDUAL PARTICIPANT DATA META-ANALYSIS**

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A thesis submitted to the School of Graduate Studies in partial fulfilment of the requirements for the Degree Master in Science

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**ABSTRACT**

Predictors of seizure outcomes in children with tuberous sclerosis complex and intractable epilepsy undergoing resective epilepsy surgery: An individual participant data meta-analysis, Master of Science 2012

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**Objective**: To perform a systematic review and individual participant data meta-analysis to identify preoperative factors associated with a good seizure outcome in children with Tuberous Sclerosis Complex (TSC) undergoing resective epilepsy surgery.

**Data sources**: Electronic databases (MEDLINE, EMBASE, CINAHL and Web of Science), archives of major epilepsy and neurosurgery meetings, and bibliographies of relevant articles, with no language or date restrictions.

**Study selection:** We included case-control or cohort studies of consecutive participants undergoing resective epilepsy surgery that reported seizure outcomes. We performed title and abstract and full text screening independently and in duplicate.

**Data extraction**: One author performed data extraction which was verified by a second author using predefined data fields including study quality assessment using a risk of bias instrument we developed. We recorded all preoperative factors that may plausibly predict seizure outcomes.

**Data synthesis**: To identify predictors of a good seizure outcome (i.e. Engel Class I or II) we used logistic regression adjusting for length of follow-up for each preoperative variable.

**Results**: Of 9863 citations, 20 articles reporting on 181 participants were eligible. Good seizure outcomes were observed in 126 (69%) participants (Engel Class I: 102(56%); Engel class II: 24(13%)). On univariable analysis, absence of generalized seizure semiology (OR=3.1, 95%CI=1.2-8.2, p=0.022), no or mild developmental delay (OR=7.3, 95%CI=2.1-24.7, p=0.001), unifocal ictal scalp electroencephalographic (EEG) abnormality (OR=3.2, 95%CI=1.4-7.6, p=0.008) and EEG/Magnetic resonance imaging concordance (OR=4.9, 95%CI=1.8-13.5, p=0.002) were associated with a good postoperative seizure outcome.

**Conclusions**: Small retrospective cohort studies are inherently prone to bias, some of which are overcome using individual participant data. The best evidence suggests 4 preoperative factors predictive of good seizure outcomes following resective epilepsy surgery. Given the low incidence of children with TSC undergoing epilepsy surgery, large long-term prospective multicenter observational studies are required to further evaluate the predictive factors identified in this review.

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**LIST OF ABBREVIATIONS**

AED – Antiepileptic drug

CINAHL - Cumulative Index to Nursing and Allied Health Literature

EEG – Electroencephalography

EMBASE - Excerpta Medica Database

EZ – Epileptogenic Zone

IQ – Intelligence Quotient

IPD – Individual Participant Data

MEDLINE - Medical Literature Analysis and Retrieval System Online

MEG - Magnetoencephalography

MRI – Magnetic Resonance Imaging

PET – Positron Emission Tomography

PubMed - Public/Publisher MEDLINE

SPECT - Single-Photon Emission Computed Tomography

TTE – Time to event

TSC - Tuberous Sclerosis Complex

VEEG – Video electroencephalography

**PREFACE**

This thesis is organized into five chapters. Chapter one provides the background information and defines the research question. Chapter two, three and four includes the methodology, results and discussion, respectively. Chapter five includes guidelines for future research and provides the disclosure of the funding sources.

**DECLARATION OF ACADEMIC ACHIEVEMENT**

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