**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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**TABLE OF CONTENTS**

**ABSTRACT** iv

**ACKNOWLEDGEMENTS** vi

**LIST OF FIGURES AND TABLES** xii

**LIST OF ABBREVIATIONS** xiv

**PREFACE** xv

**BACKGROUND** 1

**CHAPTER 1: BACKGROUND** 2

1.1 IMPACT OF MEDICALLY REFRACTORY EPILEPSY 2

1.2 TUBEROUS SCLEROSIS COMPLEX 3

1.3 DETERMINATION OF SURGICAL CANDIDACY 4

1.4 RISKS OF PEDIATRIC EPILEPSY SURGERY 5

1.5 CLINICAL PROBLEM 6

1.6 LITERATURE REVIEW 6

1.6.1 COHORT STUDIES 6

1.6.2 SYSTEMATIC REVIEWS 8

1.7 RESEARCH QUESTION 9

**INDIVIDUAL PARTICIPANT DATA META-ANALYSIS** 10

**CHAPTER 2: METHODS** 11

2.1 STUDY POPULATION 11

2.2 DESCRIPTION OF STUDY OUTCOME 11

2.3 TYPE OF STUDY DESIGN USED 12

2.4 QUALIFICATIONS OF REVIEW TEAM 12

2.5 INFORMATION SOURCES AND SEARCH STRATEGY 13

2.6 INCLUSION CRITERIA 14

2.7 EXCLUSION CRITERIA 14

2.8 ARTICLE SCREENING 15

2.9 EFFORT TO INCLUDE ALL AVAILABLE STUDIES 16

2.10 SEARCH SOFTWARES USED 16

2.11 USE OF HAND SEARCHING 16

2.12 LIST OF CITATIONS LOCATED AND THOSE EXCLUDED 17

2.13 METHOD OF ADDRESSING ARTICLES PUBLISHED IN LANGUAGES OTHER THAN ENGLISH 17

2.14 METHOD OF HANDLING ABSTRACTS 17

2.15 SELECTION AND CODING OF DATA 18

2.16 ASSESMENT OF RISK OF BIAS 18

2.17 ASSESMENT OF HETEROGENEITY 19

2.18 ASSESMENT OF PUBLICATION BIAS 19

2.19 STATISTICAL METHODS 20

2.20 TABLES AND FIGURES 20

**CHAPTER 3: RESULTS** 22

3.1 ARTICLE IDENTIFICATION 22

3.2 STUDY CHARACTERISTICS 23

3.3 PREDICTORS OF OUTCOME 24

3.3.1 STATISTICALLY SIGNIFICANT PREDICTORS OF OUTCOME 24 3.3.2 ASSESSMENT OF COVARIATION BETWEEN STATISTICALLY SIGNIFICANT PREDICTORS OF OUTCOME 25

3.4 ASSESSMENT OF HETEROGENEITY 26

3.5 ASSESSMENT OF PUBLICATION BIAS 26

**CHAPTER 4: DISCUSSION** 27

4.1 GENERALIZED SEIZURE SEMIOLOGY 27

4.2 NO OR MILD DEVELOPMENTAL DELAY 27

4.3 UNIFOCAL ICTAL SCALP EEG ABNORMALITY 29

4.4 EEG/MRI CONCORDANCE 29

4.5 STUDY STRENGTHS 30

4.6 STUDY LIMITATIONS 30

4.7 SOURCES OF BIAS 32

4.8 ASSESMENT OF QUALITY OF INCLUDED STUDIES 33

4.9 APPROPRIATENESS OF STUDIES ASSEMBLED FOR ASSESSING THE HYPOTHESIS 33

4.10 COMPARISON TO PREVIOUS LITERATURE 34

4.11 ALTERNATIVE EXPLANATIONS FOR OBSERVED RESULTS 35

4.12 GENERALIZATION OF THE FINDINGS 36

**FUTURE DIRECTIONS** 38

**CHAPTER 5: FUTURE DIRECTIONS AND DISCLOSURE OF FUNDING SOURCES** 39

5.1 GUIDELINES FOR FUTURE RESEARCH 39

5.2 DISCLOSURE OF FUNDING SOURCES 40

**REFERENCES** 41

**LIST OF FIGURES AND TABLES**

**FIGURES**

FIGURE 1. PRISMA 2009 Flow Diagram 54

FIGURE 2. Engel Classification of TSC participants undergoing resective epilepsy

surgery 55

**TABLES**

TABLE 1. Characteristics of included studies 56

TABLE 2. Frequency table of dichotomous predictors of seizure outcome 58

TABLE 3. Frequency table of dichotomous predictors of seizure outcome 60

TABLE 4. Summary table for continuous predictors of seizure outcome 61

TABLE 5. Odds ratios, 95% confidence intervals and p values for preoperative predictors of good seizure outcome adjusted for duration of follow-up 62

**LIST OF APPENDICES**

APPENDIX A: Engel Classification table 64

APPENDIX B: Search strategy 65

APPENDIX C: Participant level data collection 67

APPENDIX D: Tool to assess risk of bias in prognostic cohort studies 71

APPENDIX E: List of excluded articles with reasons 73

**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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