APPENDIX B

Study protocol as accepted by HREC 11 December 2014

The outcomes of children with cerebral palsy and upper airways obstruction at Red Cross War Memorial Children's Hospital

Background and significance

Cerebral palsy (CP) has been defined as a group of disorders of the development of movement and posture, causing activity limitation that is attributed to non-progressive disturbances that occurred in the developing foetal or infant brain. The motor disorders are often accompanied by disturbances of sensation, perception, cognition, communication, and behaviour; by epilepsy, and by secondary musculoskeletal problems. (1) It is the most common cause of physical disability in children across the world with prevalence in developed countries of 1-2/1000. (23)' (24,25)

Limited information is available regarding the epidemiology of cerebral palsy in developing countries. A review of intellectual disability in a rural district in the Northern Province published in 2002 reported the presence of cerebral palsy in 8.4% of their cohort.(26) Given the burden of disease from infectious diseases compared to developed countries and the difference in quality of perinatal care available in developing countries, the prevalence of cerebral palsy in the public sector in South Africa can be expected to be higher than the previously quoted figures. (27-30)

Respiratory complications are significant contributors to morbidity and mortality in children with cerebral palsy and other developmental disabilities. Children with cerebral palsy are at increased risk of obstructive sleep apnoea and upper airways obstruction.(4)(5,6)(3) Mid-facial and gastro intestinal abnormalities as well as the underlying low neuromuscular tone of the upper airway predispose children with cerebral palsy to upper airway compromise.(3)(7) Contributors to upper airways obstruction during sleep in children with cerebral palsy are tonsillar and adenoidal hypertrophy, subglottic stenosis, laryngomalacia, tracheomalacia, and obesity.(4)

The symptoms of upper airways obstruction include snoring, noisy breathing, obstructive sleep apnoea and awake airway obstruction and are thought to be underreported by parents.(8) Children may also present with complications of chronic upper airways obstruction including pulmonary hypertension and cardiac failure.(7)

Upper airway obstruction may be exacerbated during upper and lower respiratory infections and may require admission to intensive care unit and result in long term respiratory insufficiency and mortality.(7)(17) Chronic upper airways obstruction is an important contributor to poor quality of life in both neurotypical as well as children with developmental disabilities like CP.(6)

The management of upper airways obstruction in children with cerebral palsy is complex due to the multifactorial nature of the aetiology and there are no clear guidelines for this important clinical problem. Adenotonsillectomy is generally recommended as an appropriate first intervention. [14] When severe airways obstruction persists after interventions like adenoidectomy and tonsillectomy, more invasive procedures have been attempted for example uvulopalatopharyngoplasty, maxillofacial procedures as well as tracheostomy for definitive airway management. [17, 18, 19]

Non-invasive interventions in the form of continuous nasal positive pressure or home oxygen have also been utilized to administer respiratory support where surgical intervention could not take place. [14, 19]

There is a paucity of data to guide current best practice in the management of children with cerebral palsy and severe upper airways obstruction. The available publications all present reviews of practices in first world settings and report mainly on small groups, often mixed with other disabilities. Many are retrospective in nature and do not report long term outcomes or indicators of quality of life of children post intervention.

This research aims to describe the investigation, management and outcomes of children who were admitted to a tertiary setting in Cape Town with cerebral palsy and upper airways obstruction. The results from this study may inform future practice at our institution as well as suggest possible recommendations for the management of airways obstruction in resource limited settings.

Research question:

What are the outcomes of children with cerebral palsy who were admitted to a tertiary hospital in Cape Town with upper airways obstruction?

Objectives:

1. To describe the investigation, management and outcomes of children admitted over a 5 year period with upper airways obstruction and cerebral palsy.

2. To compare the outcomes of children admitted with upper airways obstruction based on the nature and severity of the motor disorder of cerebral palsy.

Aims:

1. To describe the prevalence and severity of upper airways obstruction in children with cerebral palsy admitted over a 5 year period.

2. To document all investigations performed during hospital admission to evaluate the nature and severity of upper airways obstruction.

3. To document all interventions performed for management of upper airways obstruction in children with cerebral palsy.(surgical and non-surgical)

4. To describe the cohort of children admitted with upper airways obstruction through classification of nature and severity of motor disorder (GMFCS scale) and reporting any comorbid conditions associated with cerebral palsy.

5. To compare outcomes of children with upper airways obstruction based on underlying nature and severity of motor disorder.

Research design and methods:

This will be a descriptive study. A cross sectional retrospective folder review of all children admitted to Red Cross War Memorial Hospital with cerebral palsy during the study period will be performed.

Study population and sampling:

Selection criteria:

1. All children with a diagnosis of cerebral palsy between the ages of 2 – 18 years who were admitted to any ward at Red Cross War Memorial Children's Hospital and documented to have a diagnosis of upper airways obstruction between 1 January 2009 and 31 December 2013 will be included in the study.

Exclusion criteria:

1. Children known with craniofacial disorders including craniosynostosis/ cleft palate will be excluded.

2. Children who are known with neurodegenerative/ neurometabolic disorders which might contribute to progressive airways obstruction will also be excluded.

A retrospective folder review will be conducted of all children with a diagnosis of cerebral palsy who were admitted between 1 January 2009 and 31 December 2014. Demographic and clinical information will be collected including the aetiology of cerebral palsy, classification of cerebral palsy, as well as the presentation, investigation and management of upper airways obstruction and recorded on a predefined data collection form. Outcome information collected will include one year mortality, number of readmissions in subsequent year, as well as duration of hospital admission.

See Appendix 1

Ethical considerations

Ethical approval will be obtained from UCT HREC prior to commencement of any study activities.

Informed consent

Permission will be sought from UCT health ethics review committee as well as the Red Cross War Memorial Children's Hospital to confirm that signed consent forms may be waivered for this study. As this study

involves no patient contact and no risk to patient, informed consent will not be obtained from the parent or legal guardian.

Data management

The principal investigator will check the completed data collection forms for errors and completeness. An information database will be set up in EPIDATA by the principal investigator which will be kept on a password protected computer. Information will be entered into this electronic database by a research assistant.

Patient confidentiality

Patient confidentiality will be strictly maintained. Study documentation will be securely stored in a locked cabinet in the principal investigator office.

Data analysis

Data will be exported from EPIDATA into STATA 13 after it has been cleaned and checked by the principal investigator. Statistical analysis will be performed using the STATA program using continuous and categorical variables. A p value of < 0.05 will be considered significant.

Categorical variables will be reported as percentages and relative percentages with confidence intervals and displayed in frequency tables or bar charts. Numerical variables which are normally distributed will be analysed and reported using the summary statistics: mean, standard deviation and range. Numerical variables which are not normally distributed will be analysed and the median with interquartile range will be reported.

The main outcomes (one year mortality, number of readmissions in subsequent year, as well as duration of hospital admission) will be reported as relative percentages with confidence intervals.

Comparison between groups will be performed by using the X^2 statistic for binary outcomes and the Kruskal Wallis test for numerical outcomes which are not normally distributed.

Data dissemination plan:

Publication will be sought in a peer review journal: Developmental Medicine and Child Neurology

Presentation at national (SAPA 2016) and international conferences (American Academy of Cerebral Palsy meeting 2015)

Presentation to Red Cross War Memorial Hospital as well as Tygerberg children's Hospital at annual research day meetings in 2015.

Budget & budget justification

TIME PERIOD	ITEM	COST
1 DECEMBER 2014-30 NOVEMBER 2015	PERSONNEL	R10000
	CONSUMABLES	R500
October 2015	RESEARCH TRAVEL	R10000
	SPECIALIZED ITEMS	R2500
TOTAL		R23000

BUDGET JUSTIFICATION:

Research assistant:

A research assistant will be used to enter data collection forms into the study database once a week for 5 hours for a period of 4 months. Assistance with data entry is essential as the principal investigator is a full time employee of a busy academic hospital and will not be able to complete both folder reviews as well as data entry within the project timeline.

Consumables: paper for printing of data collection forms and additional paperwork will be purchased at an estimated cost of R500.

Equipment:

Office computer, printer, furniture and copier will be utilized from the existing infrastructure at Red Cross War Memorial Hospital.

Research travel: an abstract will be submitted for presentation at the American academy of cerebral palsy and developmental medicine. The conference registration fee as well as visa costs are included in the budget. Additional funding will be sought for transport and accommodation costs.

Funding application will be made to the University of Cape Town for a departmental research grant as well as conference funding from University of Stellenbosch to cover the cost of budget items.

Limitations:

The study will be limited by its retrospective design which is susceptible to bias and confounders. It may not be possible to obtain all the relevant information from the folders, folders may be lost or missing which will result in missing data and affect the final results.

The results of the study may not be generalizable to the all children with cerebral palsy.

However as the research question involves a vulnerable population and a life threatening condition, the study design is considered the most appropriate way to address this issue.

References:

APPENDIX C

STUDY QUESTIONNAIRE **as approved by HREC December 2014**

STUDY NUMBER FOLDER NUMBER

DATE OF BIRTH SEX

CEREBRAL PALSY

AETIOLOGY OF CP: TICK

ANTENATAL PERINATAL POSTNATAL

CLASSIFICATION OF CP TICK

BILATERAL UNILATERAL

TONE ABNORMALITY: TICK

SPASTIC DYSTONIC MIXED ATAXIC HYPOTONIA

GMFCS: TICK APPROPRIATE LEVEL

I II III IV V

COIMPAIRMENTS:

EPILEPSY Y/N VISUAL IMPAIRMENT Y/N HEARING IMPAIRMENT Y/N

MUSCULOSKELETAL IMPAIRMENT Y/N GASTROINTESTINAL COMPLICATIONS Y/N

PRESENCE OF GASTROSTOMY Y/N

ADMISSION DIAGNOSIS UPPER AIRWAYS OBSTRUCTION: Y/N

AGE ON ADMISSION IN MONTHS: _____

SYMPTOMS OF UAO ON ADMISSION:

SNORE: Y/N STRIDOR: Y/N NOISY BREATHING OTHER: Y/N

SLEEP APNOEA: Y/N AWAKE APNOEA: Y/N

URTI: Y/N LRTI: Y/N

WEIGHT NUTRITIONAL CLASSIFICATATION

INVESTIGATIONS:

CXR: Y/N PNEUMONIA Y/N RVH: Y/N

ECG: Y/N ABN: Y/N RVH: Y/N

PNS XRAY: Y/N ADENOIDAL HYPERTROPHY ON PNS: Y/N

ABG: Y/N RESULT:

SLEEP SATURATIONS: Y/N RESULT:_____

FORMAL OVERNIGHT POLYSOMNOGRAPGY: Y/N

RESULT: _____

NASAL ENDOSCOPY: Y/N RESULT_____

ENT CONSULT: Y/N PULMONOLOGY CONSULT: Y/N CARDIOLOGY CONSULT:Y/N

CP DOCTOR CONSULT: Y/N MDT DISCUSSION: Y/N

FINAL ASSESSMENT OF AETIOLOGY OF UAO: _____

MANAGEMENT: PLEASE TICK

NCPAP: Y/N DURATION: CIPP TUBE: Y/N DURATION:

IPPV: Y/N DURATION ICU ADMISSION: Y/N DURATION OF ICU ADMISSION: _____ DAYS

MANAGEMENT: TONSILLECTOMY: Y/N ADENOIDECTOMY: Y/N

TONSILLECTOMY AND ADENOIDECTOMY: Y/N SUPPORTIVE MANAGEMENT ONLY:

TRACHEOSTOMY:Y/N OTHER :

DISCHARGE SATS__ DISCHARGE SLEEP SATS___

MEDICATION:

OUTCOMES:

DURATION OF HOSPITAL ADMISSION: _____DAYS

NUMBER OF READMISSIONS TO HOSPITAL FOR UAO COMPLAINTS: READMISSIONS OTHER

NUMBER OF READMISSIONS TO ICU FOR UAO COMPLAINTS:

DEATH: Y/N

DEATH WITHIN ONE YEAR

DEATH AFTER ONE YEAR BUT IN STUDY PERIOD

CAUSE OF DEATH

NOSOCOMIAL INFECTIONS: _____

WEIGHT AT 1 YEAR

NUTRITIONAL STATUS

APPENDIX D

ETHICS

Permission was obtained from the University of Cape Town HREC to proceed without individual consent as the study was retrospective in nature and did not pose any risks to participants. In addition permission was obtained from the hospital management to proceed without individual consent. Confidentiality was strictly maintained.

APPENDIX E

Acknowledgements:

I would like to acknowledge the records department Red Cross War Memorial Children's Hospital for their help in obtaining more than 500 patient folders.

I would like to acknowledge the tireless work of Mrs Leonie Alston, senior administration clerk in the Cerebral Palsy clinic at Red Cross War Memorial Hospital in support of this research project as well as in our clinical service.

I would also like to acknowledge Sister Jane Booth for her support with this research project as well as her care of our children with tracheostomies.

APPENDIX F

TURNITIN REPORT

RESPONSE TO TURNITIN REPORT