An exploration of the experiences and support needs of families of young children with refractory epilepsy

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Thesis Overview

This thesis explores the experiences and support needs of parents of young children who have refractory epilepsy[a] and for whom surgery is being considered as a treatment. The introductory chapter presents a contextual overview of paediatric epilepsy, surgery as treatment for refractory epilepsy and the rational for the current investigation. A systematic review of pertinent research is then presented (chapter 1) before an empirical research paper focussing on the experiences and support needs of families with a young child being considered for epilepsy surgery (chapter 2).

The format of chapter one and two follow guidelines for publication in the journal Epilepsy & Behavior (Appendix A). This introduction section is formatted according to American Psychological Association (APA) style.

Background Literature

Epilepsy is a neurological condition that affects 50 million people worldwide (World Health Organisation (WHO), 2019) and is characterised by recurrent seizures. In the UK prevalence of epilepsy is approximately five to 10 cases in 1000 (National Institute for Health and Care Excellence (NICE), 2012) with incidence highest in infants, children and those over 80 years (Neligan, Hauser, & Sander, 2012). The impact of epilepsy on a child and their family is extensive and can include cognitive, behavioural, educational, social and psychosocial difficulties (Aguiar, Guerreiro, McBrian, & Montenegro, 2007; Dunn, Austin, & Huster, 1997; Fastenau, Jianzhao, Dunn, & Austin, 2008; Ott et al., 2003; Reilly et al., 2015; Rodenburg, Wagner, Austin, Kerr, & Dunn, 2011).

Two thirds of those with active epilepsy (children and adults) have satisfactory seizure control through anti-epileptic drugs (AEDs) (NICE, 2012). However, this leaves approximately 10-20% of children with epilepsy (CWE) with uncontrolled or 'refractory' seizures (Aneja & Jain, 2014). This is often defined as when seizures have demonstrated resistance to two or more AEDs (Kwan et al., 2010). For these children neurosurgery, with the aim to remove or disconnect the epileptogenic

[a] Refractory epilepsy, drug-resistant epilepsy (DRE) and intractable epilepsy are often used interchangeably. To maintain clarity the term 'refractory' is used throughout.

brain tissue, may be considered as a treatment option (Gadgil et al., 2019).

In children selected as suitable candidates, epilepsy surgery has been shown to be effective in reducing seizure frequency, slowing developmental regression and improving quality of life (Hemb et al., 2010; Jonas et al., 2004; Van Empelen, Jennekens-Schinkel, Van Rijen, Helders, & Van Nieuwenhuizen, 2005). It is suggested that epilepsy surgery should be considered as early as possible due to the negative impact ongoing seizures have upon brain development (Freitag & Tuxhorn, 2005). This is thought to be particularly advantageous for younger children under five years of age (NHS England, 2018).

In 2012, the national Children's Epilepsy Surgery Service (CESS) was developed to increase early uptake and quality of paediatric epilepsy surgery in England (NHS England, 2018). This followed the publication of a review which highlighted that assessment and evaluation for surgery was taking two years or more (Harvey, Cross, Shinnar, & Mathern, 2008). The national Children's Epilepsy Surgery Service is divided into four designated centres (CESSs) in Birmingham, London, Bristol and the North (Liverpool and Manchester) (NHS England, 2018).

The process of assessment to establish suitability for epilepsy surgery may include clinical review, additional investigations such as EEG, fMRI, MEG, MRI, 3T MRI, PET, SEEG and VT, as well as assessment by neuropsychology, neuropsychiatry, speech and language therapy, ophthalmology, occupational therapy and physiotherapy. Results inform the decisions made by the multidisciplinary team as to whether surgery is appropriate. If the CESS team decide that the child is a suitable candidate for surgery their family will then have to decide whether or not to proceed. For other families, it is concluded that their child is not a suitable candidate for surgery. They will therefore have completed the assessment process, but surgery is not available to them as a treatment option.

Epilepsy surgery in infancy and early childhood is increasingly recommended and the UK CESS has been formed and commissioned to increase uptake, particularly in children under five years of age (NHS England, 2018). However, there has been a lack of literature exploring the experiences of the families of young children with refractory epilepsy whilst being considered for epilepsy surgery

and what support might be needed during this time. It is important to understand the possible psychosocial needs of those caring for children and young people with refractory epilepsy to inform future development of UK family centred epilepsy services. However, there is a lack of literature exploring the psychological wellbeing of those living with and caring for a child or young person with refractory epilepsy.

This study aims to explore the experiences of families of young children being considered for epilepsy surgery, the support provided and their support needs. Chapter one, therefore, synthesises and evaluates research related to symptoms of stress, anxiety and depression in parents of children and young people (CYP) with refractory epilepsy. This is followed by an exploration of family's experiences and support needs whilst their young child is considered for epilepsy surgery (Chapter 2). Outcomes aims to inform future development of family centred support services and contribute to the body of literature around family experiences of young children's epilepsy surgery.

References

Aguiar, B. V. K., Guerreiro, M. M., McBrian, D., & Montenegro, M. A. (2007). Seizure impact on the school attendance in children with epilepsy. *Seizure, 16*(8), 698-702. doi:https://doi.org/10.1016/j.seizure.2007.05.013

Aneja, S., & Jain, P. (2014). Refractory epilepsy in children. *Indian J Pediatr, 81*(10), 1063-1072. doi:10.1007/s12098-014-1533-1

Dunn, Austin, J. K., & Huster, G. A. (1997). Behaviour problems in children with new-onset epilepsy. *Seizure, 6*(4), 283-287. doi:https://doi.org/10.1016/S1059-1311(97)80075-1

Fastenau, P. S., Jianzhao, S., Dunn, D. W., & Austin, J. K. (2008). Academic underachievement among children with epilepsy: Proportion exceeding psychometric criteria for learning disability and associated risk factors. *Journal of Learning Disabilities, 41*(3), 195-207. doi:10.1177/0022219408317548

Freitag, H., & Tuxhorn, I. (2005). Cognitive function in preschool children after epilepsy surgery: Rationale for early intervention. *Epilepsia, 46*(4), 561-567. doi:10.1111/j.0013-9580.2005.03504.x

Gadgil, N., LoPresti, M. A., Muir, M., Treiber, J. M., Prablek, M., Karas, P. J., & Lam, S. K. (2019). An update on pediatric surgical epilepsy: Part I. *Surgical Neurology International, 10*, 257-257. doi:10.25259/SNI_417_2019

Harvey, A. S., Cross, J. H., Shinnar, S., & Mathern, G. W. (2008). Defining the spectrum of international practice in pediatric epilepsy surgery patients. *Epilepsia, 49*(1), 146-155. doi:10.1111/j.1528-1167.2007.01421.x

Hemb, M., Velasco, T. R., Parnes, M. S., Wu, J. Y., Lerner, J. T., Matsumoto, J. H., . . . Mathern, G. W. (2010). Improved outcomes in pediatric epilepsy surgery: the UCLA experience, 1986-2008. *Neurology, 74*(22), 1768-1775. doi:10.1212/WNL.0b013e3181e0f17a

Jonas, R., Nguyen, S., Hu, B., Asarnow, R. F., LoPresti, C., Curtiss, S., . . . Mathern, G. W. (2004). Cerebral hemispherectomy: hospital course, seizure, developmental, language, and motor outcomes. *Neurology, 62*(10), 1712-1721. doi:10.1212/01.wnl.0000127109.14569.c3

Kwan, P., Arzimanoglou, A., Berg, A. T., Brodie, M. J., Allen Hauser, W., Mathern, G., . . . French, J. (2010). Definition of drug resistant epilepsy: Consensus proposal by the ad hoc Task Force of the ILAE Commission on Therapeutic Strategies. *Epilepsia, 51*(6), 1069-1077. doi:10.1111/j.1528-1167.2009.02397.x

National Institute for Health and Care Excellence (2012). *Epilepsies: Diagnosis and management.* (Clinical guideline 137). Retrieved from https://www.nice.org.uk/guidance/cg137

Neligan, A., Hauser, W. A., & Sander, J. W. (2012). Chapter 6 - The epidemiology of the epilepsies. In H. Stefan & W. H. Theodore (Eds.), *Handbook Of Clinical Neurology* (Vol. 107, pp. 113-133). Online: Elsevier.

NHS England (2018). *Children's epilepsy surgery service (CESS): Service specification.* Retrieved from https://www.england.nhs.uk/publication/childrens-epilepsy-surgery-service-cess/

Ott, D., Siddarth, P., Gurbani, S., Koh, S., Tournay, A., Shields, W. D., & Caplan, R. (2003). Behavioral disorders in pediatric epilepsy: Unmet psychiatric need. *Epilepsia, 44*(4), 591-597. doi:10.1046/j.1528-1157.2003.25002.x

Reilly, C., Atkinson, P., Chin, R. F., Das, K. B., Gillberg, C., Aylett, S. E., . . . Neville, B. G. R. (2015). Symptoms of anxiety and depression in school-aged children with active epilepsy: A population-based study. *Epilepsy and Behavior, 52*, 174-179. doi:10.1016/j.yebeh.2015.09.004

Rodenburg, R., Wagner, J. L., Austin, J. K., Kerr, M., & Dunn, D. W. (2011). Psychosocial issues for children with epilepsy. *Epilepsy & Behavior, 22*(1), 47-54. doi:10.1016/j.yebeh.2011.04.063

Van Empelen, R., Jennekens-Schinkel, A., Van Rijen, P. C., Helders, P. J. M., & Van Nieuwenhuizen, O. (2005). Health-related quality of life and self-perceived competence of children assessed before and up to two years after epilepsy surgery. *Epilepsia, 46*(2), 258-271. doi:10.1111/j.0013-9580.2005.27304.x

World Health Organization (2019). *Epilepsy* (Fact sheet). Retrieved from https://www.who.int/en/news-room/fact-sheets/detail/epilepsy

Chapter One

Parental stress, anxiety and depression in paediatric refractory epilepsy: A systematic review

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Abstract

Background: Parents of children with epilepsy experience greater parenting stress, anxiety and depressive symptomatology than parents of healthy children. For children with refractory epilepsy (CWRE), lack of seizure control can have deleterious effects on their cognition, behaviour, education, social and psychological wellbeing. Their parents may therefore be particularly vulnerable to psychological distress. However, a review of stress, anxiety and depression in parents of CWRE specifically has not been conducted. This systematic review investigates prevalence of, and risk factors for, psychological distress in this population.

Methods: Electronic searches (conducted in April 2020 across APA PsycINFO, Medline, CINAHL Plus, AMED and Scopus) were conducted in conjunction with iterative hand searches. Nineteen papers, reporting data from 18 studies, were included. Risk of bias was assessed using a standardised checklist. Relevant data were extracted and synthesised narratively.

Results: Nineteen studies reported prevalence data and eleven reported correlates and predictors of symptoms of stress, anxiety or depression. Stress, anxiety and depression are commonly experienced by parents of CWRE. A high proportion of parents of CWRE were reported to experience symptoms of stress above levels defined as 'clinical.' All studies of parental anxiety reported mean scores above 'mild-moderate' anxiety or a high proportion of participants with anxiety symptomatology above that of clinical significance. With the exception of attention deficit hyperactivity disorder (ADHD) as a predictor of maternal depression and child's intelligence as a predictor of parental stress, a consistent pattern with respect to the role of demographic, clinical and psychosocial variables in parental distress was not found across the included studies. Lack of prospective cohort studies limited understanding of cause/effect and true risk factors of psychological distress in parents of CWRE. However, narrative synthesis highlighted several associations of interest for future investigation.

Conclusions: Further prospective research is required to determine risk factors for psychological distress in parents of CWRE. Studies should focus on identifying modifiable psychosocial predictors of distress, in recognition that demographic and clinical factors are less amenable to change within this population.

Keywords: Paediatric refractory epilepsy, parental stress, parental anxiety, parental depression, systematic review

1. Introduction

Epilepsy is a serious chronic neurological condition [1] that affects approximately one in 220 children and young people (CYP) below the age of 18 in the UK [2]. Incidence is particularly high in the first year of life and early childhood but decreases during adolescence [3]. An epilepsy diagnosis is complex but has been defined by the International League Against Epilepsy (ILAE) as characterised by having "(1) At least two unprovoked seizures occurring >24 h apart; (2) one unprovoked seizure and a probability of further seizures similar to the general recurrence risk after two unprovoked seizures, occurring over the next 10 years; (3) diagnosis of an epilepsy syndrome" [4].

Epilepsy can have long-term consequences for the health and wellbeing of CYP [5], resulting in cognitive, behavioural, educational, social and psychological difficulties [6-11]. Specifically, CYP with epilepsy are at high risk of emotional difficulties [12-15]. A review of anxiety and depression concluded that 12-14% of CYP with epilepsy experience clinically significant depressive symptoms and prevalence rates for both anxiety and depression are greater than in the general paediatric population and children with other chronic health conditions [12]. Furthermore, parents of children with chronic illnesses, including epilepsy, experience significantly greater parenting stress than parents of healthy children [16]. Between 9 and 58% of parents of children and young people with epilepsy (CWE) experience clinical levels of anxiety [17] and up to 50% of mothers of CWE experience clinical depression [18].

Although reviews of psychological distress in parents of CWE of all types have been conducted, there are a group of parents within this category that may be particularly vulnerable to psychological distress - parents of children with refractory epilepsy. Refractory epilepsy is defined as "a failure of at least two tolerated, appropriately chosen and used" anti-epileptic drug (AED) regimens "to achieve sustained freedom of seizures"[19]. For roughly two thirds of CWE, seizure control is achieved through the use of use of AEDs [20, 21]. However, approximately 10-20% of CWE

Abbreviations: Children and young people with epilepsy (CWE); Children and young people with refractory epilepsy (CWRE)

experience uncontrolled or ‘refractory’ seizures [22].

In addition to the continued unpredictability of ongoing seizures, lack of seizure control can have further deleterious effects on cognition, behaviour, education, social and psychological wellbeing [22]. Parents may also have to consider whether their child should undergo more invasive treatments such as surgery to remove epileptogenic brain tissue or to insert a vagus nerve stimulation (VNS) device to achieve better seizure control. It might therefore be expected that parents of children with this diagnosis experience additional psychological burden than parents of children with other types of epilepsy.

To our knowledge, there has not been a comprehensive review of literature specifically related to psychological distress (stress, anxiety and depression) in parents of children and young people with refractory epilepsy (CWRE). Reviews conducted in parents of children with all types of epilepsy [16-18] have identified several potentially important demographic, clinical and psychosocial predictors of distress. These include lower socio-economic status [23], parent gender [24, 25], maternal education [26], age [27], seizure frequency, comorbidities [23, 28, 29], greater child depressive symptoms, presence of child learning disability [30], maternal non-resolution of child’s illness [31], illness related behaviour problems, child temperament [32], greater family stress, higher generalised anxiety, fewer coping resources, increased parental directiveness or protectiveness [33] and adolescent behaviour problems [34]. In order to best support parents of CWRE, we need to understand whether these factors are also important determinants of distress for this group. This is particularly important given that the potential to alter clinical factors is limited for this group.

This review therefore aims to synthesise, analyse and critically evaluate published literature which examines stress, anxiety and depression in parents of CWRE. Specific aims are to i) ascertain the prevalence of parental stress, anxiety and depression in this population; and ii) identify any correlates or predictors of parental stress, anxiety and depression.

2. Method

Methodology follows the preferred reporting items for systematic reviews and meta-analysis (PRISMA) statement for reporting systematic reviews [35] (Appendix B). The review protocol was

registered with the PROSPERO database for systematic reviews (PROSPERO ID: CRD42020177502).

2.1 Search Strategy

Following scoping searches to pilot the search strategy, five electronic databases (APA PsycINFO, Medline, CINAHL Plus, AMED and Scopus) were searched from their inception to identify relevant peer reviewed literature. Searches were initially conducted in February 2020 and were re-run in April 2020. Searches were developed in PsycINFO and adapted to fit the requirements of other databases. The syntax used is detailed in Appendix C. Reference lists of relevant studies and review articles were examined to identify additional literature.

2.2. Eligibility Criteria

Studies were eligible for inclusion if they were published in a peer-reviewed journal and reported quantitative data regarding psychological distress in caregivers (person with parental responsibility) of children and adolescents (defined as 18 years old or younger) diagnosed with refractory epilepsy. Epilepsy surgery is only considered for those diagnosed with refractory epilepsy. Therefore, a diagnosis of refractory epilepsy was assumed in studies where participants were being considered for surgery. For the purposes of this review, psychological distress was defined as stress, anxiety and depression assessed using a validated measure or subscale. Studies were written in English. There were no limitations on study design, however, intervention studies were only included where pre-intervention measures were used.

Studies were excluded if they: i) were reviews, editorials, dissertations, textbooks, case studies/case series or letters; ii) reported on transition period to adult services; and iii) related to tuberous sclerosis complex, febrile seizures or sudden unexpected death in epilepsy (SUDEP).

2.3 Screening and selection

Duplicates were removed from the studies identified. Titles and abstracts were then screened against inclusion/exclusion criteria by FN to assess suitability for the study. Where eligibility could not be established from the article title or abstract, the study was included for full text review. Full

text copies of the remaining studies were then obtained and screened by FN. A random sample of 10% of abstracts and full texts were screened independently by a second reviewer (CM) to ensure consistency, with any disagreement resolved through discussion and consensus.

2.4 Data Extraction

Relevant data, including methodological and demographic data and study and sample characteristics, were extracted by FN using a data extraction form and then checked for accuracy by a second reviewer (CM). For studies where data were published in multiple papers, data were extracted from all relevant papers and links between studies noted. Where studies included data related to a control group or those with and without refractory epilepsy, data related to those with refractory epilepsy only were extracted. For intervention studies, only pre-intervention data was extracted. If multiple analyses were reported, only data related to prevalence or correlates of parental psychological distress where stress, anxiety and/or depression were the outcome variable(s) were extracted.

2.5 Risk of Bias/ Quality assessment

The methodological quality of the studies included was assessed by FN using a tool adapted from the Agency for Healthcare Research and Quality [36, 37] (Appendix D). This tool facilitates assessment of risk of bias across seven specific areas. Comparisons can therefore be made across all included studies on these specific issues [38]. A random sample of 20% of papers were independently quality assessed by a second reviewer (CM). Inconsistencies were discussed and resolved with arbitration from a third reviewer (KW) if required. In line with guidance from the Centre for Reviews and Dissemination [39], all studies were included regardless of results of risk bias assessment, but this was considered during interpretation of findings.

2.6 Data synthesis

A meta-analytic approach was not possible due to the heterogeneity between studies including participant demographics, study design, measures of psychological distress and associations examined. Data were therefore synthesised narratively.

3. Results

3.1 Number of studies identified and included

Electronic database searches identified 2444 studies, resulting in 1600 studies following removal of duplicates and those not written in English. In total, 1435 studies were excluded through title and abstract screening. The main reason for exclusion at full text screen stage was that the study did not include data related to children with refractory epilepsy specifically. No further records were identified through searching other sources or through the updated search. This left 19 studies included for qualitative synthesis. The flow of studies through the review is illustrated in Figure 1.

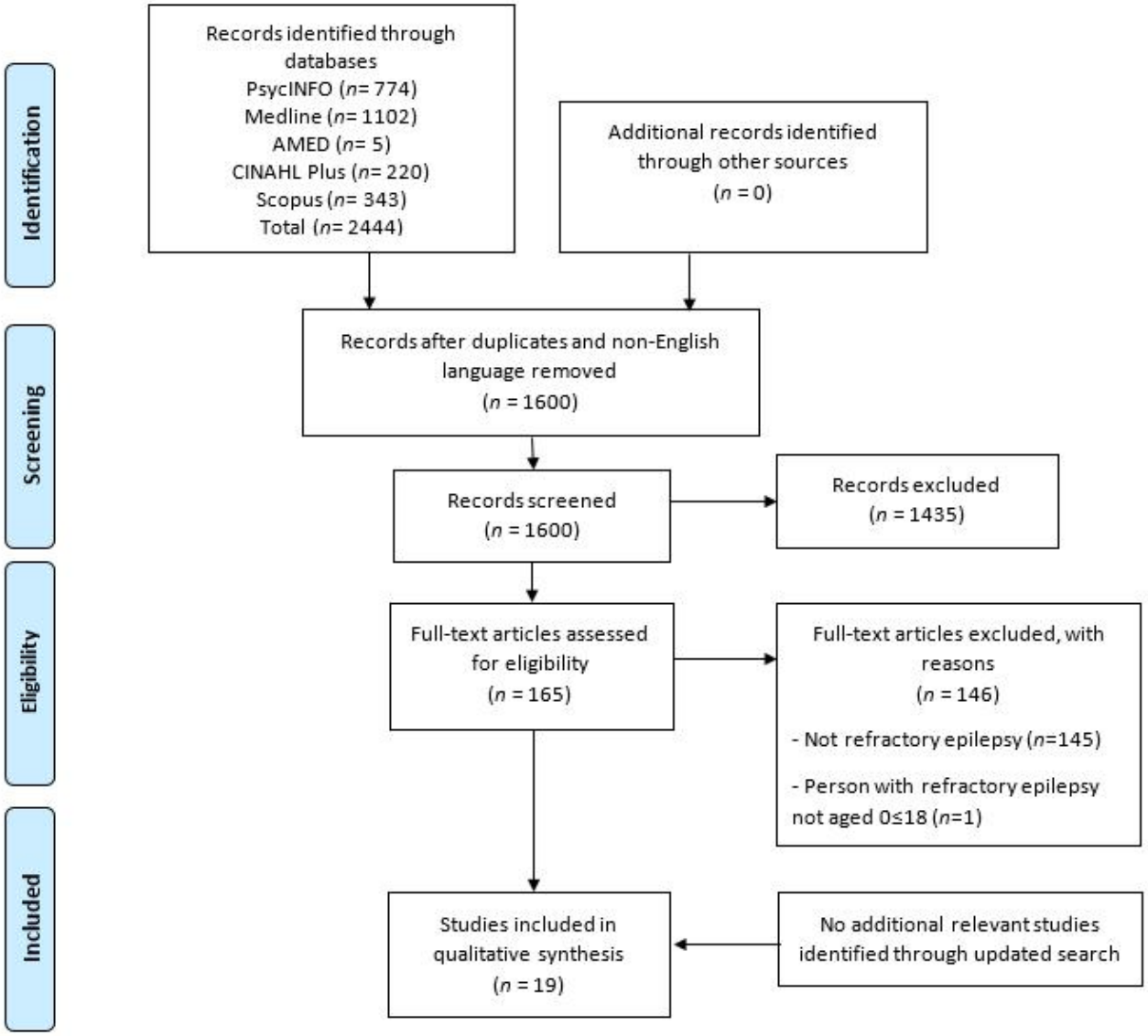

Figure 1: PRISMA flow diagram of search process and outcomes when identifying articles for review.

3.2 Characteristics of included studies

The main characteristics of the included studies are displayed in Table 1. Most studies were conducted in Canada and the USA. All studies sampled their participants purposively with 13 employing a cross-sectional and six a prospective cohort design. Three studies used participant data from the Impact of Pediatric Epilepsy Surgery on Health-Related Quality of Life (PEPSQOL) multicentre prospective cohort study. One study used baseline data from PEPSQOL [40], another used data between March 2014 – May 2016 [41] and one did not specify the dates of access [42]. It is recognised that participants in the latter study may have also been included in one of the other two papers from this dataset, however, as differing results are stated studies have been reported separately whilst noting this possible limitation. Studies reported data from 1251 (predominantly female) parents of 1310 CWRE.

3.3 Assessment of distress

Measures of parental distress were taken at a variety of time points across studies. Seven studies used measures during assessment of CWRE as a candidate for epilepsy surgery [40-46], four when candidacy had been confirmed but before surgery [47-50], one at diagnosis [51], one at diagnosis and 1-year follow-up [52] and one before commencing a ketogenic diet [53]. Five studies did not state when measures were taken [54-58].

As detailed in Tables 2 and 3, studies used a variety of self-report measures to assess stress, anxiety and/or depression. All except one [45] reported prevalence of stress, anxiety and/or depression in parents of CWRE. Eight studies reported prevalence data only [40-43, 48-50, 53]. The remaining 10 reported prevalence data and correlates of symptoms of stress, anxiety and/or depression in parents of CWRE. Eight studies compared distress levels (stress, anxiety and/or depression) in parents of CWRE with another group [47, 51, 54-57], between mothers and fathers [46] or across time points [52]. Although seven studies reported correlates of symptoms of parental stress, anxiety and depression [44, 45, 47, 52, 56-58], only two studies considered predictors of parental distress (stress [47]; depression [58]).

3.4 Results of assessment of risk of bias

The results of the assessment of risk of bias are presented in Table 4. Demographic data for parents of CWRE were commonly underreported with five studies omitting descriptions of caregiver age [44, 46, 47, 49, 58], one omitting both caregiver age and CYP age [51] and six omitting adequate caregiver descriptions [48, 50, 52, 53, 56, 57]. In addition, all studies failed to report a priori sample size calculations. Although some studies did not provide detailed exclusion criteria [48, 51-53, 55], the process of cohort selection appeared otherwise unbiased. For all except one study [51], validated measures of stress, anxiety and depression were used. The validity of the measure in the remaining study could not be ascertained as standardisation information was published in Korean. All studies used validated measures to assess the other variables under investigation. Most studies controlled for potentially confounding variables. However, two studies did not control for confounders where they could have done so [52, 57], one controlled for age and gender but not socioeconomic confounders [55] and four [49-51, 56] did not provide sufficient information to establish whether confounders were controlled for, either in the study design or analysis. One study [49] did not provide any information about the analysis performed. All except one study [52] did not have the primary aim of investigating prevalence, correlates and predictors of parental distress (stress, anxiety or depression). Therefore, although relevant data were extracted, the nature of the data available was not consistent.

3.5 Main findings: Prevalence of stress, anxiety and depression in parents of CWRE

Data regarding prevalence of stress, anxiety and depression in parents of CWRE are presented in Table 3.

3.5.1 Prevalence of stress in parents of CWRE

Nine studies assessed stress in parents of CWRE [47-53, 56, 57]. Although all nine used a variant of the parental stress index (PSI), the way in which data were reported differed, and included mean raw scores, the percentage of participants above clinical cut off and noting subscales with the highest scores.

Of the studies that reported clinical cut-offs, 32% [53] and 63% [57] of participants were found to score above the clinical cut-off on scores of total stress. One study [52] reported that the mean participant score of total stress was 'above clinical cut off' at both time of diagnosis and one year follow up. As the clinical cut-off on the PSI is defined by percentile rank (>90th centile) it is difficult to gauge the prevalence of clinical levels of stress within studies that reported mean raw scores. It was possible, however, to compare scores on parent and child domains (which assess parent and child characteristics respectively that may contribute to overall stress). Three [49, 50, 56] of the four studies that stated parent and child domain mean raw scores reported higher scores for parent domain than child domain. Within the parent domain, highest scores were observed on subscales of 'role restriction' (parenting role results in sense of limited freedom and constrained personal identity) and 'spouse' (perception of emotional and physical support from partner) [47, 48]. Within the child domain, highest mean scores for 'distractibility/hyperactivity' (behavioural characteristics that reflect symptoms of ADHD), 'demandingness' (experience of the child as placing demands on parent) and 'acceptability' (mismatch between expectations parent had for the child and the child's physical intellectual and emotional characteristics) [47, 48] were found. Studies that used the PSI-Short Form reported mean scores above clinical cut off for 'parenting distress' (extent to which parent feels competent, conflicted, restricted, supported and/or depressed in their role) and 'parent-child dysfunctional interaction' (extent to which parent feels satisfied with their child and interactions with them) [52]. This was also reported as the proportion of participants scoring above clinical levels for 'parenting stress' (22%) and 'parent-child dysfunctional interaction' (37%) [53]. In addition, 23% of participants were found to reach clinical cut off on scores of 'difficult child' (parent perception of the child, whether easy or difficult to look after) subscale [53].

3.5.2 Prevalence of anxiety in parents of CWRE

Eight studies measured anxiety in parents of CWRE [40-44, 46, 54, 55]. Of those using the generalised anxiety disorder (GAD) measure, three studies (two of which may be linked samples) reported mean scores that fell within the 'mild-moderate' range [40-42] and one within the 'moderate' range for anxiety [43]. Four studies also recorded the percentage of participants who scored 'above

clinical cut off' (9% [54] and 23% [41]), within the 'moderate-severe' range (20.9% [42]) or the 'severe' range (27.9% [43]).

One study [46] separated scores for mothers and fathers. Maternal but not paternal mean scores fell within the 'probable' range for anxiety. Reported mean scores for state anxiety also met suggested clinical cut-offs [55]. As the parental anxiety about epilepsy questionnaire (PAE) is not a clinical measure, prevalence of 'abnormal' anxiety cannot be established where this was reported [44].

3.5.3 Prevalence of depression in parents of CWRE

Nine studies assessed depression in parents of CWRE [40-43, 46, 51, 54, 55, 58]. Eight studies reported mean scores that were indicative of 'minimal' [46, 51, 55, 56] or 'mild' [40-43] symptomatology. However, when the percentage of participants that reached clinical cut off was reported, 20% of participants exhibited 'mild' [58], 12% 'moderate' [58], 24.9% [51] and 13.3% [53] 'moderate-severe' and 14% 'severe' [58] depression. Two studies were less specific, reporting that 3% [54] and 14% [41] of participants were 'above clinical cut off.' One study used the hospital anxiety and depression scale (HADS), reporting 'probable' depression (15% mothers, 8% fathers) and 'possible/probable' depression (30% mothers, 22% fathers) [46]. They also reported the percentage of participants experiencing both anxiety and depression concomitantly; 'probable' (38% mothers; 18% fathers), 'possible/probable' (27% mothers; 18% fathers).

3.6 Correlates and predictors of stress, anxiety and depression in parents of CWRE

Data relating to correlates and predictors of stress, anxiety and depression in parents of CWRE are detailed in Table 5.

3.6.1 Demographic factors

Two studies reported on the difference between maternal and paternal stress, anxiety and depressive symptomatology [46, 52]. Comparison between mothers and fathers of CWRE revealed significantly more maternal than paternal symptoms of anxiety and a significantly higher proportion of mothers (52%) than fathers (38%) reaching clinical levels of 'possible/probable' anxiety [46]. However, the

same pattern was not observed for parental stress [52] or depression [46]. No significant difference was seen between maternal and paternal scores of parental stress (at diagnosis or 1 year follow up) [52], between mean scores of maternal and paternal depression or between scores of mothers and fathers with 'possible/probable' depression [46]. The child's age [52, 56, 57] and gender [52, 56] were not found to be significantly associated with parental stress. However, parental education level was found to be significantly associated with parental anxiety [45]. This result was reported in only one paper with a cross-sectional design and therefore causation cannot be inferred. If this were to be supported by other studies that describe lower parental education level as a predictor of anxiety it could be suggested that the level of parental education may influence how parents engage with medical information, navigate services or make decisions. For example, studies of parental decision-making in paediatric healthcare services have reported that parents with lower levels of education were less likely to participate in decision making [59]. However, mothers who had higher education levels and higher incomes have been observed to be less satisfied with the process of decision-making in situations regarding their child's health [60]. Any hypotheses about the influence of parental education level for parents of CWRE, however, is speculative at present without further research.

3.6.2 Clinical factors

Nine studies examined clinical factors associated with parental stress, anxiety and depression [45, 47, 51, 52, 54-58]. Six studies examined the impact of diagnosis of refractory epilepsy by comparing parents of CWRE with the normative mean, parents of healthy children, CWE of any type, CWE with controlled seizures and children with mitochondrial disease (CWMD) [47, 51, 52, 54, 56, 57].

Studies compared levels of stress in parents of CWRE to the normative mean [57], parents of healthy controls [47], CWE [51, 52] or CWE with controlled seizures [56]. Stress in parents of CWRE was reported to be significantly higher on total stress and all subscales of the child domain [47, 56, 57]. In the parent domain, significantly higher scores were reported for either 'all subscales' [56] or only 'role restriction,' 'health' (extent that the parent's health contributes to overall parenting stress), and 'spouse' [47], with the addition of 'isolation' (parent's degree of social support) [57] in a further

study. In contrast, two studies reported no significant difference between stress in parents of CWRE and parents of CWE when comparing total stress [51, 52], child and parent domains on the PSI [51] and subscales of 'parent distress' and 'parent-child dysfunctional interactions' on the PSI-SF [52].

Two studies examined the relationship between seizure severity and parental stress [47, 56]. Although one observed significant associations between the two [56] the other reported that parent estimations of seizure severity were not predictive of parenting stress [47]. Significant associations were also observed between age at seizure onset and parent stress [57]. This was not, however, found to be the case with parental anxiety [45]. Seizure frequency was not found to be significantly associated with either parental stress [52, 56, 57] or anxiety 1 year after diagnosis [52]. In addition, ketogenic diet, VNS and previous epilepsy surgery [57] were not significantly associated with parental stress. The presence of secondarily generalised seizures, parental seizure history and family seizure history was associated with parental anxiety but this was not observed for seizure duration [45]. Findings regarding parental distress and the number of treatments that had been tried and failed were inconclusive, with one study reporting significant associations between number of AEDs and parental anxiety [45] and another showing no significant association between number of failed treatments and stress [57].

Comparative studies between parents of CWRE and parents of CWE with controlled seizures or parents of CWMD (a complex and often life-limiting condition) showed that parents of CWRE had significantly higher trait anxiety than parents of children with controlled seizures [55] but significantly lower levels of anxiety than parents of CWMD [54].

Only one study looked at changes in associations over time. At time of diagnosis, maternal stress was significantly associated with the child's diagnosis but not their response to drugs [52]. Neurological examinations and MRI findings were significantly associated with both maternal and paternal stress at time of diagnosis, however, these became non-significant after 1 year [52]. A significant reduction in level of paternal and maternal stress (total, parent distress (PD) and parent-child dysfunctional interaction (P-CDI) subscales) was also observed between diagnosis and 1 year

follow up [52]. However, this was not the case for difficult child (DC) subscale scores. Despite reductions in parental stress over time, mean stress scores remained above clinical level at both time points [52].

Parents of CWMD were shown to have significantly higher anxiety scores than parents of CWRE. They were also shown to have significantly higher scores of depression than parents of CWRE [54]. For parents of CWRE significant associations were observed between depression score and 'impact of paediatric epilepsy' score [58].

3.6.3 Psycho-social factors

Six studies considered associations between parental stress, anxiety or depression and a range of child psychosocial factors [44, 45, 47, 56-58]. Significant associations were noted between subscales of parental stress and the intelligence of the child [47] as well as child behaviour (externalising behaviour and problem score) [57]. However, cognitive function [56], autism and internalising behaviour [57] were not significantly associated with parental stress. One study reported that the 'attachment' subscale of the PSI (the parent's sense of closeness with the child and their ability to observe and effectively respond to the child's needs) was significantly lower in parents of CWRE than the normative mean [57]. One study observed that child's intelligence was predictive of parental stress [47].

Significant associations were noted between parental anxiety and the CYPs communication, daily living skills, socialisation [45], social skills and social problems [44]. Unlike studies of parental stress, the child's full-scale intelligence quotient was not significantly associated with parental anxiety [45]. In addition, significant associations were reported between maternal depression and child behaviour as well as maternal depression and ADHD rating [58]. However, only ADHD rating was significantly predictive of maternal depression [58]. A time point was not specified.

Table 1: Sample characteristics of included studies

Author	**Study Characteristics**		**CWRE Characteristics**		**Caregiver Characteristics**		**Assessment point**
	Location	Study Design	*n* (% female)	Age (years), mean (SD) *range*	*n* (% female)	Age (years) mean (SD) *range*	
Almanza-Sepulveda et al. (2019)	Canada	Cross-sectional	86(42)	11.87(3.37) *6-17.58*	86(81)	43.09 (7.40) n/s	Assessment for surgery
Braams et al. (2014)	The Netherlands	Prospective cohort	31(41)	8.5(4.2) n/s	31(93)	n/s	Prior to surgery
Carson & Chapieski (2016)	USA	Cross-sectional	93(51)	12.32(2.95) *6-18*	93(n/s)	n/s	Assessment for surgery
Conway et al. (2016)	Canada	Cross-sectional	115(44)	11.85(3.81) n/s	116(84)	n/s *40-49*	Assessment for surgery
Eom et al. (2017)	Korea	Cross-sectional	32(100)	n/s	Assessed for Stress: 16(100) Assessed for Depression: 12(100)	n/s	After diagnosis
Fan et al. (2017)	Taiwan	Prospective cohort	26(39)	n/s *6-12*	26(n/s)	n/s	Pre-VNS implantation
Jain et al. (2018)	Canada	Cross-sectional	181(42)	11.00(4.20) n/s	181(84)	n/s *40-49*	Assessment for surgery
Kerne & Chapieski (2015)	USA	Cross-sectional	97(47)	12.24(2.99) n/s	97(95)	n/s	Assessment for surgery
Kim et al. (2010)	Korea	Cross-sectional	32(47)	4.38(3.41) n/s	32(n/s)	35.41(4.56) n/s	n/s
Li et al. (2017)	Taiwan	Prospective cohort	30(43)	7.43(3.59) n/s	30(43)	n/s	M=14.9, *7-30* days before VNS surgery
Operto et al. (2019)	Italy	Prospective cohort	35(40)	8.50(3.10) *2-14*	35(n/s)	n/s	T0: Diagnosis T1: 1 year follow-up
Pekcanlar Akay et al. (2011)	Turkey	Cross-sectional	5(n/s)	n/s	n/s	n/s	n/s

Puka et al. (2017)	Canada	Cross-sectional	109(40)	9.08(1.90) *6-11* 14.62(1.9) *12-18*	109(82)	n/s	Assessment for surgery
Pulsifer et al. 2001	USA	Prospective cohort	65(45)	5.30(1.50-14.50) n/s	65(n/s)	n/s	Before initiation of ketogenic diet
Reilly et al. (2015)	Sweden	Cross-sectional	122(n/s)	n/s *0-18*	219(53)	n/s	Assessment before surgery
Shatla et al. (2011)	Egypt	Cross-sectional	13(n/s)	n/s	n/s	n/s	n/s
Tsai et al. (2016)	Taiwan	Prospective cohort	37(49)	n/s	n/s	n/s	Pre-VNS implantation
Wirrel et al. (2008)	USA	Cross-sectional	52(60)	9.80(4.50) *2-18*	52(100)	n/s	n/s
Wood et al. (2008)	Canada	Cross-sectional	52(60)	9.80(4.60) *2-18*	51(100)	n/s	n/s

Note: CWRE=Children and young people with refractory epilepsy; n=number; n/s=not stated; SD=standard deviation, VNS=Vagus nerve stimulation

Table 2: Glossary of measures of distress used in included papers

Abbreviation	Measure	Outcome Assessed	Has clinical cut-off? (Y/N)	Clinical Cut-offs (If Y)
PSI/ PSI-SF	Parental Stress Index/ Parental Stress Index-Short Form	Parental stress	Y	High:>85th centile Clinical:>90th centile
PAE	Parental Anxiety about Epilepsy Questionnaire	Anxiety about epilepsy	N	N/A
STAI	Spielberger State-Trait Anxiety Inventory	Anxiety	N	N/A
GAD-7	General Anxiety Disorder-7	Anxiety	Y	Mild: 0-5 Moderate: 6-10 Severe: ≥15
HADS	Hospital Anxiety and Depression Scale	Depression (HADS-D) Anxiety (HADS-A)	Y	Possible: 8-10 Probable: >10
QIDS	Quick Inventory of Depressive Symptomatology	Depression	Y	Moderate-Severe: ≥11
BDI	Beck Depression Inventory	Depression	Y	Minimal: 10.9(8.1) Mild: 18.7(10.2) Moderate: 25.4(9.6) Severe: 30(10.4)

Note: N/A = Not applicable; N=no; Y=yes

Table 3: Prevalence of symptoms of stress, anxiety and depression in caregivers of children and young people with refractory epilepsy.

Authors	**Assessment Measure(s)**	**Findings: Prevalence of symptoms in caregivers**		
		Stress	Anxiety	Depression
Braams et al. (2014)	PSI	Greater than normative average score (standard score >4.5) on subscales: - Parent domain (role restriction & spouse) - Child domain (distractibility/hyperactivity, demandingness & acceptability)	n/a	n/a
Eom et al. (2017)	PSI – Korean	Total stress: M=93.9(9.5) Parent domain: M=90.1(14.4) Child domain: M=92.6(10.6)	n/a	n/a
	BDI	n/a	n/a	M=14.7(9.1)
Fan et al. (2017)	PSI	Total stress: n/s Parent domain: n=146 median (132-169) Child domain: n= 135 median (124-153)	n/a	n/a
Li et al. (2017)	PSI-LF - Taiwan	Total stress M=282.1(38.0) Highest subscale scores: - Parent domain – (role restriction & spouse) - Child domain – (distractibility/hyperactivity, demandingness & acceptability)	n/a	n/a
Operto et al. (2019)	PSI-SF	Sub scores rated above clinical cut-off at T0 & T1= Mean Total stress, Mean PD & Mean P-CDI	n/a	n/a
Pulsifer et al. (2001)	PSI-SF	Total stress M=111.5(15.75) Above clinical cut off on all subscales: Total stress (32%); P-CDI (37%); DC (23%); PD (22%)	n/a	n/a
Shatla et al. (2011)	PSI	Total stress M=333.9(3.534) Child domain M=160.5(43.4) Parent domain M=173(44.4)	n/a	n/a

Tsai et al. (2011)	PSI	Total stress: All participants M=283(195-365) Parents of CWRE<12 years M=285(243-365) Parents of CWRE 12-18 years M=272(195-337) Child domain M=130(76-169) Parent domain M=148(109-222)	n/a	n/a
Wirrel et al. (2008)	PSI	In clinical range: - Total stress=63% - Parent domain=29% - Child domain=75%	n/a	n/a
Almanza-Sepulveda et al. (2019)	GAD-7	n/a	M=6.8(6.17) 'severe' n=24(27.9%)	n/a
	QIDS		n/a	M=6.93(5.55) 'moderate-severe' n=18(24.9%)
Carson & Chapieski (2016)	PAE	n/a	M=36.17(12.49)	n/a
Conway et al. (2016)	GAD-7	n/a	M=4.9(4.8) *Range=0-20*	n/a
	QIDS	n/a	n/a	M=5.82(3.9) *Range=0-17*
Jain et al. (2018)	GAD-7	n/a	M=5.7(5.7) 'moderate-severe' n=38(20.9%)	n/a
	QIDS	n/a	n/a	M=6.1(4.6) 'moderate-severe' n=24(13.3%)
Kim et al. (2010)	BAI	n/a	M=8.63(6.59) Above clinical cut-off n=3(9%)	n/a
	BDI	n/a	n/a	M=8.34(5.54) Above clinical cut-off n=1(3%)

Pekcanlar et al. (2019)	STAI	n/a	State Anxiety: M=39.04(9.77) Trait Anxiety: M=41.00(7.32)	n/a
	BDI	n/a	n/a	M=11.66(8.66)
Puka et al. (2017)	GAD	n/a	M=5.15(5.2) Above clinical cut-off n=21.1(23%)	n/a
	QIDS	n/a	n/a	M=5.64(4.1) Above clinical cut-off n=12.8(14%)
Reilly et al. (2015)	HADS	n/a	Mothers: M=8.41(4.96) Fathers: M=6.49(4.67) Above clinical cut off: 'Probable': Mothers 45(38%); Fathers 18(18%) 'Possible/probable' anxiety and depression: Mothers=27%; Fathers=18%	Mothers: M=5.39 (3.97) Fathers: M=4.84(3.75) Above clinical cut off: 'Probable': Mothers 17(15%); Fathers 8(8%) 'Possible/probable' depression: Mothers=30%; Fathers=22%
Wood et al. (2008)	BDI	n/a	n/a	'Mild' n=10(20%) 'Moderate' n=6(12%) 'Severe' n=7(14%)
Kerne & Chapieski (2015)	PAE	n/a	n/s	n/a

Note: BAI=Beck Anxiety Inventory; BDI=Beck Depression Inventory; CWRE=Child with refractory epilepsy; DC=Difficult child; GAD=Generalised Anxiety Disorder Scale; HADS=Hospital Anxiety and Depression Scale; M=mean; PAE=Parental Anxiety about Epilepsy scale; P-CDI=Parent-child dysfunctional interaction; PD=parent distress; PSI(LF/SF)=Parental Stress Index (Long form/Short form); QIDS=Quick Inventory of Depressive Symptomatology; STAI=State Trait Anxiety Inventory;

Table 4: Assessment of risk of bias

Author(s)	Unbiased selection of cohort?	Sample size calculation?	Adequate description of cohort?	Validated measure of stress/anxiety/depression	Validated measure of other variables	Confounders controlled for?	Appropriate analysis
Almanza-Sepulveda et al. (2019)	Y	n/s	Y	Y	Y	Y	Y
Braams et al. (2015)	Y	n/s	P	Y	Y	Y	P
Carson & Chapieski (2016)	Y	n/s	P	Y	Y	Y	Y
Conway et al. (2016)	Y	n/s	Y	Y	Y	Y	Y
Eom et al. (2017)	P	n/s	N	P	Y	n/s	Y
Fan et al. (2017)	Y	n/s	P	Y	Y	n/s	n/s
Jain et al. (2018)	Y	n/s	Y	Y	Y	Y	Y
Kerne & Chapieski (2015)	Y	n/s	Y	Y	Y	Y	Y
Kim et al. (2010)	Y	n/s	Y	Y	Y	Y	Y
Li et al. (2017)	P	n/s	N	Y	n/a	Y	Y
Operto et al. (2019)	P	n/s	N	Y	n/a	N	P
Pekcanlar Akay et al. 2011	P	n/s	Y	Y	P	P	Y
Puka et al. (2017)	Y	n/s	Y	Y	Y	Y	Y
Pulsifer et al. 2001	P	n/s	N	Y	Y	Y	Y
Reilly et al. (2015)	Y	n/s	P	Y	Y	Y	Y
Shatla et al. (2011)	Y	n/s	N	Y	Y	n/s	Y
Tsai et al. (2016)	Y	n/s	N	Y	Y	n/s	Y
Wirrel et al. (2008)	Y	n/s	N	Y	Y	N	P
Wood et al. (2008)	Y	n/s	P	Y	Y	Y	Y

Note: Y=yes; P=partially; N=No; n/s=not stated; n/a=not applicable

Table 5: Correlates and predictors of symptoms of stress, anxiety or depression in caregivers of children and young people with refractory epilepsy

Authors	**Assessment Measures**	**Analysis**	**Findings: Correlates & Predictors**
			Caregiver Stress
Braams et al. (2014)	PSI	Multivariate analysis of variance (MANOVA)	Significantly higher in parents of CWRE than healthy controls ($F(13, 48)=5.05$, $p<.002$, $n^2=0.578$) Significantly higher in parents of CWRE than healthy controls across the following subscales: - Parent domain (role restriction, health & spouse) - Child domain (All subscales: adaptability, mood, distractibility/hyperactivity, demandingness reinforces parent, & acceptability) Intelligence of CYP predicts parenting stress ($F(13,15)=4.273$, $p=.004$, $n^2=0.787$) when measured 2 years post-surgery. Seizure status, parent estimations of seizure severity do not predict parenting stress.
		Post hoc univariate analysis	Child intelligence has significant effect on parenting stress within two child domain subscales only: Mood ($F=4.222$, $p=.050$, $n^2= 0.135$) Distractibility/hyperactivity ($F=10.624$, $p=.003$, $n^2=0.282$) Data inspection suggests: negative relationship with mood and positive relationship with distractibility/hyperactivity
Eom et al. (2017)	PSI - Korean	Bivariate analysis: Chi-square & Mann-Whitney U test	No significant difference in total stress ($p=.125$), child domain ($p=.402$) or parent domain ($p=.179$) between caregivers of CWE and CWRE.
Operto et al. (2019)	PSI-SF	2-tailed independent sample *t*-test; Bivariate Pearson Pearson's Product Moment Correlation Coefficient; ANOVA	***Caregiver stress at T0 (at diagnosis)*** Significant association with: - Child's diagnosis for mothers ($p=.008$) but not fathers ($p>0.05$) - Neurological examination for mothers ($p=.000$) and fathers ($p=.022$) - MRI findings for mothers ($p=.001$) and fathers ($p=.012$) No significant association with age, gender or number of seizures for mothers or fathers ($p>.05$) No significant difference between caregivers of CWE & CWRE on total stress or subscales PD, P-CDI.

			Caregiver stress at T1 (12-month follow-up) No significant associations with age, gender, diagnosis, neurological examination, MRI findings or response to drugs for mothers or fathers (p>.05) T1: Significant difference between caregivers CWE & CWRE on all subscales – no direction stated. ***Caregiver stress T0, T1 comparisons*** Significant difference between: - T0 and T1 for maternal anxiety subscales: PD (p=.001), P-CDI (p=.01), TS (p=.003) but not DC (p=.622). - T0 and T1 for paternal anxiety on all subscales: PD (p=.001), P-CDI (p=.007), TS (p=.001), DC (p=.034) - Significant reduction in most subscales for parental anxiety between T0 and T1 but mean scores remained above clinical range. No significant difference between mothers & fathers on any subscales.
Shatla et al. (2011)	PSI	t-test; Pearson's Product Moment Correlation Coefficient	Parental stress significantly higher in caregiver of CWRE than CWE with controlled seizures (p<.001) in both child domain (p<.05) and parent domain (p<.05) Significant association with seizure severity (p<.05) No significant association with age, gender or seizure frequency or between composite stress and child cognitive function or between parent domain subscale and child cognitive function.
Wirrel et al. (2008)	PSI	One sample t-test; Pearson's Product Moment Correlation Coeffcient	Total stress, child and parent subdomains significantly higher than normative mean (p<.001) *Child domain:* All subscale scores significantly higher than normative mean (p<.001 for all except p<.007 for 'reinforces parent'). *Parent domain:* 5/7 subscales were significantly different to normative mean (p<.001). Mothers scored higher on isolation, health, role restriction and spouse (p<.001) and lower on attachment (p=.03). Total stress significantly associated with CBCL subscales:

			- Externalising behaviour (r=0.51, p<.002) - Problems score (r=0.50, p<.003) Total stress and child domain score associated with early age at onset of epilepsy at p=.02 but a priori cut off p<.01 No significant correlation between total stress and child or parent domain scores and internalising behaviour score, SIB-R score, presence of autism, age, number of failed treatments, seizure frequency, treatment with the ketogenic diet, vagal nerve stimulator or prior epilepsy surgery, income, family type or parental education.
			Caregiver Anxiety
Carson & Chapieski (2016)	PAE	Pearson's Product Moment Correlation Coefficient	Significantly associated with: CYP Social Skills (parent report) r=-.298* CYP Social skills (teacher report) r=-.347* CYP Social problems (parent report) r=.335**
Kerne & Chapieski (2015)	PAE	Pearson's Product Moment Correlation Coefficient and *t*-tests	Significantly associated with: - Parental education: r=-.31* - Secondarily generalised seizures: r=.23* - No. of AEDs: r=.38* - Parental seizure history: t=2.56* - Seizure history in wider family: t=1.99*** - CYP Communication: r=-.34** - CYP Daily living skills: r=-.30** - CYP Socialisation: r=-.26* Not significantly associated with: - Age at onset: r=0.14, p>.01 - Duration: r=-0.16, p>.01 - Seizure frequency: r=.01, p>.01 - Full scale IQ: r=-0.21, p>.01
Kim et al. (2010)	BAI	*t*-test	Mothers of CWRE significantly lower anxiety than mothers CWMD (t=3.442, p=.001)

Pekcanlar et al. (2019)	STAI	Chi-squared; *t*-test; Pearson Pearson's Product Moment Correlation Coefficient; Mann-Whitney U test	Caregivers of CWRE significantly higher trait anxiety than caregivers of children with seizure control (p=.027)
Reilly et al. (2015)	HADS	Chi-square; Independent samples *t*-test (differences in parent couples' anxiety & depression)	Maternal anxiety significantly higher than paternal anxiety (p=.005) Proportion of mothers of CWRE with 'Possible/probable' anxiety (52%) significantly higher than fathers of CWRE (38%) (X^2 =4.244; p=.039)
			Caregiver Depression
Kim et al. (2010)	BDI	*t*-test	Mothers CWRE significantly lower depression than mothers CWMD (t=4.328, p<.0001)
Reilly et al. (2015)	HADS	Chi-square; Independent samples *t*-test (differences in parent couples' anxiety & depression)	No significant difference between mean maternal and paternal depression (p=.353) No significant difference between depression scores of mothers and fathers with 'possible/probable' depression (p>.05) ***Caregiver Anxiety and Depression*** No significant difference between scores of mothers and fathers with both 'possible/probable' anxiety and depression (p>.05)
Wood et al. (2008)	BDI	Correlation	Significantly associated with: - Child behaviour (r=0.41, p<.02) - ADHD rating (r=0.44, p<.004) - Child IPE score (r=0.51, p<.001) Not significantly associated with: Internalising problems score (r=0.32, p=.06); externalising problems score (r=0.27, p=.11), child global QOL (r= -0.28, p=.05), family income (r=0.13, p=.40), family type (r=-0.03, p=.82), number of siblings (r=0.15, p=.30), autism (r=-0.16, p=.58), independent behaviour (r=-0.18, p=.24), age seizure onset (r=-0.17, p=.23), seizure frequency (r=0.29, p=.11), number of failed therapies (r=0.08, p=.58).
		Stepwise linear regression	Child ADHD scale score is significantly predictive of maternal depression (β=0.49, 95%CI: 0.22-0.98, p<.004)

Note: ADHD=Attention deficit hyperactivity disorder; AED=Anti-epileptic medication; BAI=Beck Anxiety Inventory; BDI=Beck Depression Inventory; CBCL=Child behaviour checklist; CI=Confidence interval; CWE=Children and young people with epilepsy; CWMD=Children with mitochondrial disease; CWRE=Children and young people with refractory epilepsy; CYP=Child or young person; DC=Difficult child; GAD=Generalised Anxiety Disorder Scale; HADS=Hospital Anxiety and Depression Scale; IPE=Impact of paediatric epilepsy scale; IQ=Intelligence quotient; PAE=Parental Anxiety about Epilepsy scale; P-CDI=Parent-child dysfunctional interaction; PD=parent distress; PSI(LF/SF)=Parental Stress Index (Long form/Short form); SIB-R=Scales of independent behvaiour-revised; STAI=State Trait Anxiety Inventory; QOL=Quality of life; QIDS=Quick Inventory of Depressive Symptomatology;

*p<.01

**p<.001

***p<.05

4. Discussion

4.1 Highlights and Clinical Implications

Table 6: Highlights and clinical implications of the review

Highlights
▪ Eight studies reported prevalence data only. A further 10 reported both prevalence data and correlates or predictors of symptoms of stress, anxiety and depression in parents of CWRE.
▪ Collectively, prevalence data indicated that symptoms of stress, anxiety and depression are commonly experienced by parents of CWRE. However, given heterogeneity in reporting methods, and the varied quality of the included studies, it was not possible to draw firm conclusions regarding prevalence of such symptoms.
▪ Studies examined a range of clinical, demographic and psychosocial correlates and predictors of stress, anxiety and depression parents of CWRE.
▪ No consistent predictors or correlates were reported across included studies. It was therefore not possible to observe a consistent pattern with respect to the role of demographic, clinical and psychosocial variables in parental distress.
Clinical Implications
▪ The review demonstrates the need for prospective studies designed to assess prevalence, correlates, and predictors of parental distress within this population.
▪ The use of a standard set of core outcome measures of parental mental health within services supporting CWRE and their families would be one way to allow researchers to compare, contrast and combine outcomes of studies related to prevalence of stress, anxiety and depression in this population [61].
▪ Through understanding the associations with distress in parents of CWRE it may then be possible to design specific individual or family interventions to support this population.

Note: CWRE=Children with refractory epilepsy

4.2 In-depth Discussion

This systematic review sought to synthesis, analyse and critically evaluate published literature which reported data regarding psychological distress (stress, anxiety and depression) experienced by parents of CWRE. It aimed to ascertain the prevalence of parental stress, anxiety and depression in this population, as well as identify any correlates and predictors of psychological distress.

Previous reviews have primarily examined psychological distress in parents of CWE of all types. However, to our knowledge none have examined parents of CWRE specifically. In total, 19 empirical papers were included [40-58]. We are confident that all relevant literature was identified as a broad search strategy was maintained before the exclusion of papers that were not related to refractory epilepsy.

Collectively, data indicated that symptoms of stress, anxiety and depression are common in parents of CWRE. However, heterogeneity in measures of distress as well as reporting methodology made comparison between studies challenging. Included studies used a variety of psychometric measures to assess stress, anxiety and depression. Some individual measures recorded clinical outcomes in a graded manner (GAD-7, HADS, QIDS, BDI); these each had their own category descriptions e.g., mild, moderate, severe or possible/probable depression or anxiety. Other measures (PSI/PSI-SF) used centiles to create a 'clinical cut off'. The PAE and STAI, however, used by some studies did not have any measure of 'clinical cut-off.' Variation in measuring and recording outcomes of clinical significance meant that it was therefore not possible to reach firm conclusions regarding the prevalence of stress, anxiety and depression in this population.

A high proportion of parents of CWRE experienced symptoms of stress above levels defined as 'clinical.' There is some indication that the level of stress may remain high over time [52]. However, meaningful conclusions cannot be drawn as data were lacking in this area. Heterogeneity in reporting methodology meant it was not possible to establish consistency across all studies. Parents of CWRE also experienced significantly higher levels of stress than the 'normative mean,' parents of healthy children and parents of CWE with controlled seizures [47, 56, 57]. However, it was not possible to determine whether parents of CWRE experienced levels of stress significantly above that of parents of CWE of any type.

All studies of parental anxiety reported mean scores above 'mild-moderate' anxiety or a high proportion of participants with anxiety symptomology above that of clinical significance (range between 9-27%) [41-43, 54]. The highest proportions were noted in 'moderate-severe' and 'severe' ranges [42, 43] of anxiety symptomatology.

Data indicated that parents of CWRE experienced high levels of depressive symptomatology. Reported mean scores above that of clinical cut off may indicate that most participants experienced a low level of clinical depression or that a proportion of parents had more severe symptomatology. The latter was the case in some studies with 12-24.9% of participants experiencing 'moderate,' 'moderate-severe' or 'severe' depression [51, 53, 58].

` With the exception of ADHD as a predictor of maternal depression [58] and child's intelligence as a predictor of parental stress [47], a consistent pattern with respect to the role of demographic, clinical and psychosocial variables in parental distress was not found across the included studies. This is likely to reflect the varied methodologies and variables under investigation. As studies examined a wide range of factors, it was not possible to determine conclusively what predicted or was associated with psychological distress in parents of CWRE. However, narrative synthesis highlighted several associations of interest for further investigation.

When considering demographic factors, data indicated that mothers experienced greater anxiety than fathers. This has also been found in studies of parents of CWE of any type [24, 25]. However, for parents of CWRE, this did not appear to extend to symptoms of stress and depression. In addition, this was only examined in two studies. One, comparing psychological distress in mothers and fathers of CWRE, stated a near even ratio of participant genders, the other did not state the number of mothers and fathers included. Therefore, although parental gender may be a risk factor for anxiety in parents of CWRE, further research is required.

Clinical characteristics within the included studies were not consistently associated with distress. However, the findings of this review indicated that the experiences of parents of CWRE may differ from those of healthy children or CWE with controlled seizures. As significantly higher symptoms of stress and anxiety were observed in parents of CWRE than CWE with controlled seizures [55, 56], it might be expected that clinical elements of refractory epilepsy such as age at seizure onset, seizure frequency, severity and number of failed medications might contribute towards parental distress. However, although one study reported significant association between age of seizure onset [57] and parental stress, others reported no significant association with parental stress [52, 56], anxiety [45] or depression [58]. In addition, no significant associations were noted between seizure frequency and symptoms of stress [52, 56, 57] or anxiety [45] and only one study noted significant associations between seizures severity and stress [56]. Whether the number of failed treatments/AEDs is associated with parental stress and anxiety was inconclusive as contradictory results were reported [45, 57]. Other clinical factors such as the presence of secondarily generalisable seizures and seizure

history in parents and wider family were raised as significant but further studies are required to verify the consistency of results and direction of any associations.

Multiple psychosocial factors of interest were highlighted for further investigation. However, a consistent pattern regarding the direction of any associations could not be concluded. Aspects of the child that relate to their ability to communicate and socialise with others including their externalising behaviour seemed to play a role in parental distress. Further research is required to establish the direction of such factors and whether they remain when other confounding factors (such as demographic and clinical variables) are controlled for. As most included studies did not focus specifically on psychosocial factors related to CWRE and their parents, it is also likely that there are additional factors that require investigation to develop a more comprehensive understanding.

4.3 Implications for research and methodological limitations

There is a need for population-based studies with well described parent and child characteristics to provide good data on the extent of stress, anxiety and depressive symptomatology in parents with CWRE. It is also important that studies focus on identification of true risk factors of parental psychological distress and specifically psychosocial factors given that demographic and clinical factors are not easily altered for CWRE.

Most included studies were of a cross-sectional design. Although this was important in identifying some correlates of symptoms of parental distress it is not possible to infer causation. Therefore, prospective cohort studies are required to clarify cause/effect and true risk factors for parental of psychological distress in parents of CWRE. The use of such methodologies may also result in the ability to track elevated rates of symptomology over the course of diagnosis and management of CWRE.

Despite included papers coming from a range of geographical locations overall, most were from the US and Canada and only texts in English were considered for this study. This may have resulted in language or cultural bias. This is particularly poignant when considering variation in health systems and the way in which different cultures support CYP and their families.

Overall, the included studies that provided appropriate demographic characteristics for parent participants sampled more mothers than fathers. This may therefore present a biased view of psychological distress in both parents, presenting a viewpoint more indicative of maternal distress. Although some studies indicated that parent gender may play a role in distress of parents of CWRE it has been suggested that the impact of caring for CWRE is less to do with the gender of the parent but rather whether they are the primary caregiver [62]. Therefore, efforts are needed to ensure future research includes more fathers as well as a focus on the primary caregiving role as a variable.

As studies without validated measures of stress, anxiety and depression were excluded from this review contributions from qualitative studies were not considered. However, qualitative methodologies may provide a more comprehensive understanding of the contributors toward distress, particularly psychosocial factors, not identified thus far. Potential factors identified through qualitative research could form the basis of future quantitative studies with a specific focus on risk factors for psychological distress in parents of CWRE. It may also be useful to study literature related to CWE of any type to identify further possible factors of interest. Aspects of epilepsy may specifically contribute to parental stress, anxiety and depression. However, whether the nature of refractory epilepsy contributes uniquely is less clear.

4.4 Clinical implications

This study highlights the importance of considering the psychological wellbeing of parents of CWRE. Clinically, the ability to identify those potentially at risk of clinical levels of stress, anxiety and depression would be beneficial so that appropriate and timely support can be provided. However, research conducted to date is insufficient to identify true risk factors for psychological distress in this population.

As none of the studies identified were designed specifically to investigate all possible psychosocial factors associated with this process it is important that a better understanding of parental experience is established. Children and young people diagnosed with refractory epilepsy and their families are more likely to have regular contact with health services, particularly during the process of

consideration for epilepsy surgery. This may therefore provide the opportunity to conduct qualitative studies as well as prospective cohort studies to ensure identification and insight into factors of psychological distress in parents of CWRE. Understanding the nature of symptomatology in this way may help professionals to develop services and interventions to help prevent the development of clinical levels of psychological distress in parents of CWRE.

This review suggests that stress, anxiety and depression are common in parents of CWRE. In the absence of specific risk factors for psychological distress, understanding that stress, anxiety and depressive symptomology is prevalent in parents of CWRE remains clinically relevant. This highlights the importance of incorporating the provision of emotional support for parents throughout each contact with health services.

5. Conclusions

Our review suggests that stress, anxiety and depression are common in parents of CWRE. However, heterogeneity in reporting methodology meant it was not possible to establish consistency across all studies. A reliable pattern with respect to the role of demographic, clinical and psychosocial variables in parental distress was also not found across the included studies. This is likely to reflect the varied methodologies and variables under investigation. However, narrative synthesis highlighted several associations of interest for further investigation.

Further research is required to identify potential risk factors for subsequent investigation within prospective cohort studies. Thus, true risk factors for psychological distress in parents of CWRE can be established as well as the trajectory of symptoms of distress over time. Studies would also benefit from a focus on psychosocial factors in recognition that neither demographic nor clinical factors are easily altered within this population.

References

[1] Aaberg KM, Gunnes N, Bakken IJ, Lund Søraas C, Berntsen A, Magnus P, Lossius MI, Stoltenberg C, Chin R, Surén P. Incidence and prevalence of childhood epilepsy: A nationwide cohort study. Pediatrics 2017;139: e20163908.

[2] Joint epilepsy council of the UK and Ireland. Epilepsy prevalence, incidence and other statistics, https://www.epilepsyscotland.org.uk/wp-content/uploads/2019/05/Joint_Epilepsy_Council_Prevalence_and_Incidence_September_11_3.pdf [accessed 18th May 2020]

[3] Neligan A, Hauser WA, Sander JW. Chapter 6 - The epidemiology of the epilepsies. In: Stefan H, Theodore WH, editors. Handbook of Clinical Neurology. Online: Elsevier; 2012, p. 113-133.

[4] Fisher RS, Cross JH, French JA, Higurashi N, Hirsch E, Jansen FE, Lagae L, Moshe SL, Peltola J, Roulet Perez E, Scheffer IE, Zuberi SM. Operational classification of seizure types by the International League Against Epilepsy: Position paper of the ILAE commission for classification and terminology. Epilepsia 2017;58: 522-530.

[5] Meeraus WH, Petersen I, Chin RF, Knott F, Gilbert R. Childhood epilepsy recorded in primary care in the UK. Archives of Disease in Childhood 2013;98: 195.

[6] Reilly C, Atkinson P, Chin RF, Das KB, Gillberg C, Aylett SE, Burch V, Scott RC, Neville BGR. Symptoms of anxiety and depression in school-aged children with active epilepsy: A population-based study. Epilepsy and Behavior 2015;52: 174-179.

[7] Rodenburg R, Wagner JL, Austin JK, Kerr M, Dunn DW. Psychosocial issues for children with epilepsy. Epilepsy & Behavior 2011;22: 47-54.

[8] Fastenau PS, Jianzhao S, Dunn DW, Austin JK. Academic underachievement among children with epilepsy: Proportion exceeding psychometric criteria for learning disability and associated risk factors. Journal of Learning Disabilities 2008;41: 195-207.

[9] Aguiar BVK, Guerreiro MM, McBrian D, Montenegro MA. Seizure impact on the school attendance in children with epilepsy. Seizure 2007;16: 698-702.

[10] Dunn, Austin JK, Huster GA. Behaviour problems in children with new-onset epilepsy. Seizure 1997;6: 283-287.

[11] Ott D, Siddarth P, Gurbani S, Koh S, Tournay A, Shields WD, Caplan R. Behavioral disorders in pediatric epilepsy: Unmet psychiatric need. Epilepsia 2003;44: 591-597.

[12] Reilly C, Agnew R, Neville BGR. Depression and anxiety in childhood epilepsy: A review. Seizure 2011;20: 589-597.

[13] Davies S, Heyman I, Goodman R. A population survey of mental health problems in children with epilepsy. Developmental Medicine and Child Neurology 2003;45: 292-295.

[14] Plioplys S. Depression in children and adolescents with epilepsy. Epilepsy & Behavior 2003;4: S39-S45.

[15] Caplan R, Siddarth P, Gurbani S, Hanson R, Sankar R, Shields WD. Depression and Anxiety Disorders in Pediatric Epilepsy. Epilepsia 2005;46: 720-730.

[16] Cousino MK, Hazen RA. Parenting stress among caregivers of children with chronic illness: A systematic review. Journal of Pediatric Psychology 2013;38: 809-828.

[17] Jones C, Reilly C. Parental anxiety in childhood epilepsy: A systematic review. Epilepsia 2016;57: 529-537.

[18] Ferro MA, Speechley KN. Depressive symptoms among mothers of children with epilepsy: A review of prevalence, associated factors, and impact on children. Epilepsia 2009;50: 2344-2354.

[19] Kwan P, Arzimanoglou A, Berg AT, Brodie MJ, Allen Hauser W, Mathern G, Moshé SL, Perucca E, Wiebe S, French J. Definition of drug resistant epilepsy: Consensus proposal by the ad hoc Task Force of the ILAE Commission on Therapeutic Strategies. Epilepsia 2010;51: 1069-1077.

[20] Kwan P, Sander JW. The natural history of epilepsy: an epidemiological view. Journal of Neurology, Neurosurgery & Psychiatry 2004;75: 1376.

[21] National Institute for Health and Care Excellence (2012). Epilepsies: Diagnosis and management (Clinical guideline 137), https://www.nice.org.uk/guidance/cg137 [accessed 1st April 2020].

[22] Aneja S, Jain P. Refractory epilepsy in children. Indian J Pediatr 2014;81: 1063-72.

[23] Li Y, Ji C-Y, Qin J, Zhang Z-X. Parental anxiety and quality of life of epileptic children. Biomedical And Environmental Sciences: BES 2008;21: 228-232.

[24] Wojtas K, Oskedra I, Cepuch G, Swiderska E. The level of negative emotions, coping with stress and social support for parents of children suffering from epilepsy. Folia Med Cracov 2014;54: 79-86.

[25] Lewis MA, Hatton CL, Salas I, Leake B, Chiofalo N. Impact of the Children's Epilepsy Program on Parents. Epilepsia 1991;32: 365-374.

[26] Mu P-F, Kuo H-C, Chang K-P. Boundary ambiguity, coping patterns and depression in mothers caring for children with epilepsy in Taiwan. International Journal of Nursing Studies 2005;42: 273-282.

[27] Mu P, Wong T, Chang K, Kwan S. Predictors of maternal depression for families having a child with epilepsy. Journal of Nursing Research (Taiwan Nurses Association) 2001;9: 116-126.

[28] Williams J, Steel C, Sharp GB, DelosReyes E, Phillips T, Bates S, Lange B, Griebel ML. Parental anxiety and quality of life in children with epilepsy. Epilepsy & Behavior 2003;4: 483-486.

[29] Mu P, Kuo H, Chang K. Boundary ambiguity, coping patterns and depression in mothers caring for children with epilepsy in Taiwan. International Journal of Nursing Studies 2005;42: 273-282.

[30] Cushner-Weinstein S, Dassoulas K, Salpekar JA, Henderson SE, Pearl PL, Gaillard WD, Weinstein SL. Parenting stress and childhood epilepsy: The impact of depression, learning, and seizure-related factors. Epilepsy & Behavior 2008;13: 109-114.

[31] Sheeran T, Marvin RS, Pianta RC. Mothers' resolution of their child's diagnosis and self-reported measures of parenting stress, marital relations, and social support. Journal of Pediatric Psychology 1997;22: 197-212.

[32] Rodenburg R, Meijer AM, Deković M, Aldenkamp AP. Parents of children with enduring epilepsy: Predictors of parenting stress and parenting. Epilepsy & Behavior 2007;11: 197-207.

[33] Chapieski L, Brewer V, Evankovich K, Culhane-Shelburne K, Zelman K, Alexander A. Adaptive functioning in children with seizures: Impact of maternal anxiety about epilepsy. Epilepsy & Behavior 2005;7: 246-252.

[34] Shore CP, Austin JK, Huster GA, Dunn DW. Identifying risk factors for maternal depression in families of adolescents with epilepsy. Journal for Specialists in Pediatric Nursing 2002;7: 71-80.

[35] Moher D, Liberati A, Tetzlaff J, Altman DG. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. PLoS Med 2009;6: e1000097.

[36] Taylor PJ, Hutton P, Wood L. Are people at risk of psychosis also at risk of suicide and self-harm? A systematic review and meta-analysis. Psychological Medicine 2014;45: 911-926.

[37] Williams JW, Plassman BL, Burke J, Benjamin S. Preventing Alzheimer's disease and cognitive decline. Evidence report/technology assessment 2010: 1-727.

[38] Jüni P, Witschi A, Bloch R, Egger M. The Hazards of Scoring the Quality of Clinical Trials for Meta-analysis. JAMA 1999;282: 1054-1060.

[39] Tacconelli E. Systematic reviews: CRD's guidance for undertaking reviews in health care. The Lancet Infectious Diseases 2010;10: 226.

[40] Conway L, Smith ML, Ferro MA, Speechley KN, Connoly MB, Snead OC, Widjaja E. Correlates of health-related quality of life in children with drug resistant epilepsy. Epilepsia 2016;57: 1256-1264.

[41] Puka K, Widjaja E, Smith ML. The influence of patient, caregiver, and family factors on symptoms of anxiety and depression in children and adolescents with intractable epilepsy. Epilepsy and Behavior 2017;67: 45-50.

[42] Jain P, Subendran J, Smith ML, Widjaja E. Care-related quality of life in caregivers of children with drug-resistant epilepsy. Journal Of Neurology 2018;265: 2221-2230.

[43] Almanza-Sepulveda ML, Smith ML, Widjaja E. Influence of patient, caregiver, and family factors on unmet healthcare needs in children with drug-resistant epilepsy undergoing epilepsy surgery evaluation. Epilepsy and Behavior 2019;99.

[44] Carson AM, Chapieski L. Social functioning in pediatric epilepsy reported by parents and teachers: Contributions of medically related variables, verbal skills, and parental anxiety. Epilepsy & Behavior 2016;62: 57-61.

[45] Kerne V, Chapieski L. Adaptive functioning in pediatric epilepsy: Contributions of seizure-related variables and parental anxiety. Epilepsy & Behavior 2015;43: 48-52.

[46] Reilly C, Taft C, Nelander M, Malmgren K, Olsson I. Health-related quality of life and emotional well-being in parents of children with epilepsy referred for presurgical evaluation in sweden. Epilepsy & Behavior 2015;53: 10-14.

[47] Braams O, Meekes J, Braun K, Schappin R, van Rijen PC, Hendriks MPH, Jennekens-Schinkel A, van Nieuwenhuizen O. Parenting stress does not normalize after child's epilepsy surgery. Epilepsy & Behavior 2015;42: 147-152.

[48] Li S-T, Chiu N-C, Kuo Y-T, Shen E-Y, Tsai P-C, Ho C-S, Wu W-H, Chen J-C. Parenting stress in parents of children with refractory epilepsy before and after vagus nerve stimulation implantation. Pediatrics And Neonatology 2017;58: 516-522.

[49] Fan H-C, Hsu T-R, Chang K-P, Chen S-J, Tsai J-D. Vagus nerve stimulation for 6- to 12-year-old children with refractory epilepsy: Impact on seizure frequency and parenting stress index. Epilepsy & Behavior 2018;83: 119-123.

[50] Tsai JD, Chang YC, Lin LC, Hung KL, on behalf of the VT. The neuropsychological outcome of pediatric patients with refractory epilepsy treated with VNS - A 24-month follow-up in Taiwan. Epilepsy and Behavior 2016;56: 95-98.

[51] Eom S, Lee Y-M. Preliminary study of neurodevelopmental outcomes and parenting stress in pediatric mitochondrial disease. Pediatric Neurology 2017;71: 43-49.e1.

[52] Operto FF, Mazza R, Pastorino GMG, Campanozzi S, Verrotti A, Coppola G. Parental stress in a sample of children with epilepsy. Acta Neurologica Scandinavica 2019;140: 87-92.

[53] Pulsifer MB, Gordon JM, Brandt J, Vining EPG, Freeman JM. Effects of ketogenic diet on development and behavior: Preliminary report of a prospective study. Developmental Medicine & Child Neurology 2001;43: 301-306.

[54] Kim KR, Lee E, Namkoong K, Lee YM, Lee JS, Kim HD. Caregiver's burden and quality of life in mitochondrial disease. Pediatric Neurology 2010;42: 271-276.

[55] Pekcanlar Akay A, Hiz Kurul S, Ozek H, Cengizhan S, Emiroglu N, Ellidokuz H. Maternal reactions to a child with epilepsy: Depression, anxiety, parental attitudes and family functions. Epilepsy Research 2011;95: 213-220.

[56] Shatla R, El said Sayyah H, Azzam H, Elsayed RM. Correlates of parental stress and psychopathology in pediatric epilepsy. Annals of Indian Academy of Neurology 2011;14: 252-256.

[57] Wirrell EC, Wood L, Hamiwka LD, Sherman EMS. Parenting stress in mothers of children with intractable epilepsy. Epilepsy & Behavior 2008;13: 169-173.

[58] Wood LJ, Sherman EMS, Hamiwka LD, Blackman MA, Wirrell EC. Maternal depression: the cost of caring for a child with intractable epilepsy. Pediatric Neurology 2008;39: 418-422.

[59] Tarini BA, Christakis DA, Lozano P. Toward family-centered inpatient medical care: the role of parents as participants in medical decisions. J Pediatr 2007;151: 690-5, 695.e1.

[60] Penticuff JH, Arheart KL. Effectiveness of an intervention to improve parent-professional collaboration in neonatal intensive care. J Perinat Neonatal Nurs 2005;19: 187-202.

[61] Kirkham JJ, Davis K, Altman DG, Blazeby JM, Clarke M, Tunis S, Williamson PR. Core Outcome Set-STAndards for Development: The COS-STAD recommendations. PLOS Medicine 2017;14: e1002447.

[62] Ferro M, Speechley K. Depressive symptoms in mothers of children with epilepsy: a comparison of growth curve and latent class modeling. Health Services & Outcomes Research Methodology 2012;12: 44-61.

Chapter Two

The experiences and support needs of families of young children on the epilepsy surgery pathway: a qualitative study

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Abstract

Background: Children's epilepsy surgery services (CESS) in the UK were established with a focus on improving outcomes for young children by increasing access to surgery. The process of consideration for epilepsy surgery is complex and can often be lengthy, yet there is a lack of research to gain insight into how this process might impact on families. This study aimed to explore the experiences of families of young children with refractory epilepsy being considered for epilepsy surgery, including their support needs and the support provided, to inform future service development and delivery.

Methods: We conducted a qualitative study involving semi-structured interviews with parents of children (aged < six years old) being considered for epilepsy surgery or who had been considered within the previous three years. Sampling was purposive and we analysed data using a thematic and iterative approach.

Results: A total of 15 parents of 14 children were interviewed (13 mothers and 2 fathers). Initial discussions of epilepsy surgery were described as 'shocking' but also as a source of hope. Poor communication between staff and parents, however, and lack of information about the steps, assessments/investigations and timeframes involved in the process of assessment for surgical candidacy led to some feeling 'out of control,' uncertain and in some cases distressed. Although parents described examples of positive support from staff, many felt they needed additional general and emotional support throughout the epilepsy surgery pathway. They sought this independently through non clinical and clinical sources. Parents expressed their need for pre-warning that surgery will be discussed at their next appointment, further information about the CESS itself, the process of consideration for surgery, nature of assessments/investigations and timeframes involved. They also suggested access to psychosocial and clinical psychological support would have been beneficial.

Conclusions: Findings suggest the need for CESS centres to recognise the importance of providing clear and consistent information about the service, assessments/investigations and timeframes involved to allow parents to feel a sense of control within the process of their child being considered for surgical candidacy. It also highlights the importance of providing emotional support throughout

the assessment process. Recommendations for future service development include pre-warning parents that surgery will be discussed at a scheduled meeting, providing further information about the CESS, a step-by-step guide of the process with realistic timelines and information about each assessment/ investigation. In addition, families should be given the opportunity to meet others with shared experiences as well as access to clinical psychological support as required.

Keywords: Family experiences, support needs, childhood epilepsy surgery, children's epilepsy surgery service, family, qualitative

1. **Introduction**

Children with refractory epilepsy (RE) experience ongoing seizures despite the use of anti-epileptic drugs (AEDs) [1]. Ongoing seizures have a negative impact upon brain development [2, 3], whereas surgical intervention for certain children with RE can lead to reduction in seizure frequency [2, 4, 5] and improved developmental and quality of life outcomes [6-8]. Epilepsy surgery services have therefore been established with the focus on increasing access for younger children (aged five years or under) for whom it is suggested that epilepsy surgery is particularly advantageous [9].

Since November 2012, children's epilepsy surgery in England has been provided through the Children's Epilepsy Surgery Service (CESS). There are four CESS clinical pathways with specialist multidisciplinary teams (MDT) covering the process from point of referral for consideration for surgery to completion of surgery (if acceptable) and follow up. Each MDT typically includes an epileptologist, neurosurgeon, neurophysiologist, neuroradiologist, neuropsychologist, neuropsychiatrist, specialist epilepsy nurse and can involve access to an occupational therapist, physiotherapist, neuroanaesthetist and ophthalmologist as necessary [9].

To establish whether a child is a suitable candidate for epilepsy surgery, multiple assessments and investigations are required. These may include clinical review, scans (EEG, fMRI, MEG, MRI, 3T MRI, PET, SEEG, VT), as well as assessment by neuropsychology, neuropsychiatry, ophthalmology, occupational therapy and physiotherapy. Assessment results are discussed at local and, in some cases, national MDTs before a decision about whether the child is a suitable candidate for surgery is made.

Consideration for epilepsy surgery is complex and time consuming. There have been few studies exploring the experiences of those caring for children undergoing the process. Two studies

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Abbreviations: Children's Epilepsy Surgery Service (CESS); Electroencephalography (EEG); Functional magnetic resonance imaging (fMRI); Magnetoencephalography (MEG); Magnetic resonance imaging (MRI); 3 Tesla magnetic resonance imaging (3T MRI); Positron emission tomography (PET); Stereo electroencephalography (SEEG); Vagus nerve stimulation (VNS); Video telemetry (VT)

were conducted in the United States with parents of children and young people (up to 18 years) who had already undergone resective surgery. The first focussed on parent's perceived barriers to timely receipt of surgery, concluding that the journey prior to surgery felt 'long and arduous' [10]. A follow-up study attempted to describe this period more thoroughly, identifying that parents felt the need to process the emotional elements of diagnosis and treatment, navigate the complexities of the health care system, such as medical insurance and treatment and seek information and support. They also identified that it was helpful to find a specialist team of clinicians, as well as other parents with similar experiences [10, 11]. Neither of these studies were directly applicable to the context of healthcare provision in the UK or parents of young children, who are the focus of service provision within the UK. Although there has been one UK based study relating to the process of consideration for paediatric epilepsy surgery it focusses specifically on how families make decisions about surgery [12].

As services develop to increase the number of young children accessing epilepsy surgery, it is important to understand how this process is experienced by their families. The aims of this study were therefore to explore the experiences of families of young children with refractory epilepsy being considered for epilepsy surgery, the support provided and their support needs. The study aimed to inform future development of UK family centred support services and contribute to the body of literature around family experiences of young children's epilepsy surgery.

2. Material and Methods

We employed a qualitative interview design, involving semi-structured interviews to provide insights into the experiences and support needs of parents whose young child had been, or were being considered for epilepsy surgery. Qualitative study elements were developed and reported using the consolidated criteria for reporting qualitative studies (COREQ) (Appendix E).

2.1 Participants

To help ensure sample diversity, we recruited parents for interviews through a CESS in the North of England, alongside online advertising. Parents were eligible if they had a child (aged < six years old) who was being considered for epilepsy surgery, or had been considered within the last three years, regardless of whether they went on to have surgery or not.

Participant information sheets (Appendix F) and the topic guide (Appendix G) were reviewed by adults with personal experience of being considered for epilepsy surgery, as well as VG, an experienced clinician working with families of children being considered for surgery. These were revised by FN and KW in response to feedback to ensure materials were appropriate.

For CESS recruitment, a member of staff within a CESS accessed hospital records in June 2019 to identify potential participants who met inclusion criteria. Participant packs, including a covering letter (Appendix H) and participant information sheet (PIS), were posted by the service to potential participants. Online recruitment was facilitated by FN who contacted relevant support groups and asked them to place a study advert (Appendix I) on their social media accounts. The PIS and online advert included details of how parents could contact the study team to register interest in participation. Participants were given the option to be entered into a prize draw to win Amazon vouchers as a thank you for their time. Based on previous qualitative studies [10-12] we aimed to recruit between 10 and 30 participants. Recruitment and interviews were discontinued at data saturation, where no novel themes were discovered in the analysis [13].

2.2 Data collection

2.2.1 Semi-structured interviews

FN, a female trainee clinical psychologist, designed and conducted semi-structured interviews following an interview topic guide. FN had training and experience using qualitative research techniques, previously completing studies with adults, children and young people with complex medical conditions and their caregivers. The topic guide was structured to cover the various stages of the epilepsy surgery assessment process: before, during and after initial discussions about epilepsy

surgery as a treatment option, the investigations required and any decision made about suitability for surgery.

Those who registered interest in participation were assessed for eligibility using a screening tool (Appendix J). FN arranged interviews either via Skype or face-to-face at the participant's home or local CESS centre. Before interviews, the study was explained, referring to the PIS provided. For face-to-face interviews the consent form (Appendix K) was completed in person, for Skype interviews FN read each point to the participant and responses were audio recorded and documented. All consent processes were completed before the interview began and each participant received a copy of their completed consent form. Rapport was built with each participant prior to commencing the interview.

Interviews were conducted with a single parent. If both parents wished to participate they were interviewed separately. Interviews were semi-structured and audio recorded with demographic information such as participant age and age of child with epilepsy collected at the onset. Although supported by the use of a topic guide, questions were open ended and conducted flexibly to explore participants perspectives, priorities and idiosyncratic experiences [14]. Summation was used throughout interviews to allow confirmation of understanding and additional input from participants. As the topic under discussion was potentially upsetting, a distress protocol (Appendix L) was followed and attention drawn to details of support services (detailed on the PIS) as required.

2.3 Ethical considerations and approval

The nature of the research meant that a number of ethical issued were considered when designing the project. The research included interviews with parents of CWRE who were still in the process of consideration for surgery therefore questions may have been emotive. Participants were informed within the PIS that they would be invited to discuss experiences which they may find distressing and that they can pause or stop the interview as well as decide not to answer a question at any time. Participants were reminded of this at the outset of interviews. If participants became distressed, FN followed the protocol for responding to distressed participants (Appendix L). FN was aware that the topic under discussion might highlight potential support needs for the families taking

part. Therefore, it was ensured that a comprehensive list of support services was made available within the PIS. Participant attention was drawn to these at the end of interviews if a particular need was identified by FN.

In addition, the invitation to participate was provided by healthcare professionals at the site of treatment. There was therefore a potential risk to voluntariness although the participant information sheet described how the interviews would be conducted by FN, who was independent to the clinical care team within the CESS and could not influence any processes or decisions that families were currently involved with. It was also clearly stated that participation in the research was voluntary and their child's care would not alter whether they took part in the study or not. FN's role and the aim of the research was clearly outlined within the PIS and reiterated at the onset of each interview.

Ethical approval was granted by North West – Preston Research Ethics Committee (19/NW/0040) and NHS Health Research Authority and Health and Care Research Wales (Appendix M).

2.4 Data analysis

We employed a hermeneutic phenomenological approach, which understands lived experience as an in-depth interpretive process situated within the life world of the participant [15]. The researcher forms a part of that world and understands phenomenon by interpretive means. It allows reflection of the essential themes of participant experience within the phenomenon, whilst reflecting on own experience [16]. In line with a phenomenological philosophy we chose a reflexive thematic approach to analysis of data [14]. Reflexive thematic analysis is a method for identification, in-depth analysis and interpretation of patterns of meaning across a qualitative data set [17]. It employs iterative and interpretive cycles towards robust and in-depth analysis [17]. This approach was also appropriate from a phenomenological position as the process itself focusses on recovering structures and meanings that are key participant experiences of the phenomenon explored [16].

The approach was interpretive and iterative moving back and forth between analysis and gathering further data [14, 18]. A summary of the phases of the reflexive thematic analysis is presented in Table 1.

Table 1: Summary of phases of reflexive thematic analysis.

Phase	Description
1. Familiarisation with data	Interviews were transcribed verbatim by FN and 'UK transcription.' Transcripts were verified and anonymised by FN. FN read and re-read interview transcripts noting down initial ideas on themes. FN and KW reviewed transcripts to assess and develop the topic guide as interviews progressed.
2. Generating initial codes	FN developed initial data-codes for each theme. Features of the data were coded in a systematic fashion across the entire data set, collating data relevant to each code. This was managed within NVivo12 software.
3. Developing the codes	KW coded 10% of the interview transcripts using the initial codes and made notes on any new codes and themes identified in order to reach a richer, more nuanced reading of the data.
4. Defining and naming themes	Following review and reflection on any assumptions made in interpreting and coding data FN and KW revised codes were developed and ordered into sub-themes and themes within the NVivo12 software.
5. Completion of coding of transcripts	FN completed coding interview transcripts in preparation for write-up. Reflected on themes to ensure clarity and that all extracts are appropriate to analytic claims.
6. Producing the report	FN developed the manuscript using themes to relate back to the study aims ensuring key findings and recommendations were relevant to the study design. Final discussion and development of selected themes occurred during the write-up phase (with KW and VG).

Interviews were audio recorded, transcribed verbatim (by FN and 'UK Transcription Services') before verification and anonymization by FN. Transcripts were reviewed by FN and KW to assess and develop the topic guide as interviews progressed as part of the iterative approach. NVivo 12 software was used to assist the organisation and indexing of data. Familiarisation with transcripts was followed by coding for subthemes and themes. An example of the coding structure can be seen in Appendix N. Ten percent of interview transcripts were reviewed and second coded by KW to inform the developing coding framework and discussed to ensure credibility [18, 19]. It was intended that

findings should be relevant to future research and practice, therefore catalytic validity was a key consideration [18, 20].

3. Results

A diagram of the themes and sub-themes is presented (Figure 1) followed by illustrative quotations from a range of participants to demonstrate identified research themes. Where material has been removed for brevity or to ensure anonymity "[…]" is used to represent omitted text. Pseudonyms are used throughout.

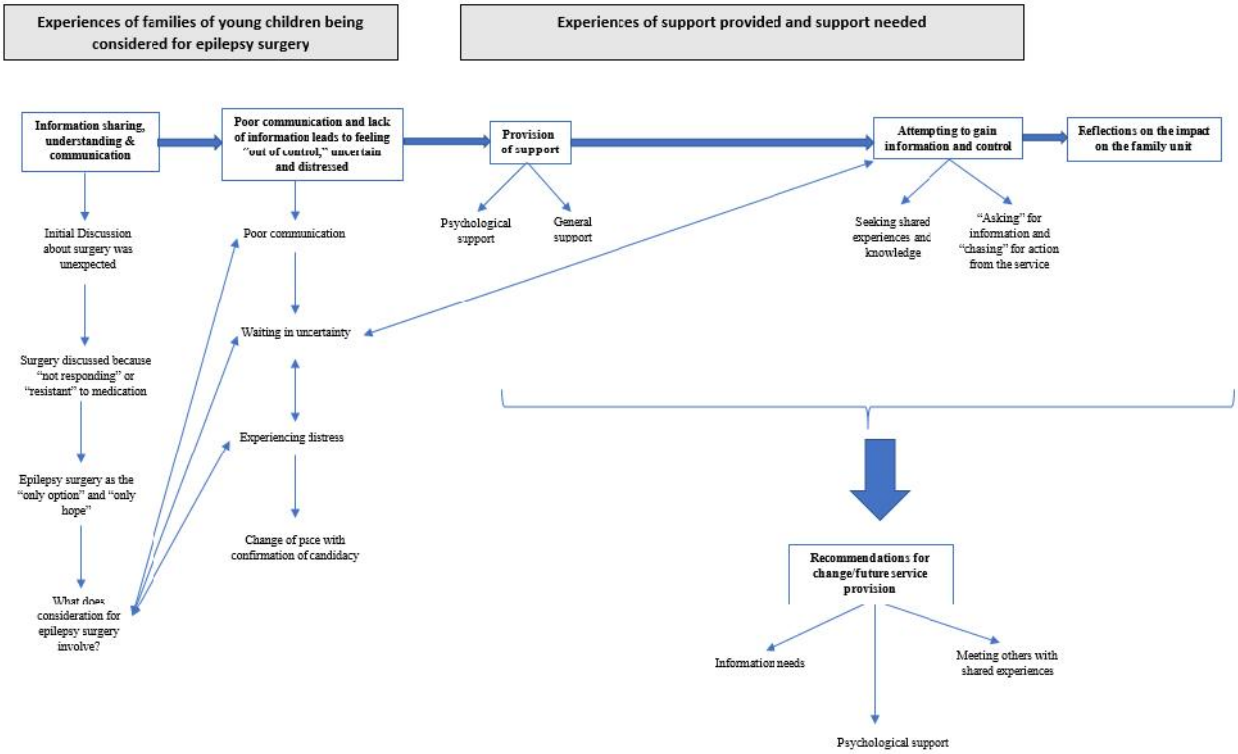

Figure 1: Diagram of themes and sub-themes.

3.1 Participant and interview characteristics

A total of 119 families were invited to take part in the study via recruitment from the CESS, 15 of which responded. No participants were recruited via online advertisement. After responding, one family decided not to participate and both parents from another family took part in separate

interviews. Therefore, 15 parents (13 mothers and 2 fathers) aged 35-48 (mean 39) years were interviewed. Participant demographic information can be seen in Table 2. Interviews lasted between 57 and 102 minutes (mean 77 minutes). Data from one interview was limited to 29 minutes, due to an audio equipment failure.

Table 2: Participant demographic information.

Region	Age of child with epilepsy at time of interview (years)	Approximate age at first epilepsy diagnosis (months)	Outcome of Consideration for Surgery (Y/N)	If Y: age at surgery (years)	Interview setting
West Yorkshire	5	2	Y	Scheduled	Home
Northern Ireland	5	24	Y	3	Skype
West Yorkshire	2.5	2	Ongoing	N/A	Home
Greater Manchester	7	2	Y	Awaiting date	Home
Merseyside	7	12	Y	1.3 - Under consideration again	Home
Tyne and Wear	4	10	Y	4 - Awaiting further surgery	Skype
Greater Manchester	6	15	Y	3	Home
North Wales	3	4	Y	3	Home
Merseyside	7	3	Y	5.5	Home
Lancashire	3	1	Y	2.75	Skype
Isle of Man	6	48	Ongoing	Ongoing	Skype
West Yorkshire	7	18	Y	4	Skype
Greater Manchester	5	2	Ongoing	-	Skype
South Yorkshire	5	24	Y	Scheduled	Skype
North Wales	3	4	Y	3	Home

3.2 Information sharing, understanding and communication

3.2.1 Initial discussion about surgery was unexpected.

The majority of parents were used to attending regular appointments regarding their child's conventional treatment (i.e. medication/ketogenic diet), however, they described experiencing 'shock' when surgery was first raised by a doctor as a potential treatment option.

> *"But this time when the doctor just told us that it seems like Sammy has not reacted to any medication and we will check the possibility for surgery, I was shocked […] I still believed that we can find a solution and not surgery, just we can find some right medication for her."* [Mary, Aged 36]

> *"I thought I was going to be sick, […], I was just like oh my God I, this can't be […] I'd never come across surgery and never nobody had ever talked to us about before […] it was an awful shock."* [Tracey, Aged 45]

Shock was experienced even in cases where parents had been aware that surgery might eventually be considered.

> *"It's just a bit of a shock and you're just like... I don't know. For me anyway, I was in a bit of a daze, just a bit taken back. You know? Even though you know it's probably going to happen one day, once you get told it's happening, it's like a shock to the system."* [Katy, Aged 35]

In some cases, not being prepared for initial discussions affected parents' ability to recall or process the information they were given about their child's surgery: *"I don't recall much of it to be honest with you. As I said, I was in such a shock that I just didn't even know what to say"* [Amina, Aged 39]. They suggested that *"just a little bit of pre-warning would make a huge difference"* [Amina, Aged 39] to their experience of discussing surgery for the first time.

In contrast, those parents who had been informed that their medical team wished to talk about epilepsy surgery at their next appointment found this helped them to prepare and allow them to get the most out of discussions.

"…he rang to see if we both wanted to come down to meet with the consultant to discuss surgery. […] I think had it went straight into the surgeon or the consultant's office and being told that news it would have been like "oh my God." But at least you know we were given a few days to sort of process it you know think about it before we got there and then if there's any questions, we had them ready." [Tracey, Aged 45]

3.2.2 Surgery discussed because 'not responding' or 'resistant' to medication.

Parents described understanding that the reason surgery was discussed as a treatment option was because their child's seizures "haven't responded" [Mary, Aged 36] or were "resistant" [Petra, Aged 36] to multiple medications.

"She tried about four or five different medications and it was just a case of, "We're going to have to do something because she's resistant to medication." That's when they started to discuss the surgery." [Petra, Aged 36]

Some perceived there to be a process of 'qualification' for their child to be considered for surgery by having *"a few more drugs to try before she qualified [to be considered for surgery]."* [Sarah, Aged 40] However, this was frustrating for some, who felt such processes where unnecessarily long, overly bureaucratic and ultimately delayed their child's potential to improve their seizures/situation: it was like "*ticking a bureaucratic box [because] the expert neurologist is telling me that it's probably not going to work […] but we've got to do it anyway and it has added a whole 6 months […] onto his potential recovery*." [Mariam, Aged 39]

3.2.3 Epilepsy surgery as the 'only option' and 'only hope'

Many appeared to feel they had no choice but for their child to be considered for surgery as "*this [surgery] was going to be our only option*" [Sarah, Aged 40]. Some acknowledged that this made them feel worried or fearful.

"I think we felt that this was going to be our only option, really, and that we were going to have to be brave…" [Nihad, Aged 37]

"I'm scared that it's not going to work, because this is our last option. We haven't got anything else." [Sarah, Aged 40]

However, for parents who had witnessed the continuation of their child's seizures despite trying multiple medications, the discussion of a different treatment i.e. surgery, appeared to provide them with a sense of hope that there is "*something else available."* [Alison, Aged 35].

"*I thought well may be this is the hope and potentially only hope of being seizure free and leading a normal life"* [Sally, Aged 37].

"I do think, at the start [of being considered for surgery], we were really hopeful. We thought this is going to be great and we were going to have a solution." [Mariam, Aged 39]

3.2.4 What does consideration for epilepsy surgery involve?

Parents discussed the information that was shared with them about the process of their child being considered for epilepsy surgery and their expectations of what would happen. Overall, there appeared to be a lack of clarity and consistency in the information provided.

Those whose child was being considered for vagus nerve stimulation (VNS) surgery described positive experiences, such as receiving case studies and a DVD to explain the surgery. However, this was not the case for those being considered for other types of surgery. Many participants felt "*in the dark in terms of where we go and what happens next. Particularly, how long it could take. So, it wasn't 'this is what we're going to do, this is how' in fact, nobody has told us what the actual pathway entails."* [Tessa, Aged 42]

It was noted that within the CESS, the process of referral and consideration of a child for epilepsy surgery is referred to by practitioners as being 'on the (epilepsy surgery) pathway.' However, some families were not familiar with this phrase or 'the pathway' as a concept when it was described during interviews. "*I would never say I heard the word 'pathway', or anything like that, no. […] I never thought of it as a pathway*." [Mary, Aged 37] *"I never heard the word pathway until you've mentioned it."* [Tracey, Aged 45] Although one parent recalled understanding at this early stage that they would have to go through *"all these assessments"* [Eilidh, Aged 48] and an MDT

decision. Others described being told about the first step in the process of consideration for surgery *"one of the options is surgery. That will take years probably, but the first step is video telemetry. That will take months, we'll start there*" [Tessa, Aged 42] but not being given an overview of what else would be involved.

Regardless of the information they had received, parents described that they *"thought the whole process would have been quicker."* [Tracey, Aged 45] They anticipated receiving appointments for investigations/assessments, a decision about candidacy to be made and for surgery itself to occur more rapidly.

> *"We just thought that we'd get a letter from [the hospital], that we'd be getting an appointment, that they'd book… I think all the things […], but not to be stretched out over the period of a year.* [Eilidh, Aged 37]
>
> *"I expected the surgery will be very soon, but unfortunately not. This process, it's so long."* [Mary, Aged 36]
>
> *"I think […] Anna's consultant she had said you know it would be like, this would probably happen within a year. So a year would be this [month] coming now but it doesn't look like it's going to be a year you know because we haven't got an appointment or anything."* [Tracey, Aged 45]

3.3 Poor communication and lack of information leads to feeling 'out of control,' uncertain and distressed

3.3.1 Poor communication.

Half of the parents interviewed expressed that they had experienced poor communication from professionals, or between professionals themselves, at different points through the process. This appeared to lead to feeling 'out of control' and uncertain.

"I just think if it had been handled better in the beginning, the whole process […] and better coordinated with the communication to the families that were involved then that just would have made such a big difference and perhaps I then might not have felt so out of control." [Mariam, Aged 39]

"Just some idea of what all those appointments are for would've been lovely. […] And I guess, some idea of what's still to come. Do we just get a decision? Do we meet with the neurosurgeons and then get a decision? Do we meet with the neurosurgeons and then they'll say they want some more stuff? Do they say they might want some more testing before we meet with them? Just that kind of idea of the possibilities of what's to come." [Tessa, Aged 42]

3.3.2 Waiting in uncertainty.

Parents described the burden of 'waiting' throughout the process for information or communication from CESS about the next assessment/investigation as well as for an outcome.

"Every day the postman comes, you're expecting a letter from them." [Tracey, Age 45] *"Two years, it's not a life. You're just sitting and thinking about it and waiting for approval."* [Mary, Aged 36]

This appeared to be all consuming, as normal life was put 'on hold' waiting for updates. In some cases the uncertainty this provoked meant that life both for immediate and wider family members was assessed on a weekly or even daily basis over the period of several years.

"…at this point I'm still feeling like what is going on? Where is this going? […] Where is this going to end? […] I don't know what next week looks like or the week after that or the week after that and I don't like that I'm a planner… so that it literally sets like my hair on end I hated it was the worst thing that could ever have happened not knowing what was happening" [Mariam, Aged 39]

"… things like, "Shall we go on holiday?" or, "What shall we do?" Basically, all year we've not been able to plan anything […] and our families haven't. I know [Grandmother] has not

been away for that reason, because we just don't know what's happening and obviously, they want to be there for us." [Christina, Aged 39]

3.3.3. Experiencing distress

Parents described experiencing stress, anxiety and in two cases starting anti-depressant medication whilst their child was in the process of being considered for surgery. Rules around conducting surgery for children under 6 years old at a different hospital to the one where their child had received all previous treatment was particularly stressful for two families.

"You find you're stressed all the time […] maybe it's alright if we just have him but we have 2 other children […] we have to try and see to them as well as see to Peter […] you know it's stressful waiting on this" [Tracey, Aged 45]

"That was probably the most stressful thing about the whole thing. We were used to [hospital 1] and we were used to all the people at [hospital 1]. Then, they wanted to try and send us to [hospital 2], even though it was going to be done by the same surgeons and everything." [Alistair, Aged 35]

Of the two parents who described experiencing depression as a result of the process of their child being considered for epilepsy surgery, one described the cycle of her distress.

"You can't sleep. You're thinking about it. I started with antidepressants because I can't sleep […]. This process, waiting is the worst thing in life. You would like to finish it. You would like to do it. You would like to forget about it. You would like to have done it as soon as possible […] You think about it, you read about it. You can't relax. You can't sleep. You're nervous a lot. It destroys all parents." [Mary, Aged 36]

3.3.4. Change of pace with confirmation of candidacy

A sharp contrast from their experiences of 'waiting' was felt by those parents whose child was confirmed as a suitable candidate for surgery. Half of these parents spoke positively about this experience describing feeling a distinct change in pace and level of information provided at this time when *"all of a sudden it was all systems go."* [John, Aged 38]

"I say it was the kind of lack of information really or feeling of real progress until we got to that one where we met the surgery team and felt that something was really happening. […] I think before that point […] we probably felt like we were on the periphery of it. All of sudden we felt like we mattered a little bit more and Hester was a priority." [John, Aged 38].

"We saw everybody [MDT] in the space of a couple of hours. You know like they organised everything and we walked out feeling like right well we know what the plan is, we know what's going to happen […] the complete opposite of all the other meetings. […] really hopeful and like we didn't leave feeling wanting, […] they'd answered all of our questions, we knew what the plan was, there was a plan." [Mariam, Aged 39]

3.4 Provision of Support

3.4.1 General Support.

Positive experiences of the support received whilst their child was considered for surgery were described by some parents. They spoke highly of their child's neurologist, particularly valuing the ability to contact them via email to answer specific queries in a timely manner. Some parents also praised both local and CESS epilepsy nurses as being a supportive point of contact within the service.

"What I found was good was that we were able to contact Dr Samuel through email. He was available, and he would always get back to us. […] Any questions we had, he'd say, "Contact my secretary." So then we'd go, by email, through the secretary, and then he would always get back to us straight away." [Eilidh, Aged 48]

"The epilepsy nurses, both here [locally] and at [CESS], they're very supportive, you know, because they know you well. They're […] your outpatient point of contact." [Nihad, Aged 37]

It appears, however, that the service provided by epilepsy nurses may not be experienced consistently by all parents, with one mother expressing that she was *"disappointed in that kind of support because they are supposed to be our first port of call" but "you have to leave a message on their answering machine. It takes them a week to get back to you."* [Sarah, Aged 40]

Despite the positive experiences of some, seven parents expressed that friends and family provided them with support whilst their child was being considered for epilepsy surgery but that *"there wasn't any*" [Christina, Aged 39] support provided to them by the surgery service itself.

> *"[Support] was pretty much non-existent. It was like, "We'll refer you for VT, we'll talk to you about keto." Then nothing, radio silence."* [Tessa, Aged 42]

> *"We got support from family and friends, we always get good support from them. We haven't really- I wouldn't say we've had much support at the moment from health professionals around it."* [Alison, Aged 35]

3.4.2 Psychological support.

Parents described the support they had received for their psychological needs specifically. One mother found that the *"[epilepsy nurse was] good in the sense of someone you could go to"* [Eilidh, Aged 48]. However, many parents felt like *"there wasn't any support"* [Christina, Aged 39] for their mental health needs and that they *"just had to take it, get on with it […] mentally parents are left to their own devices to deal with their own affairs."* [Amina, Aged 39]. One parent described that it wasn't until her mental health deteriorated significantly that she was she offered any help:

> *"not until… I rang my GP and said 'look, I can't do it anymore…'"* [Mariam, Aged 39].

For one mother it appeared that the emotional needs of her family were assessed but not subsequently supported. She received a psychological assessment with *"a questionnaire in there about how it's affected your family life, which we answered very honestly. It comes back, […] saying that, 'The family is […] in an at-risk situation for the impact it's had on our family. I'm thinking, "Right. Alright, okay, well, I'm glad that's been highlighted, but again, what support is there?" None."* [Christina, Aged 39]

3.5 Attempting to gain information and control

3.5.1 Seeking shared experiences and knowledge

Parents expressed the need for *"a lot more information"* [Petra, Aged 36] and support from the CESS whilst their child was being considered for epilepsy surgery. Alternative resources and support were often sought via the internet and Facebook groups. Others conducted personal research, looking at scientific papers and National Institute for Health and Care Excellence (NICE) guidelines.

It was acknowledged that Facebook groups could, at times, be a source of distress and that information could vary depending on location, but that they also provided parents with a valued opportunity to gain knowledge and support from others with similar experiences.

> *"Some of them [Facebook posts] upset me; some of them make me smile. […] Then, there have been times where I've been able to join in a conversation and it's really helped somebody, and vice versa. When I've put things on, people have been able to advise me of things."* [Sarah, Aged 40]

> *"It was […] nice to speak to be able to speak to other people that were going through a similar thing […] because even though my family were really supportive and they're going through it as well. They're not going through it like I'm going through it, they're not shouldering the whole thing themselves."* [Mariam, Aged 39]

Parents also described using the internet and Facebook groups to gain knowledge, such as practical advice on how to prepare for assessments/interventions, how to source equipment and to access alternative professional advice.

> "We *prepared ourselves quite a bit because of the Facebook groups"* [Nihad, Aged 37]

> *"There's Epilepsy Action that you can join on Facebook. You can ask them questions and then you know you're speaking to a professional then because a professional is there to join in the conversation."* [Sarah, Aged 40]

3.5.2 'Asking' for information and 'chasing' for action from the service.

Throughout the process of assessment and consideration for surgery many parents felt they had to 'ask questions' to get the information they needed, were "*constantly having to ring to get updates and find out what was happening"* [Mariam, Aged 39] and they *"felt like I'm the one doing all the chasing."* [Sarah, Aged 40].

> *"[I needed] just a better idea of what was going on, which now I ask for because I realise that I'm not going to get it unless I ask for it. At the time, I didn't know that."* [Tessa, Aged 42]

In contrast, one parent described how it felt when she received a clear explanation of what the next steps for her child were.

> *"The neuropsychologist. […] was the one who explained what would happen next, the only one so far who has explained what would happen next. […] it was really nice to have a clear idea of what happens next and a clear idea that, unless they want to request more testing, she's had all the testing."* [Tessa, Aged 42]

Some parents felt a sense of responsibility to 'chase' their child's assessment results to ensure good communication between professionals and safeguard their child's progress.

> *"I was the one chasing that, "Have you got the results? When is going to get discussed? When is the next MDT?" […] "I was this really pushy, horrible parent at the beginning of the year […] I feel like if you don't push, you don't get it."* [Christina, Aged 39]

> *"We found out that the MRI […] record has just been in the images department for three months. And the doctor just waited for the MRI result and we started to call every day and ask, "What happened? […] We haven't received any letter from you. What did the last MRI show?" When we found out that the doctor still hasn't received this CD from the images department, we were just shocked. [..] I don't want to take care of this one, to call everyone, to remind everyone that, "Guys, we did this check three months ago. My daughter is in a very bad condition. Can you pass this result to the doctor, please?"* [Mary, Aged 36]

Whilst trying to understand the next steps for their child within the process and even when surgery had been confirmed parents described how it felt *"like the goalposts kept on getting moved"* [Sarah, Aged 40]. For some, after developing hopes and expectations about what is next for their child, this rapid return to uncertainly caused them additional distress.

> *"… my expectation was each time we went to the [CESS hospital] I thought we're going to get an answer here, we're going to find out […] But every time "oh well we've got to do something else […]" and it felt it just felt like every time the goalposts were being moved […] in the end actually it made me ill and like the doctor put me on antidepressants because I just couldn't cope."* [Mariam, Aged 39]

> *"… the fact it's been going on a year and just thinking he's going to have this massive surgery in March and then, "Oh, no, it's going be July," then it's suddenly September, and now it's going to be early next year. Just constantly managing those emotions really and worrying about it."* [Christina, Aged 39]

3.6 Reflections on the impact on family unit

It appeared that having different ways of managing distress within families or feeling the need to 'protect' one another from difficult emotions could lead to stress within parents' relationships.

> *"It's been stressful because the difference in me and Esther's father is like I said, he's very laid back and he's a calming influence and I'm the one that stresses, major worry head and sometimes opposites are great but then sometimes you get frustrated and I'm like why are you not worried about this you know, why are you not thinking about this*" [Sally, Aged 37].

> *"Some things I have to keep to myself because you don't want to stress your partner out. He keeps things to himself because he doesn't want to stress me out. […] We're anxious about it.* [Sarah, Aged 40].

Regardless of the emotional impact on parents themselves, they expressed that they felt being considered for epilepsy surgery had not impacted on the child with epilepsy because they *"don't understand"* [Mary, Aged 36] or *"wouldn't know"* [Mariam, Aged 39] about it due to their age or

developmental stage. Some parents felt that the siblings of children with epilepsy had to *"grow up a bit quick"* [John, Aged 38] as a result of witnessing seizures and helping their sibling but that they hadn't been affected by the process of consideration for surgery due to keeping things *"as normal as it could be"* [Sally, Aged 37].

In addition, despite the challenges encountered whilst their child was being considered for epilepsy surgery, most parents reflected that they had experienced elements of positive growth in their relationship or themselves as a parent for example feeling 'stronger' or more 'patient.'

> *"… the whole process has made me and my wife stronger. […] I'd say we were stronger now together than we would have been if all this hadn't have happened. […] It definitely makes you stronger as a family."* [Alistair, Aged 35]

> *"My total parenting technique has changed, and I do try and be a little bit more patient. I'm a hell of a lot more patient with other people's children as well. I think it's just made me a different person. It's made me grow up."* [Petra, Aged 36]

3.7 Recommendations for change/ future service provision

When asked to reflect on their overall experience of the process of their child being considered for epilepsy surgery parents expressed mixed opinions. Some voiced their frustrations and expectations about the rapidity of the process as previously discussed. However, a third of parents (the children of whom had all been confirmed as surgical candidates) felt "positive" [Sally, Aged 37] about the process overall and were "glad we did it." [Eilidh, Aged 48]

> *"I'm happy with this process except to think that it's too long."* [Mary, Aged 36]

> *"Well on the whole it's overwhelming positive, the simple fact that you can do these things for someone with that condition erm you know I can't complain about it really because in that result that we've got so far has been outstanding. Erm are there ways to improve it? Yes."* [John, Aged 38]

When reflecting on what they would have liked to have happened at different stages throughout consideration, parents recommended the provision of additional information, psychological support and the facilitation of meeting others with shared experiences.

3.7.1 Information Needs

Parents felt that more transparency about the service structure, MDT processes, how children are prioritised and any limitations around investigations or surgery with respect to a child's age was needed.

> *"Even just an explanation of the different epilepsy centres and the way that the NHS has broken up epilepsy surgery into different centres, because you're in this region you'll be looked at by this epilepsy centre. That would be helpful because we didn't know."* [Tessa, Aged 42]

> *"They should make it clear […] that the decision is made at a panel with different neurologists from different hospitals, including [nationally] […] We've just been told we're going to [CESS] and we haven't questioned anything […] maybe they need to explain that the second opinion is already in place by the discussions that are made… It's a multi-hospital decision […] that would be reassuring for people to know."* [Nihad, Aged 37]

It was recommended, by parents, that they needed a 'step-by-step' guide to what the process of being considered for epilepsy surgery entailed. They also wanted to be given some understanding of how long each stage of the process would take and approximately how long it would take to reach a decision about candidacy. Parents suggested this information could be shared within a face-to-face discussion and/or a document.

> *"I really wish somebody had given me something that I could read, or had told me, "These are all the steps, this is approximately how long it will take between these steps. After these steps, how long it will take to get a decision."* [Tessa, Aged 42]

> *"Sit someone down, […] this is what we're thinking of, the end the end goal could potentially be surgery, these are all the things that could happen in between. Some of them will mean that*

you aren't eligible for surgery you need to know that, you will need to go through these […] diagnostic processes and things, it could take as long as this, it could be as quick as this. You know just having that initial discussion and that that could be a consultation in and of itself" [John, Aged 38]

Children had undergone a range of investigations, as described by their parents, including blood tests, lumbar punctures, scans (CT, EEG, MRI, PET, SEEG, VT) and assessments by endocrinology, occupational therapy, ophthalmology, physiotherapy, psychiatry, neuropsychology and speech and language therapy. However, parents did not feel informed about these. They would have liked more information about the purpose of investigations and assessments, what they should expect and what support is available for their child. They also discussed the importance of practical information, such as what to bring to allow them to prepare themselves and their child. This was particularly important to those families who lived a distance from the hospital, required accommodation and were unfamiliar with the surroundings.

"You need to get something that says, "You're on this pathway. You're going to need to have 3T scans, […] MRI scans, […] a repeat MRI scan. You're going to need a weeks' stay in hospital to have an EEG." I didn't realise we had all this to come." […] Just putting things like that together in a list so that you're aware […] because when it pops through your door and it says, "We've booked you in on 3rd January for a week for a 3T scan," it's like, "What the hell is a 3T scan?" [Petra, Aged 36]

"If you'd had something written down, […] "This is what is going to happen. You'll get a letter about telemetry, you can expect to wait between this amount of time and this amount of time. When you go for telemetry, this is what the room might look like" […]" [Katy, Aged 35]

3.7.2 Psychological Support: "How is he going to support himself if he is not supported by his parents?" [Amina, Aged 39]

Parents felt that they required psychological support whilst their child was being considered for surgery and when surgery had been confirmed. Many expressed that support is needed to help

maintain their own emotional wellbeing and to know how best to support their child with emotional preparation for assessment/investigation, surgery and throughout recovery.

> *"[Someone to] provide emotional support, […] and help us sort of cope and manage what's happening, help us to maybe understand things better and get our heads around things better, and help us to manage these feelings that we have. […] being able to have somebody to talk to about just everything that we're going through, really, because it's not what you expect to be going through, when you have a child. It's all very different to what you have in your mind, isn't it, of what's going to happen."* [Alison, Aged 35]

> *"What would've helped me, and Joshua's father as well, is that little bit more support, psychologically, as parents, going into it, with how to help Joshua […] To know how to talk to a child who's five, who's going to have a massive brain operation and was traumatised by the last one. […] Because you want to prepare your child, and you want to have the tools to be able to help them afterwards."* [Eilidh, Aged 48]

3.7.3 Meeting others with shared experiences.

Those interviewed suggested that meeting other parents whose children are being or who have been considered for surgery would have been valuable. Meeting others both individually and in groups was requested by participants.

> *"Along the way […] speaking to other parents that have been through exactly the same process would be really helpful… no, it would be amazing. […] we were told about other patients that had had it [surgery] done and the positives and all that sort of stuff. But it would have been nice to have been able to get that from […] meet with people and just have a little support group where you can just chat"* [Sally, Aged 37]

> *"If there was some other parents and families that had gone through that same experience that could have err been connected to us just to say "this is our experience of it, this is how it works." […] how they cope […] just to know that someone else is going through it and how it affects them as well […] I think if we've got those experiences from someone else on the surgery*

pathway and got their input [about EEG for example]. Just the little things that the doctors who aren't in the room with the child for the duration of that week won't have actually seen or witnessed […] how long they could be in there for and all those sorts of things […] I think that would be helpful." [John, Aged 38]

4. Discussion

Assessment of candidacy for paediatric epilepsy surgery is a complex multidisciplinary endeavour, the outcomes of which are potentially life changing for children and their families. Parents found initial discussions about epilepsy surgery to be unexpected and shocking, even if they were previously aware that surgery may at some point become a treatment option. This findings supports previous research by those investigating the decision-making processes involved in children's epilepsy surgery [12]. Being provided with such potentially life changing news, without any warning, appeared to have implications for parents' ability to retain information about the proposed surgery and highlights the importance of providing advanced warning that these discussions are to take place. Parental understanding of the reasons for referral to CESS, when initial discussions about surgery occurred (i.e. ongoing seizures despite the use of two or more AEDs) was aligned with NICE guidance [21]. As noted in previous studies [11, 12], parents also expressed that although surgery felt 'scary', or anxiety-provoking, it was the only treatment option available to their child and thus provided a source of hope. Nevertheless, information provision and communication about the process of consideration for surgical candidacy was inconsistent within the service and between professionals. The apparent lack of clear information appeared to lead to unrealistic expectations about the complexity and duration of the process. Parental perceptions that assessment for surgery took longer than expected or desired was shared with participants in studies outside the UK CESS [11].

Support from epilepsy nurses and neurologists, when received, was discussed positively and valued by participants, particularly when a rapid and accessible response to queries was facilitated. However, most parents felt a lack of general and emotional support from the service. In response,

families described seeking information and support from non clinical as well as clinical sources. The use of social media was cited as a resource for knowledge and support from others with similar experiences, information about how to prepare for assessments/interventions, source equipment and access professional advice through third sector organisations. In accordance with other studies [10] parents found engaging virtually with those with shared experiences particularly helpful. However, it was also noted that witnessing the experiences of others could be distressing. Although parents gained information such as assessment results and an understanding of the 'next steps' for their child through 'chasing' and 'asking' questions of CESS professionals it was felt that this was an additional burden that should not be required of them.

Without clear communication, waiting for the 'next steps,' results from assessments/investigations and for a decision about surgery appeared to heighten feelings of uncertainty, limit a family's sense of control and their ability to engage their normal coping strategies. When parent's expectations were not matched by the service (for example their child required an unexpected additional investigation, or an appointment/surgery date was rearranged) this increased the sense of uncertainty. A meta-analysis of research into uncertainty in paediatric chronic illness suggested that, within this context, uncertainty can impact on parental emotional well-being [22]. This would be consistent with the periods of distress described by parents in the current study. Parents in a study of the journey to epilepsy surgery in the US also experienced a heightened level of stress [11] but did not describe anxiety or depression as in this study.

Uncertainty has been said to relate to a particular event or situation which cannot be structured or categorised due to a lack of information [23]. Therefore, uncertainty can arise when there is insufficient information or when there is no information available to resolve the uncertainty [24]. It appears that both may be the case for many parents of children being considered for epilepsy surgery. Parents described situations where information is available but not communicated consistently such as the steps involved in the process of consideration but also those such as the outcome of investigations or a decision about surgery where this information is not yet available.

Uncertainty itself can be distressing, however, it has also been hypothesised that the individuals' attitude towards uncertainty might be of clinical importance. The tendency to be less tolerant of uncertainty, finding it threatening, disturbing, unacceptable or unmanageable has been highlighted as a possible precursor to worry, anxiety and depression [25-27]. The intolerance of uncertainty model (IUM) was originally developed as a way of explaining worry within generalised anxiety disorder (GAD) [28] but it has been further explored as a possible maintaining factor across anxiety disorders and depression [25]. Those with greater intolerance of uncertainty may therefore find the process of their child being considered for surgery to be more distressing.

Regardless of existing information and support processes within CESS, for many parents with young children being considered for epilepsy surgery it appears that these systems were viewed as falling short of what is expected or required.

4.1 Implications for clinical practice

Parents provided clear recommendations for future service development including: pre-warning parents that surgery will be discussed at a scheduled meeting, providing further information about CESS (such as service structure, MDT processes, how children are prioritised and any limitations around investigations or surgery with respect to a child's age), a step-by-step guide of the process with realistic timelines and information about each assessment/ investigation. Meeting others with shared experiences was also suggested by parents as an avenue of psychosocial support. This was also highlighted in a study which focussed on parental decision making in paediatric epilepsy surgery for children and young people (up to 18 years) [12]. It therefore appears that this form of support is felt to be helpful overall, as well as at specific stages of consideration and may not be limited to parents of young children. In our study, however, parents also recommended that more formal clinical psychological support is made available to families within the service.

Information about the CESS itself is available via third sector organisations such as Epilepsy Action (Appendix O). However, our findings suggest that a consistent approach to distributing such information is required. One approach may be to provide a pack of all information requested by participants at the time of initial discussions about surgery. An example of how each stage of

investigations could be presented can be seen in Appendix P. This may also serve to reinforce the concept of consideration for surgery as a 'pathway' supporting family's expectations around the time frames involved.

Parents recommended that psychological support should be available to them throughout the process of consideration. It may be that for some, psychosocial support, such as meeting with others with shared experiences either one-to-one or in a group is enough to 'normalise' their experiences, share expertise and thus alleviate distress. However, for others more direct psychological input with a professional who is aware of the process of consideration for epilepsy surgery may be necessary.

4.2 Strengths and limitations

To our knowledge, since UK CESSs were established in 2012 there has been no exploratory research into the experiences of families with young children who have been referred to the service, their perception of the support provided and of their needs. This study addresses this gap in the literature and provides clear recommendations about future development of family centred services. Contributing to the body of literature around family experiences of paediatric epilepsy surgery, this study may also inform future research, ensuring focus on elements of service provision which are salient to families themselves.

As previously noted, it should be considered that the impact of 'shock' during initial discussions may have limited the information absorbed by parents and thus their recollection of the information provided. To minimise the effect of poor recall, inclusion criteria dictated that consideration had taken place within the last three years, however, it is recognised that within this time families have undergone numerous consultations and investigations which may have altered or impeded their ability to recollect some elements of the process overall. A prospective approach to future research might help to mitigate such bias and provide further richness of data.

It is possible that there was an element of recall bias dependent on the outcome of the decision about candidacy for epilepsy surgery or the surgery itself. The sample characteristics of children being considered for epilepsy surgery was diverse including a range of ages at time of diagnosis and

interview as well as the outcome of surgery. However, although not limited through recruitment criteria, there was no participant with a child who had been assessed but found unsuitable for surgery. It may be that this would have provided further insight into whether the outcome of consideration process affects parents' reflections on the process itself.

The number of male/female children being considered for surgery was diverse. However, of the 15 parents themselves, only two were fathers. It is observed that in research involving the parents of children with health conditions there tends to be a higher number of mothers who volunteer to participate in interviews compared to fathers [29, 30]. It is only possible to speculate as to why this might occur. Within this study, there were equal opportunities for mothers and fathers to participate with invitation letters addressed to both parents of the child being considered for surgery. However, despite this, more mothers wished to participate than fathers. To address this issue in future research mothers and fathers could be purposively sampled via separate recruitment i.e. invitations letters sent to mothers and fathers separately and social media advertisement specifically targeted at either mother or father participants. This might ensure a more balanced number of mothers and fathers are recruited.

Recruitment was facilitated through one CESS with additional social media advertisement to improve sample diversity. Although participants lived in 9 regions of the UK they were all recruited through the CESS as no responses were received via social media. Additionally, only 15 of 119 invited via the CESS contacted the researcher to take part. This sample does not reflect the views of parents who experienced a CESS in other parts of the country.

5.3 Future research

To develop understanding of the UK CESS as a whole and thus generalisability of results it is important to conduct further studies, including families who have accessed other UK CESSs. In addition, it would be helpful to compare the experiences of those parents whose child was a candidate for and underwent epilepsy surgery to those whose child was not deemed suitable for epilepsy surgery. Future research would also benefit from an increased number of paternal participants to explore whether experiences differ between mothers/ fathers or by the role of primary caregiver.

5. Conclusions

For professionals, the process of assessing and deciding candidacy for paediatric epilepsy surgery is a challenging and complex multidisciplinary endeavour. This study provides insight into the experiences of families of young children whilst undergoing this process, the support they received, and the support needed.

Results of the study contribute to the development of a body of literature around family experiences of epilepsy surgery for young children in the UK. Despite the current provision of support within services, it is perceived by some parents as inadequate or falling short of their expectations. Our findings suggest the need for CESSs to recognise the importance of providing clear and consistent information to allow parents to feel a sense of control within the process of their child being considered for surgical candidacy. It also highlights the importance of providing emotional support throughout.

Recommendations for future service development have been outlined including informing parents of forthcoming discussions about surgery as a treatment option, providing further information about the CESS, a step-by-step guide to the process with realistic timelines and information about each assessment/ investigation. There is also a need to remain mindful of the emotional needs of families throughout the process of consideration for surgery, increase psychosocial support to families by facilitating the sharing of their experiences with others and provide direct contact with clinical psychological services when required.

References

[1] Kwan P, Arzimanoglou A, Berg AT, Brodie MJ, Allen Hauser W, Mathern G, Moshé SL, Perucca E, Wiebe S, French J. Definition of drug resistant epilepsy: Consensus proposal by the ad hoc Task Force of the ILAE Commission on Therapeutic Strategies. Epilepsia 2010;51: 1069-1077.

[2] Loddenkemper T, Holland KD, Stanford LD, Kotagal P, Bingaman W, Wyllie E. Developmental outcome after epilepsy surgery in infancy. Pediatrics 2007;119: 930.

[3] Bailet LL, Turk WR. The impact of childhood epilepsy on neurocognitive and behavioral performance: A prospective longitudinal study. Epilepsia 2000;41: 426-431.

[4] Widjaja E, Li B, Schinkel CD, Ritchie LP, Weaver J, Snead OC, Rutka JT, Coyte PC. Cost-effectiveness of pediatric epilepsy surgery compared to medical treatment in children with intractable epilepsy. Epilepsy Research 2011;94: 61-68.

[5] Ji T, Liu M, Wang S, Liu Q, Wu Y, Zhang Y, Bao X, Wang W, Wang R, Yu G, Liu X, Cai L, Jiang Y. Seizure outcome and its prognostic predictors after hemispherotomy in children with refractory epilepsy in a Chinese pediatric epileptic center. Frontiers in Neurology 2019;10.

[6] Simasathien T, Vadera S, Najm I, Gupta A, Bingaman W, Jehi L. Improved outcomes with earlier surgery for intractable frontal lobe epilepsy. Annals of Neurology 2013;73: 646-654.

[7] Van Empelen R, Jennekens-Schinkel A, Van Rijen PC, Helders PJM, Van Nieuwenhuizen O. Health-related quality of life and self-perceived competence of children assessed before and up to two years after epilepsy surgery. Epilepsia 2005;46: 258-271.

[8] Freitag H, Tuxhorn I. Cognitive function in preschool children after epilepsy surgery: Rationale for early intervention. Epilepsia 2005;46: 561-567.

[9] NHS England (2018). Children's epilepsy surgery service (CESS): Service specification, https://www.england.nhs.uk/publication/childrens-epilepsy-surgery-service-cess/ [accessed 1st April 2020]

[10] Pieters HC, Iwaki T, Vickrey BG, Mathern GW, Baca CB. "It was five years of hell": Parental experiences of navigating and processing the slow and arduous time to pediatric resective epilepsy surgery. Epilepsy and Behavior 2016;62: 276-284.

[11] Baca CB, Pieters HC, Iwaki TJ, Mathern GW, Vickrey BG. “A journey around the world”: Parent narratives of the journey to pediatric resective epilepsy surgery and beyond. Epilepsia 2015;56: 822-832.

[12] Heath G, Abdin S, Begum R, Kearney S. Putting children forward for epilepsy surgery: A qualitative study of UK parents' and health professionals' decision-making experiences. Epilepsy & Behavior 2016;61: 185-191.

[13] Baker S, Edwards R, Doidge M. How many qualitative interviews is enough? Expert voices and early career reflections on sampling and cases in qualitative research: University of Southampton; 2012.

[14] Braun V, Clarke V. Using thematic analysis in psychology. Qualitative research in psychology 2006;3: 77-101.

[15] van Manen M. Researching lived experience: Human science for an action sensitive pedagogy. London; 1997.

[16] Laverty SM. Hermeneutic phenomenology and phenomenology: A comparison of historical and methodological considerations. International Journal of Qualitative Methods 2003;2: 21-35.

[17] Braun V, Clarke V. Thematic analysis. In: Cooper H, editor. APA handbook of research methods in psychology. Washington DC: APA books; 2012.

[18] Stiles WB. Evaluating qualitative research. Evidence Based Mental Health 1999;2: 99.

[19] Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. International Journal for Quality in Health Care 2007;19: 349-357.

[20] Glaser BG. The Constant Comparative Method of Qualitative Analysis. Social Problems 2014;12: 436-445.

[21] National Institute for Health and Care Excellence (2012). Epilepsies: Diagnosis and management (Clinical guideline 137), https://www.nice.org.uk/guidance/cg137 [accessed 1st April 2020].

[22] Szulczewski L, Mullins LL, Bidwell SL, Eddington AR, Pai ALH. Meta-analysis: Caregiver and youth uncertainty in pediatric chronic illness. Journal of Pediatric Psychology 2017;42: 395-421.

[23] Budner S. Tolerance for ambiguity scale. Journal of Personality 1962;30: 29-50.

[24] Rosen NO, Knäuper B, Sammut J. Do individual differences in intolerance of uncertainty affect health monitoring? Psychology & Health 2007;22: 413-430.

[25] Mahoney AEJ, McEvoy PM. A transdiagnostic examination of intolerance of uncertainty across anxiety and depressive disorders. Cognitive Behaviour Therapy 2012;41: 212-222.

[26] Tan H-J, Marks Leonard S, Hoyt Michael A, Kwan L, Filson Christopher P, Macairan M, Lieu P, Litwin Mark S, Stanton Annette L. The Relationship between intolerance of uncertainty and anxiety in men on active surveillance for prostate cancer. Journal of Urology 2016;195: 1724-1730.

[27] Ladouceur R, Gosselin P, Dugas MJ. Experimental manipulation of intolerance of uncertainty: a study of a theoretical model of worry. Behaviour Research and Therapy 2000;38: 933-941.

[28] Freeston MH, Rhéaume J, Letarte H, Dugas MJ, Ladouceur R. Why do people worry? Personality and Individual Differences 1994;17: 791-802.

[29] Woolfall K, Frith L, Gamble C, Gilbert R, Mok Q, Young B. How parents and practitioners experience research without prior consent (deferred consent) for emergency research involving children with life threatening conditions: a mixed method study. BMJ Open 2015;5: e008522.

[30] Woolfall K, Young B, Frith L, Appleton R, Iyer A, Messahel S, Hickey H, Gamble C. Doing challenging research studies in a patient-centred way: a qualitative study to inform a randomised controlled trial in the paediatric emergency care setting. BMJ Open 2014;4: e005045.

Appendix A

Summary of Guidelines for Authors for Target Journal (Epilepsy and Behavior)

Article structure

Subdivision - numbered sections
Divide your article into clearly defined and numbered sections. Subsections should be numbered 1.1 (then 1.1.1, 1.1.2, ...), 1.2, etc. (the abstract is not included in section numbering). Use this numbering also for internal cross-referencing: do not just refer to 'the text'. Any subsection may be given a brief heading. Each heading should appear on its own separate line.

Introduction
State the objectives of the work and provide an adequate background, avoiding a detailed literature survey or a summary of the results.

Material and methods
Provide sufficient details to allow the work to be reproduced by an independent researcher. Methods that are already published should be summarized and indicated by a reference. If quoting directly from a previously published method, use quotation marks and also cite the source. Any modifications to existing methods should also be described.

Results
Results should be clear and concise.

Discussion
The **Discussion** section should explore the significance of the results of the work, not repeat them. **Results** and **Discussion** should be separate and may be organized into subheadings. Avoid extensive citations and discussion of published literature.

Conclusions
The main conclusions of the study may be presented in a short Conclusions section, which may stand alone or form a subsection of a Discussion or Results and Discussion section.

Essential title page information

• ***Title.*** Concise and informative. Titles are often used in information-retrieval systems. Avoid abbreviations and formulae where possible.
• ***Author names and affiliations.*** Please clearly indicate the given name(s) and family name(s) of each author and check that all names are accurately spelled. You can add your name between parentheses in your own script behind the English transliteration. Present the authors' affiliation addresses (where the actual work was done) below the names. Indicate all affiliations with a lowercase superscript letter immediately after the author's name and in front of the appropriate address.
Provide the full postal address of each affiliation, including the country name and, if available, the e-mail address of each author.
• ***Corresponding author.*** Clearly indicate who will handle correspondence at all stages of refereeing and publication, also post-publication. This responsibility includes answering any future queries about Methodology and Materials. **Ensure that the e-mail address is given and that contact details are kept up to date by the corresponding author.**
• ***Present/permanent address.*** If an author has moved since the work described in the article was done, or was visiting at the time, a 'Present address' (or 'Permanent address') may be indicated as a footnote to that author's name. The address at which the author actually did the work must be retained

as the main, affiliation address. Superscript Arabic numerals are used for such footnotes. Please note that proprietary names for drugs should *not* be used in the article title.

Highlights

Highlights are optional yet highly encouraged for this journal, as they increase the discoverability of your article via search engines. They consist of a short collection of bullet points that capture the novel results of your research as well as new methods that were used during the study (if any). Please have a look at the examples here: example Highlights. Highlights should be submitted in a separate editable file in the online submission system. Please use 'Highlights' in the file name and include 3 to 5 bullet points (maximum 85 characters, including spaces, per bullet point).

Abstract

A concise and factual abstract is required. The abstract should state briefly the purpose of the research, the principal results and major conclusions. An abstract is often presented separately from the article, so it must be able to stand alone. For this reason, References should be avoided, but if essential, then cite the author(s) and year(s). Also, non-standard or uncommon abbreviations should be avoided, but if essential they must be defined at their first mention in the abstract itself.

Keywords

Immediately after the abstract, provide a maximum of 6 keywords, using American spelling and avoiding general and plural terms and multiple concepts (avoid, for example, 'and', 'of'). Be sparing with abbreviations: only abbreviations firmly established in the field may be eligible. These keywords will be used for indexing purposes.

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Abbreviations

Define abbreviations that are not standard in this field in a footnote to be placed on the first page of the article. Such abbreviations that are unavoidable in the abstract must be defined at their first mention there, as well as in the footnote. Ensure consistency of abbreviations throughout the article.

Acknowledgements

Collate acknowledgements in a separate section at the end of the article before the references and do not, therefore, include them on the title page, as a footnote to the title or otherwise. List here those individuals who provided help during the research (e.g., providing language help, writing assistance or proof reading the article, etc.).

Formatting of funding sources

List funding sources in this standard way to facilitate compliance to funder's requirements:

Funding: This work was supported by the National Institutes of Health [grant numbers xxxx, yyyy]; the Bill & Melinda Gates Foundation, Seattle, WA [grant number zzzz]; and the United States Institutes of Peace [grant number aaaa].

It is not necessary to include detailed descriptions on the program or type of grants and awards. When funding is from a block grant or other resources available to a university, college, or other research institution, submit the name of the institute or organization that provided the funding.

If no funding has been provided for the research, please include the following sentence:

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Units

Follow internationally accepted rules and conventions: use the international system of units (SI). If other units are mentioned, please give their equivalent in SI.

Footnotes
Footnotes should be used sparingly. Number them consecutively throughout the article. Many word processors can build footnotes into the text, and this feature may be used. Otherwise, please indicate the position of footnotes in the text and list the footnotes themselves separately at the end of the article. Do not include footnotes in the Reference list.

Tables
Please submit tables as editable text and not as images. Tables can be placed either next to the relevant text in the article, or on separate page(s) at the end. Number tables consecutively in accordance with their appearance in the text and place any table notes below the table body. Be sparing in the use of tables and ensure that the data presented in them do not duplicate results described elsewhere in the article. Please avoid using vertical rules and shading in table cells.

References
Citation in text
Please ensure that every reference cited in the text is also present in the reference list (and vice versa). Any references cited in the abstract must be given in full. Unpublished results and personal communications are not recommended in the reference list, but may be mentioned in the text. If these references are included in the reference list they should follow the standard reference style of the journal and should include a substitution of the publication date with either 'Unpublished results' or 'Personal communication'. Citation of a reference as 'in press' implies that the item has been accepted for publication.

Web references
As a minimum, the full URL should be given and the date when the reference was last accessed. Any further information, if known (DOI, author names, dates, reference to a source publication, etc.), should also be given. Web references can be listed separately (e.g., after the reference list) under a different heading if desired, or can be included in the reference list.

Data references
This journal encourages you to cite underlying or relevant datasets in your manuscript by citing them in your text and including a data reference in your Reference List. Data references should include the following elements: author name(s), dataset title, data repository, version (where available), year, and global persistent identifier. Add [dataset] immediately before the reference so we can properly identify it as a data reference. The [dataset] identifier will not appear in your published article.

References in a special issue
Please ensure that the words 'this issue' are added to any references in the list (and any citations in the text) to other articles in the same Special Issue.

Reference style
Text: Indicate references by number(s) in square brackets in line with the text. The actual authors can be referred to, but the reference number(s) must always be given.
List: Number the references (numbers in square brackets) in the list in the order in which they appear in the text.
Examples:
Reference to a journal publication:
[1] Van der Geer J, Hanraads JAJ, Lupton RA. The art of writing a scientific article. J Sci Commun 2010;163:51–9. https://doi.org/10.1016/j.Sc.2010.00372.
Reference to a journal publication with an article number:
[2] Van der Geer J, Hanraads JAJ, Lupton RA. The art of writing a scientific article. Heliyon. 2018;19:e00205. https://doi.org/10.1016/j.heliyon.2018.e00205

Reference to a book:
[3] Strunk Jr W, White EB. The elements of style. 4th ed. New York: Longman; 2000.
Reference to a chapter in an edited book:
[4] Mettam GR, Adams LB. How to prepare an electronic version of your article. In: Jones BS, Smith RZ, editors. Introduction to the electronic age, New York: E-Publishing Inc; 2009, p. 281–304.

Reference to a website:
[5] Cancer Research UK. Cancer statistics reports for the UK, http://www.cancerresearchuk.org/aboutcancer/statistics/cancerstatsreport/; 2003 [accessed 13 March 2003].

Reference to a dataset:
[dataset] [6] Oguro M, Imahiro S, Saito S, Nakashizuka T. Mortality data for Japanese oak wilt disease and surrounding forest compositions, Mendeley Data, v1; 2015. https://doi.org/10.17632/xwj98nb39r.1.

Note shortened form for last page number. e.g., 51–9, and that for more than 6 authors the first 6 should be listed followed by 'et al.' For further details you are referred to 'Uniform Requirements for Manuscripts submitted to Biomedical Journals' (J Am Med Assoc 1997;277:927–34) (see also Samples of Formatted References).

Journal abbreviations source
Journal names should be abbreviated according to the List of Title Word Abbreviations.
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Appendix B

PRISMA Checklist

Section/topic	#	Checklist item	Reported on page #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	

Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	

Appendix C

PsycINFO search strategy

Syntax

Connector	Search Terms	Search fields
	"carer*" OR "father*" OR "mother*" OR “parent*” OR “caregiver*” OR “maternal” OR “paternal” OR “famil*”	Abstract; Title
AND	"stress*" OR "anxiet*” OR "anxious" OR “depress*”	Abstract; Title
AND	"child*" OR "infant*" OR "infancy" OR "young" OR "young person" OR "young people" OR "youth" OR “adolescen*” OR “juvenile” OR “pediatric*” OR “paediatric*”	Abstract; Title
AND	"epilep*	Abstract; Title

Appendix D

Quality Appraisal Tool: Adapted from the Agency for Healthcare Research and Quality

Quality Assessment – Observational Studies
General instructions: Grade each criterion as "Yes," "No," "Partially," or "Can't tell."

Factors to consider when making an assessment are listed under each criterion.

Where appropriate (particularly when assigning a "No," "Partially," or "Can't tell" score), please provide a brief rationale for your decision (in parentheses) in the evidence table.

Criteria marked *italics* are considered the most essential quality indicators for our purposes.

1) Unbiased selection of the cohort?
Factors that help *reduce* selection bias:
• Prospective study design and recruitment of subjects
• Inclusion/exclusion criteria
o Clearly described (especially re: age and cognitive status)
o Assessed using valid and reliable measures
• Recruitment strategy
o Clearly described
o Relatively free from bias (selection bias might be introduced, e.g., by recruitment via advertisement)

2) Sample size calculated/5% difference?
Factors to consider:
• Did the authors report conducting a power analysis or describe some other basis for determining the adequacy of study group sizes for the primary outcome(s) of interest to us?
• Was the sample size sufficiently large to detect a clinically significant difference of 5% in event rates or an OR/RR increase of ≥ 1.5 or decrease of ≥ 0.67 between groups in at least one primary outcome measure of interest to us?

3) Adequate description of the cohort?
Consider whether the cohort is well-characterized in terms of baseline:
• Age
• Sex
• Race
• Educational level
• *For genetic association studies,* were the diseased and non-diseased populations drawn from groups with the same ethnic/racial mix?

4) Validated method for ascertaining stress, anxiety, depression?
Factors to consider:
• Were primary outcomes (stress, anxiety and depression) assessed using valid and reliable measures?
• Was the method used to ascertain stress, anxiety, depression clearly described? (Details should be sufficient to permit replication in new studies.)
• Was a valid and reliable measure used? (Subjective measures based on self-report tend to have lower reliability and validity than objective measures such as clinical reports and lab findings.)
To clarify your score, please make a note of the method/measure used.

5) Validated method for other variables?
• Were other variables assessed using valid and reliable measures?

• Was the method used to ascertain variables described? (Details should be sufficient to permit replication in new studies.)
• Was a valid and reliable measure used? (Subjective measures based on self-report tend to have lower reliability and validity than objective measures such as clinical reports and lab findings.)
To clarify your score, please make a note of the method/measure used.

6) Analysis controls for confounding?
Factors to consider:
• Did the analysis control for any baseline differences between groups?
• Does the study identify and control for important confounding variables and effect modifiers? (Confounding variables are risk factors that are correlated with the intervention/exposure and outcome and may therefore bias the estimation of the effect of intervention/exposure on outcome if unmeasured. Effect modifiers are not correlated with the intervention/exposure, but change the effect of the intervention/exposure on the outcome. Age, race/ethnicity, education, and measures of SES are examples of effect modifiers and confounding variables for the exposures and outcomes of interest in this study.)

7) Analytic methods appropriate?
Factors to consider:
• Was the kind of analysis done appropriate for the kind of outcome data?
o Dichotomous – logistic regression, survival
o Categorical – mixed model for categorical outcomes
o Continuous – ANCOVA, mixed model

• Was the number of variables used in the analysis appropriate for the sample size? (The statistical techniques used must be appropriate to the data and take into account issues such as controlling for small sample size, clustering, rare outcomes, multiple comparison, and number of covariates for a given sample size. The multiple comparisons issue may be a problem particularly when performance results on numerous cognitive measures are being compared.

Appendix E

Consolidated criteria for reporting qualitive studies (COREQ): 32 item checklist

No. Item	Guide questions/description	Reported on page number
	Domain 1: Research team and reflexivity	
	Personal Characteristics	
1. Inter viewer/facilitator	Which author/s conducted the interview or focus group?	56
2. Credentials	What were the researcher's credentials? E.g. PhD, MD	56 (MSc, MSc, BSc(Hons)
3. Occupation	What was their occupation at the time of the study?	56
4. Gender	Was the researcher male or female?	56
5. Experience and training	What experience or training did the researcher have?	56
	Relationship with participants	
6. Relationship established	Was a relationship established prior to study commencement?	57
7. Participant knowledge of the interviewer	What did the participants know about the researcher? *e.g. personal goals, reasons for doing the research*	56
8. Interviewer characteristics	What characteristics were reported about the inter viewer/facilitator? *e.g. Bias, assumptions, reasons and interests in the research topic*	
	Domain 2: study design	
	Theoretical framework	
9. Methodological orientation and Theory	What methodological orientation was stated to underpin the study? *e.g. grounded theory, discourse analysis, ethnography, phenomenology, content analysis*	58
	Participant selection	
10. Sampling	How were participants selected? *e.g. purposive, convenience, consecutive, snowball*	56-57
11. Method of approach	How were participants approached? *e.g. face-to-face, telephone, mail, email*	56-57
12. Sample size	How many participants were in the study?	60-61
13. Non-participation	How many people refused to participate or dropped out? Reasons?	60-61
	Setting	
14. Setting of data collection	Where was the data collected? *e.g. home, clinic, workplace*	57
15. Presence of non-participants	Was anyone else present besides the participants and researchers?	57

16. Description of sample	What are the important characteristics of the sample? e.g. demographic data, date	60-61 and Table 2
	Data collection	
17. Interview guide	Were questions, prompts, guides provided by the authors? Was it pilot tested?	56
18. Repeat interviews	Were repeat inter views carried out? If yes, how many?	n/a
19. Audio/visual recording	Did the research use audio or visual recording to collect the data?	57
20. Field notes	Were field notes made during and/or after the inter view or focus group?	n/a
21. Duration	What was the duration of the interviews or focus group?	61
22. Data saturation	Was data saturation discussed?	56
23. Transcripts returned	Were transcripts returned to participants for comment and/or correction?	No
	Domain 3: analysis and findings	
	Data analysis	
24. Number of data coders	How many data coders coded the data?	58-59
25. Description of the coding tree	Did authors provide a description of the coding tree?	58-59
26. Derivation of themes	Were themes identified in advance or derived from the data?	58
27. Software	What software, if applicable, was used to manage the data?	59
28. Participant checking	Did participants provide feedback on the findings?	n/a
	Reporting	
29. Quotations presented	Were participant quotations presented to illustrate the themes/findings? Was each quotation identified*? e.g. participant number*	Yes; 62-75
30. Data and findings consistent	Was there consistency between the data presented and the findings?	Yes; 62-75
31. Clarity of major themes	Were major themes clearly presented in the findings?	Yes; 62-75
32. Clarity of minor themes	Is there a description of diverse cases or discussion of minor themes?	Yes; 62-75

Appendix F

Participant information sheet

PATHWAYS

Participant Information Sheet

An exploration of the experiences and support needs of families of young children on the epilepsy surgery pathway

a researcher at the University of Liverpool, would like to invite you to take part in a research study.

Before you decide whether to take part, it is important for you to understand why the research is being done and what it will involve. Please take time to read this information sheet the following information carefully and feel free to ask us if you would like more information or if there is anything that you do not understand. Please also feel free to discuss this with your friends, relatives and your child's medical team if you wish. We would like to stress that you do not have to accept this invitation and should only agree to take part if you want to.

What is the purpose of the study? Why have I been chosen to take part?

The study aims to better understand the experiences and support needs of families when they have a young child who is on the epilepsy pathway. If suitable, it is often advised that epilepsy surgery is carried out at a young age. Therefore, we are particularly interested in talking to parents/guardians whose child is **under 6 years old** and fits the categories above. We would like to hear their experiences of consideration for epilepsy surgery, what support was provided and what support they may have benefitted from.

You have been chosen because we understand that your child is (or was) under 6 years old and:

- is currently being considered for epilepsy surgery.
- has had epilepsy surgery (within the last 3 years).

Or

- has been considered for epilepsy surgery but it is not the best option for them at this time (considered within the last 3 years).

We are hoping to speak to approximately 15-20 families to take part in the study. Please be aware that once we have enough families to take part, we will not be able to carry out any more interviews.

Do I have to take part?

Participation in the study is voluntary and you are free to withdraw without explanation up until your data has been anonymised. If you chose not to take part or decide to withdraw this will not affect the service you receive from the epilepsy service.

What will happen if I take part?

If you decide to take part, at your convenience, a date and a time will be arranged to talk about your experiences. This will be conducted in person where possible. If you live in the North West this could take place at your home or at Whichever is most convenient or comfortable for you. If you live outside of the North West of England a date and time will be arranged to speak over the telephone or 'Skype.' If two parents/guardians in the same family wish to take part then the interviews will be conducted separately, one at a time.

What will the interview be like?

The interview will take approximately 45-60 minutes with the lead researcher. will also ask you for some basic information about your family such as the age of your child, first part of your post code, the outcome of the epilepsy surgery decision and the age of your child when this decision was made (if applicable). This will help us to place the study in context. Interviews will be digitally recorded which will then be written out by the researcher or a transcription service. All identifiable information removed and saved anonymously.

What will happen if I want to stop taking part?

The University of Liverpool is the sponsor for this study based in the United Kingdom. We will be using information you provide us with during interviews in order to undertake this study and will act as the data controller for this study. This means that we are responsible for looking after your information and using it properly. The University of Liverpool will keep identifiable information about you for 10 years after the study has finished.

Your rights to access, change or move your information are limited, as we need to manage your information in specific ways in order for the research to be reliable and accurate. If you withdraw from the study, we will keep the information about you that we have already obtained. To safeguard your rights, we will use the minimum personally-identifiable information possible.

You can find out more about how we use your information by contacting (details on page 4).

How will my data be used?

The University processes personal data as part of its research and teaching activities in accordance with the lawful basis of 'public task', and in accordance with the University's purpose of "advancing education, learning and research for the public benefit."

Under UK data protection legislation, the University acts as the Data Controller for personal data collected as part of the University's research. the Principal Supervisor acts as the Data Processor for this study, and any queries relating to the handling of your personal data can be sent to

Further information on how your data will be used can be found in the table below.

How will my data be collected?	Digital recording of interviews.
How will my data be stored?	Password protected data files.
How long will my data be stored for?	10 years
What measures are in place to protect the security and confidentiality of my data?	Any identifiable information will be taken out of the interviews when written out and each participant will be assigned a number. Consent forms will be securely stored.
Will my data be anonymised?	All identifiable information will be removed, and a number assigned to each participant.
How will my data be used?	Findings will be written up within a Doctorate in Clinical Psychology thesis. Publication will be sought with peer reviewed journals.
Who will have access to my data?	
Will my data be archived for use in other research projects in the future?	No
How will my data be destroyed?	Shredded or deleted after 10 years

Your rights to access, change or move your information are limited, as we need to manage your information in specific ways in order for the research to be reliable and accurate. To safeguard your rights, we will use the minimum personally-identifiable information possible.

Expenses and / or payments

If you live within the North West of England and are required to travel to either or to participate in the study, you will be reimbursed for your travel expenses up to the value of £10.

Are there any risks in taking part?

This is a low risk study. However, we will be inviting you to discuss experiences which you may find distressing. You can decide to pause or stop the interview at any time. You can also decide not to answer a question at any time.

What are the benefits in taking part?

Your participation in the research will contribute towards a better understanding of the experiences and support needs of families with a child on the epilepsy surgery pathway.

Before your interview you will be asked if you want to be entered into a prize draw to win up to £100 worth of Amazon vouchers as a token of our appreciation for taking part. If you say yes, we will need to ask for your email or postal address so that we can send the vouchers to you if you win.

What will happen to the results of the study?

Findings will be written up as part of a Doctorate in Clinical Psychology thesis. It may also be published in scientific journals. If you would like a summary of the final report this will be made available to you. All identifiable information will be removed from the results so no one will know you were a participant.

What if I am unhappy or if there is a problem?

If you are unhappy, or if there is a problem, please feel free to let us know by contacting

Telephone: and we will try to help. If you remain unhappy or have a complaint which you feel you cannot come to us with then you should contact the Research Ethics and Integrity Office at ethics@liv.ac.uk. When contacting the Research Ethics and Integrity Office, please provide details of the name or description of the study (so that it can be identified), the researcher(s) involved, and the details of the complaint you wish to make.

The University strives to maintain the highest standards of rigour in the processing of your data. However, if you have any concerns about the way in which the University processes your personal data, it is important that you are aware of your right to lodge a complaint with the Information Commissioner's Office by calling 0303 123 1113.

Who can I contact if I have further questions?

Please speak to if you have any further questions about the study.

Contact details for the researchers are:

Trainee Clinical Psychologist

Telephone: **Email:**

Address: Doctorate of Clinical Psychology Programme, University of Liverpool, G05 Ground Floor Whelan Building, Brownlow Hill, Liverpool, L69 3GB.

The project is supervised by:

Telephone: **Email:**

Telephone:

Who is organising this study?

This study is sponsored by the University of Liverpool and is organised with

It has

been reviewed by NHS Research Ethics Committee.

Thank you for taking the time to read this information sheet.

Further Information and Support

Young Epilepsy

Website: https://www.youngepilepsy.org.uk/ **Helpline:** 01342 831342

Epilepsy Action

Website: https://www.epilepsy.org.uk/ **Helpline:** 0808 800 5050

Epilepsy Research UK

Website: https://www.epilepsyresearch.org.uk/

Patient Advice and Liaison Service (PALS)

Email: **Tel:**

Patient Advice and Liaison Service (PALS)

Email: **Tel:**

Appendix G

Topic guide

Interview Topic Guide

Introduction to Study: "You have been invited to take part in our study because you have a young child (under 6 years old) who is on the epilepsy surgery pathway or has been in the last 3 years. We are interested in understanding more about your:

- **Experiences** throughout the journey of being considered for surgery
- What **helped**?
- What **would have** helped?

We would like to talk about the whole pathway since surgery was first discussed and ask you to describe the things that happened along that journey. We will begin with some background information."

Demographics

- Could you please tell me your age?
- What is the first part of your postcode?
- What is your child's name?
- How old is your child?
- Do you have any other children? (ask age)
- Who else do you live with?

Before the pathway

- Can you tell me a bit about life before [your child] was considered for epilepsy surgery?
    - *Prompts: Family life, day-to-day life, emotions, relationships, frequency of seizures, impact on siblings, quality of life.*

The pathway

- How old was [your child] when they received their diagnosis?
- What type of epilepsy does [your child] have?
- Did [your child] have any treatments for their epilepsy?
- How long was [your child] on the epilepsy surgery pathway?

- When was surgery first discussed? Who with? How? Why then?
- How old was [your child] when surgery was first discussed?
- How much did you know about the epilepsy surgery pathway before then? What did you expect to happen?
- What information were you given (verbal and written)?
- How did you feel about these discussions?
- Who else was aware of these discussions? (e.g. siblings, close/wider family, friends etc.)

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Research Ethics Committee No. 19/NW/0040

- What impact did this have on [these people] at this time?
- After these discussions what did you expect to happen?
- What was the support like at this time? (Explore professional & personal support, information etc).
- What was helpful?
- What was less helpful?
- Is there anything you would have liked to happen at this time? Prompt: *more information, support – support for who? Them/child/siblings/both. Support groups?*

What happened next?

- Can you describe what happened next? (Allow participant to explore what parts of the experience were most important to them).

At each stage explore:

- How did this affect you [parent/ guardian] (relationships, day-to-day life, emotions)?
- How did this affect [the young child] (relationships, day-to-day life, emotions)?
- How did this affect [siblings/ close family/ wider family/ friends] (relationships, day-to-day life, emotions)?
- What helped?
- What was less helpful?
- What would you have like to have happened?

Further prompt if needed: **Investigations/ Surgery**

- Can you tell me about any [investigations/ surgery] [your child] had? Who by? What for? How long?
- What did you expect? What was your understanding of [the investigation/ surgery]?
- How did you experience [the investigation/surgery]?
- How did your child experience [the investigation/ surgery]? – Explore: *Fears, anxieties, changes in behaviour?*
- What support was available during [the investigation/surgery]?
- How did this impact on your/ your child's/ family's experience?
- What helped?
- What was less helpful?
- What would you have liked to have happened?

If completed pathway: Reflections following completion of the pathway

- Looking back how did you feel about the process of being 'on the pathway'?
- How did the process compare to your expectations?
- Looking back how has this affected you [parent/ guardian] (relationships, day-to-day life, emotions)?
- Looking back how has this affected [the young child] (relationships, day-to-day life, emotions)?
- Looking back how has this affected [siblings/ close family/ wider family/ friends] (relationships, day-to-day life, emotions)?
- What was helpful?
- What was less helpful?

- What would you have like to have happened?
- Do you have any suggestions/ advice for others families?

Hopes for the future

- *If no longer on pathway:* Now you are no longer on the surgery pathway what are your hopes for [you child's] future?
- *If still on pathway:* What are your hopes for [your child's] future following a decision about surgery?

Appendix H

Invitation letter

PATHWAYS

Date:

Dear

We hope is well.

I am writing to you as we are carrying out a study which aims to explore the experiences and support needs of families when they have a young child who is on the epilepsy pathway. We are inviting families with a child who was under the age of 6 years when they were considered for epilepsy surgery to take part in the study. This includes children who:

- are currently being considered for epilepsy surgery.
- have had epilepsy surgery (within the last 3 years).
- have been considered for epilepsy surgery but it is not the best option for them at the time (considered within the last 3 years).

If you decide to take part, at your convenience, a date and a time will be arranged to talk for about 45-60 minutes about your experiences. This will be conducted in person where possible. If you live in the North West this could take place at your home or at
Whichever is most convenient or comfortable for you. If you live outside of the North West of England a date and time will be arranged to speak over the telephone or 'Skype.'

Your participation in the research will contribute towards a better understanding of the experiences and support needs of families with a child on the epilepsy surgery pathway. We are hoping that this will help us to inform future development of family centred support services.

The lead researcher is who is carrying out the research at the University of Liverpool with Dr and Dr Your decision whether to take part in the study will not affect your child's medical care.

We have included information sheets for you which explain exactly what would be involved if you participated in the study. If you have any other questions you can ask at any time.

We would be grateful if you could please **contact the lead researcher by telephone or email** using the contact details on the information sheet indicating whether you would like the researcher to contact you about the study.

We look forward to hearing from you.
Yours sincerely,

Consultant Clinical Psychologist

Tel:
Email:

Research Team:

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Appendix I

Study advertisement

PATHWAYS

Has your child been considered for Epilepsy Surgery in the last three years (when aged 0-6 years)?

We are looking for parents/guardians to help us to understand the experiences and needs of families with young children who are considered for epilepsy surgery.

This includes those who:

- have had epilepsy surgery in the last 3 years
- have been considered but are not suitable for surgery at this time

Please contact using the details below to take part in an interview or ask further questions.

You can be entered into a prize draw for £100 worth of Amazon vouchers as a thank you for your time.

Researcher: University of Liverpool
Tel. No:
Email:

This study is being completed as part of a Doctorate in Clinical Psychology.

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Appendix J

Screening tool

Date contact made: This is the _____ contact.

Screening Script *(for Social Media Recruitment only)*

Children's Epilepsy Pathway qualitative study Participant Registration
(Internal use only)

Thank you for calling/emailing, we are conducting a research study of the experiences and support needs of families of young children on the epilepsy surgery pathway. Firstly, I have some short questions to check you are suitable to take part in the study/ interviews.

1. Name of potential participant	
2. Child's date of birth and age?	
3. City/ town & postcode (first part only)	
4. How did you hear about the study?	Word of mouth Twitter or Facebook (can you remember who tweeted/ posted it?) Organisation Other:
5. Has your child been diagnosed with difficult to control epilepsy? Definition: Epilepsy that is difficult to control with anti-epileptic medications (also called anticonvulsants)	Yes/No No = No further data collected
6. Has your child been considered for epilepsy surgery?	Yes/ No/ Don't know Don't know – Continue with screen
7. Has your child been referred to a children's epilepsy surgery service (CESS) centre?	Yes (GOSH/Kings; Birmingham; Bristol; Liverpool/Manchester) No/ Don't know - Discontinue
8. Location of centre?	GOSH/Kings Birmingham Bristol Liverpool/Manchester
9. Did they have the following investigations: - Seen by a neurologist - Electroencephalogram (EEG)/ video telemetry - Magnetic resonance imaging (MRI) - Positron emission tomography (PET scan)	(Record all; If majority = No – no further data collected) Yes/ No

- Single-photon emission computed tomography (SPECT scan) - Magnetoencephalography (MEG scan) 10. Neuropsychological assessment/ testing	
11. How long ago were the investigations completed?	>3 years – no further data collected
- How old was your child when the investigations were completed?	>6 years – no further data collected
12.	
13.	

Thank you for sharing this information with me. From your description it sounds as though it would be really helpful to talk to you in more detail about your experiences. The interviews last for approximately 45- 60 minutes. I will send some additional information before we meet/ arrange to speak together.

These include:

- **An information sheet about the study.**
- **A consent form**

If the participant lives in the North West we offer a face to face interview. If not, a telephone or Skype interview is offered.

Check that they will have enough time to read the information sheet before the interview.

I can send you the documents via home address or email address, what would you prefer? Are you happy to provide me with these details? (If telephone interview) I will need your telephone number so that I can phone you at the time we arrange. Are you happy to provide that to me?

14. Telephone number:	
15. Email address:	
16. Home address (if required):	
17. Interview date, time & location OR Interview to be arranged after documents read. FN to phone participant back on:	

I will now send you an email/ letter with documents, confirmation of time/date of interview.

Appendix K

Consent form

PATHWAYS

Participant consent form

An exploration of the experiences and support needs of families of young children on the epilepsy surgery pathway

Names of researchers:

NOTE: For Skype/Telephone interviews the following is to be read to the participant. Verbal consent recorded. Researcher to sign and date copy and send to the participant.

Please initial box

1. I confirm that I have read and have understood the information sheet dated **03.09.2018** for the above study, or it has been read to me. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily. ☐
2. I understand that taking part in the study involves giving some basic information about my family and an audio recorded interview about our experiences of the epilepsy surgery pathway. ☐
3. I understand that my participation is voluntary and that I am free to stop taking part and can withdraw from the study at any time without giving any reason and without my rights being affected. In addition, I understand that I am free to decline to answer any particular question or questions. ☐
4. I understand that I can ask for access to the information I provide and I can request the destruction of that information if I wish at any time prior to anonymisation. I understand that after the information has been made anonymous I will no longer be able to request access to or withdrawal of the information I provide. ☐
5. I understand and agree that my participation will be audio recorded and I am aware of and consent to your use of these recordings for the following purposes: Recordings will be transcribed by the researcher or transcription company, anonymised, analysed and written up as part of a Doctorate in Clinical Psychology thesis. It may also be published in scientific journals. ☐
6. I understand that anonymised quotations will be used to illustrate the research when it is written up as part of a Doctorate in Clinical Psychology thesis and may also be published in scientific journals.

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7. I understand that my responses will be kept strictly confidential. I give permission for members of the research team to have access to my fully anonymised responses. I understand that my name will not be linked with the research materials, and I will not be identified or identifiable in the report or reports that result from the research. ☐

8. I understand that the information I provide will be held securely and in line with data protection requirements at the University of Liverpool until it is fully anonymised and then deposited in the archive for sharing and use by other authorised researchers to support other research in the future. ☐

9. I understand that signed consent forms, original audio recordings and transcripts will be retained in a locked filing cabinet and password protected files in the researcher's office until 10 years after the study has been completed. ☐

10. I agree to take part in the above study. ☐

_____	_____	_____
Participant name	Date	Signature
_____	_____	_____
Name of person taking consent	Date	Signature

Face to face interview: ☐

Skype/ telephone interview: ☐

Principal Investigator **Student Investigator**

Tel: _
Email:

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Appendix L

Protocol for responding to distressed participants

Protocol for Responding to Distressed Participants

This distress protocol is to be used in interviews for participants who become distressed and to guide the interviewer's response to this distress.

1. Indications of distress during the interview.

   Interviewers should be aware of and alert for indications of a high level of stress or emotional distress such as crying. If distress is detected:
   - Pause the interview
   - Offer support and allow the participant time to regroup
   - Ask the participant 'what thoughts are you having, what are you feeling right now, do you feel able to go on with the interview?')
   - If the person wishes stop the interview or is experiencing distress beyond what would be normally expected in an interview about a potentially sensitive topic, stop the interview completely.

2. If the participant wishes/is able to continue, offer support and the time to regroup before continuing with the interview.

3. If distress of any level has been shown take the following actions at an appropriate point or at the end of interview (if continued):
   - Provide the participant with details of epilepsy support groups and services they may wish to access.
   - Indicate that, with permission, you will contact them the following day to see if they are okay.

4. If the participant was severely distressed or the distress continues after the interview has stopped, in addition to point 3 above:
   - Request permission from participant for you to contact their regular health provider OR
   - If there are any concerns about their immediate safety contact their regular health provider without their permission or dial 999 for assistance.

Version 1 17.12.18
Research ethics committee number: 19/NW/0040

Appendix M

Ethical approval: HRA and Health and Care Research Wales approval letter

Ymchwil Iechyd a Gofal Cymru
Health and Care Research Wales

NHS
Health Research Authority

Email: hra.approval@nhs.net
Research-permissions@wales.nhs.uk

05 March 2019

Dear Dr

HRA and Health and Care Research Wales (HCRW) Approval Letter

Study title:	**An exploration of the experiences and support needs of families of young children on the epilepsy surgery pathway**
IRAS project ID:	**253756**
Protocol number:	**UoL001428**
REC reference:	**19/NW/0040**
Sponsor	**University of Liverpool**

I am pleased to confirm that HRA and Health and Care Research Wales (HCRW) Approval has been given for the above referenced study, on the basis described in the application form, protocol, supporting documentation and any clarifications received. You should not expect to receive anything further relating to this application.

How should I continue to work with participating NHS organisations in England and Wales?
You should now provide a copy of this letter to all participating NHS organisations in England and Wales, as well as any documentation that has been updated as a result of the assessment.

Following the arranging of capacity and capability, participating NHS organisations should **formally confirm** their capacity and capability to undertake the study. How this will be confirmed is detailed in the "*summary of assessment*" section towards the end of this letter.

You should provide, if you have not already done so, detailed instructions to each organisation as to how you will notify them that research activities may commence at site following their confirmation of capacity and capability (e.g. provision by you of a 'green light' email, formal notification following a site initiation visit, activities may commence immediately following confirmation by participating organisation, etc.).

It is important that you involve both the research management function (e.g. R&D office) supporting each organisation and the local research team (where there is one) in setting up your study. Contact details of the research management function for each organisation can be accessed here.

How should I work with participating NHS/HSC organisations in Northern Ireland and Scotland?
HRA and HCRW Approval does not apply to NHS/HSC organisations within the devolved administrations of Northern Ireland and Scotland.

If you indicated in your IRAS form that you do have participating organisations in either of these devolved administrations, the final document set and the study wide governance report (including this letter) has been sent to the coordinating centre of each participating nation. You should work with the relevant national coordinating functions to ensure any nation specific checks are complete, and with each site so that they are able to give management permission for the study to begin.

Please see IRAS Help for information on working with NHS/HSC organisations in Northern Ireland and Scotland.

How should I work with participating non-NHS organisations?
HRA and HCRW Approval does not apply to non-NHS organisations. You should work with your non-NHS organisations to obtain local agreement in accordance with their procedures.

What are my notification responsibilities during the study?
The document "*After Ethical Review – guidance for sponsors and investigators*", issued with your REC favourable opinion, gives detailed guidance on reporting expectations for studies, including:

- Registration of research
- Notifying amendments
- Notifying the end of the study

The HRA website also provides guidance on these topics, and is updated in the light of changes in reporting expectations or procedures.

I am a participating NHS organisation in England or Wales. What should I do once I receive this letter?
You should work with the applicant and sponsor to complete any outstanding arrangements so you are able to confirm capacity and capability in line with the information provided in this letter.

The sponsor contact for this application is as follows:

Name: Mr Alex Astor
Tel: 01517948373
Email: sponsor@liverpool.ac.uk

Who should I contact for further information?
Please do not hesitate to contact me for assistance with this application. My contact details are below.

Your IRAS project ID is **253756**. Please quote this on all correspondence.

IRAS project ID	253756

Yours sincerely

Miss Lauren Allen
Senior Assessor

Email: hra.approval@nhs.net

Copy to: *Mr Alex Astor*
Miss Lucy Cooper, *NHS Foundation Trust*

IRAS project ID	253756

List of Documents

The final document set assessed and approved by HRA and HCRW Approval is listed below.

Document	*Version*	*Date*
Copies of advertisement materials for research participants [PATHWAYS - Advert Outpatient Department]	2	08 February 2019
Copies of advertisement materials for research participants [PATHWAYS - Advert Social Media]	2	08 February 2019
Covering letter on headed paper [PATHWAYS-Letter REC Responses]		15 February 2019
Evidence of Sponsor insurance or indemnity (non NHS Sponsors only) [Insurance Letter from Sponsor]		01 August 2018
HRA Schedule of Events	1.0	17 January 2019
HRA Statement of Activities	1.0	17 January 2019
Interview schedules or topic guides for participants [PATHWAYS - Topic Guide]	2	08 February 2019
IRAS Application Form [IRAS_Form_20122018]		20 December 2018
Letter from sponsor [PATHWAYS - University of Liverpool Agreement to Sponsor]		13 December 2018
Letters of invitation to participant [PATHWAYS - Letter of Invitation]	2	08 February 2019
Letters of invitation to participant [PATHWAYS - Participant Reminder Letter - Version 1.0, 17.12.2018]	2	08 February 2019
Other [Response to Validation Queries]		31 December 2018
Participant consent form [PATHWAYS - Participant Consent Form]	2	08 February 2019
Participant information sheet (PIS) [PATHWAYS - Participant Information Sheet]	2	08 February 2019
Research protocol or project proposal [PATHWAYS - Protocol]	1	16 December 2018
Summary CV for Chief Investigator (CI) [PATHWAYS - CV Chief Investigator ( ]	1	19 October 2018
Summary CV for student [PATHWAYS - CV Student -	1	17 December 2018
Summary CV for supervisor (student research) [PATHWAYS - CV Secondary Supervisor -	1	17 December 2018
Summary CV for supervisor (student research) [PATHWAYS - CV Primary Supervisor/ Chief Investigator -	1	17 December 2018

IRAS project ID	253756

Summary of assessment

The following information provides assurance to you, the sponsor and the NHS in England and Wales that the study, as assessed for HRA and HCRW Approval, is compliant with relevant standards. It also provides information and clarification, where appropriate, to participating NHS organisations in England and Wales to assist in assessing, arranging and confirming capacity and capability.

Assessment criteria

Section	Assessment Criteria	Compliant with Standards?	Comments
1.1	IRAS application completed correctly	Yes	No comments
2.1	Participant information/consent documents and consent process	Yes	No comments
3.1	Protocol assessment	Yes	No comments
4.1	Allocation of responsibilities and rights are agreed and documented	Yes	A statement of activities has been submitted and the sponsor is not requesting and does not expect any other site agreement to be used.
4.2	Insurance/indemnity arrangements assessed	Yes	No comments
4.3	Financial arrangements assessed	Yes	No funding will be provided to sites.
5.1	Compliance with the Data Protection Act and data security issues assessed	Yes	No comments
5.2	CTIMPS – Arrangements for compliance with the Clinical Trials Regulations assessed	Not Applicable	No comments

IRAS project ID	253756

Section	Assessment Criteria	Compliant with Standards?	Comments
5.3	Compliance with any applicable laws or regulations	Yes	No comments
6.1	NHS Research Ethics Committee favourable opinion received for applicable studies	Yes	No comments
6.2	CTIMPS – Clinical Trials Authorisation (CTA) letter received	Not Applicable	No comments
6.3	Devices – MHRA notice of no objection received	Not Applicable	No comments
6.4	Other regulatory approvals and authorisations received	Not Applicable	No comments

Participating NHS Organisations in England and Wales

This provides detail on the types of participating NHS organisations in the study and a statement as to whether the activities at all organisations are the same or different.
There is one site type. The care team at sites will review medical records to identify parents of patients to invite to take part in the research. Consent and interviews may be conducted at sites; however parents can choose to be interviewed at home or by Skype if preferred. Some participants may be recruited from outside the NHS via online support groups and advertisements. HRA and HCRW Approval does not cover activity outside the NHS. Before recruiting outside the NHS the research team must follow the procedures and governance arrangements of responsible organisations. The Chief Investigator or sponsor should share relevant study documents with participating NHS organisations in England and Wales in order to put arrangements in place to deliver the study. The documents should be sent to both the local study team, where applicable, and the office providing the research management function at the participating organisation. Where applicable, the local LCRN contact should also be copied into this correspondence. If chief investigators, sponsors or principal investigators are asked to complete site level forms for participating NHS organisations in England and Wales which are not provided in IRAS, the HRA or HCRW websites, the chief investigator, sponsor or principal investigator should notify the HRA immediately at hra.approval@nhs.net or HCRW at Research-permissions@wales.nhs.uk. We will

work with these organisations to achieve a consistent approach to information provision.

Principal Investigator Suitability

This confirms whether the sponsor position on whether a PI, LC or neither should be in place is correct for each type of participating NHS organisation in England and Wales, and the minimum expectations for education, training and experience that PIs should meet (where applicable).
A Local Collaborator should be identified at each of the sites to facilitate access arrangements for the external research team where needed. GCP training is not a generic training expectation, in line with the HRA/HCRW/MHRA statement on training expectations.

HR Good Practice Resource Pack Expectations

This confirms the HR Good Practice Resource Pack expectations for the study and the pre-engagement checks that should and should not be undertaken
External staff (University) will be expected to obtain a Letter of Access to conduct study activity at sites, this should confirm Disclosure and Barring Service and Occupational Health clearance.

Other Information to Aid Study Set-up

This details any other information that may be helpful to sponsors and participating NHS organisations in England and Wales to aid study set-up.
The applicant has indicated that they do not intend to apply for inclusion on the NIHR CRN Portfolio.

Appendix N

Example of coding framework

Theme: Attempting to gain information and control					
Sub Theme: 'Asking' for information and 'chasing' for action					
Illustrative quotations:					
"I was the one chasing that, "Have you got the results? When is going to get discussed? When is the next MDT?" [...] "I was this really pushy, horrible parent at the beginning of the year [...] I feel like if you don't push, you don't get it." [010] *"She [neurologist] was the one who saying, "Oh, it's going to take a while for surgery." I said, "Well, just start the testing now. I just want it starting now. [...] He's having seizures now. Let's just video these seizures now. I don't want to get him under control and then you take that drug off him to get the capture the seizures." That just seems crazy.* [010]	*"constantly having to ring to get updates and find out what was happening"* [009] *"when after maybe 2 months [...] I still hadn't heard anything about what the plan is I spoke to the [...] neurologist's secretary [...] this is me having to do it at every single stage of the journey and this is why it tipped me over the edge because it was too much"* [009]	*"I think, when we first started, I didn't ask enough questions. Now I ask them all the time, "What happens next? What are we doing? How long will it take?"* [007] *"[I needed] just a better idea of what was going on, which now I ask for because I realise that I'm not going to get it unless I ask for it. At the time, I didn't know that."* [007]	*"By this stage I'd got to the point where I would ask questions. I knew I would even ask questions if I thought, "It's a stupid question," but I'm not a brain surgeon. I don't know the answer. I don't really think they needed to put anything down on paper because it was a case of, I'd just asked. I'd just come straight out with it in the end.* [005]	*"I felt like I'm the one doing all the chasing."* [002].	*"We found out that the MRI [...] record has just been in the images department for three months. And the doctor just waited for the MRI result and we started to call every day and ask, "What happened? [...] We haven't received any letter from you. What did the last MRI show?" [..] I don't want to take care of this one, to call everyone, to remind everyone"* [001]

Appendix O

Epilepsy Action CESS in England booklet

epilepsy action

Children's Epilepsy Surgery Service (CESS) in England

epilepsy.org.uk
Epilepsy Helpline: 0808 800 5050

Epilepsy Action aims to improve the quality of life and promote the interests of people living with epilepsy.

Our work...

- We provide information to anyone with an interest in epilepsy.
- We improve the understanding of epilepsy in schools and raise educational standards.
- We work to give people with epilepsy a fair chance of finding and keeping a job.
- We raise standards of care through contact with doctors, nurses, social workers, government and other organisations.
- We promote equality of access to quality care.

Epilepsy Action has local branches in most parts of the UK. Each branch offers support to local people and raises money to help ensure our work can continue.

Your support

We hope you find this booklet helpful. As a charity, we rely on donations to provide our advice and information. If you would like to make a donation, here are some ways you can do this.

- Visit epilepsy.org.uk/donate
- Text ACT NOW to 70700 (This will cost you £5 plus your usual cost of sending a text. Epilepsy Action will receive £5.)
- Send a cheque payable to Epilepsy Action.

Did you know you can also become a member of Epilepsy Action from less than £1 a month? To find out more, visit epilepsy.org.uk/join or call 0113 210 8800.

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Introduction

In England, around 340 children each year could benefit from epilepsy brain surgery. However, in recent years, only around 110 children each year have had surgery on their brain to try to treat their epilepsy. Epilepsy brain surgery is done to help stop a child's seizures, or reduce the number of seizures they have.

Since November 2012, following a successful campaign by Epilepsy Action, a new Children's Epilepsy Surgery Service (CESS) has been providing epilepsy brain surgery for many more children in England. For children aged five years and under, this surgery is done at one of four specialist CESS centres. For children aged six years and over, surgery may be done at a CESS centre, or locally.

This information gives an overview of what is involved before, during and after epilepsy brain surgery. If you have already been told that surgery could help your child, the CESS centre will be able to give you more information, and answer any questions you have.

Epilepsy Action's online community, forum4e (forum4e.com) has some members who have had epilepsy surgery. They will be able to share their experiences of what to expect when surgery is being considered.

Further information on many of the different aspects of epilepsy mentioned in this booklet is available from Epilepsy Action. See page 31 for contact details.

The CESS centres

- Birmingham Children's Hospital NHS Foundation Trust
- North Bristol NHS Trust, transferring to University Hospitals Bristol NHS Foundation Trust during 2014
- Great Ormond Street Hospital for Children NHS Foundation Trust and King's College Hospital NHS Foundation Trust, London
- Alder Hey Children's NHS Foundation Trust (Liverpool) with Central Manchester University Hospitals NHS Foundation Trust

The four centres will treat children from all over England, not just those in their local area. Contact details are on page 24.

If you live in Northern Ireland, Scotland or Wales

The CESS is funded by NHS England and is therefore a service for children living in England. If you live in Northern Ireland, Scotland or Wales and your child is being considered for epilepsy brain surgery, there are a number of options as to where they might be referred. Your child's epilepsy specialist will discuss this with you.

Wherever your child is referred for epilepsy brain surgery, the information in this booklet about what is involved before, during and after surgery will still be relevant for you.

About the CESS

The CESS aims to improve the quality of epilepsy brain surgery for children. It also aims to review more children, to see if they would benefit from epilepsy surgery. All children being considered for epilepsy brain surgery will be assessed by the CESS. They may go on to have surgery at a CESS centre. Or the CESS centre may advise that they should have the surgery locally.

Each CESS centre has an expert team of surgeons, doctors, healthcare professionals, and specialist facilities needed for epilepsy brain surgery.

The centre will make sure you and your child have access to support and services, as listed below. This includes during the assessment, when your child goes in for surgery, and after their surgery.

Support and services

- A chance to visit the centre and meet the team who would do the operation, before the surgery takes place
- Support for your family for the period your child would be in hospital. This should be in a child-friendly environment with toys, books and activities that are right for your child
- A management plan, to be agreed with you and your child, and shared with you both, on an ongoing basis. This plan will include details about your child's follow-up care, and the monitoring and review process
- A named lead doctor or healthcare professional responsible for coordinating your child's care. They will act as a link between you and the people treating your child
- 24 hours a day access to a member of the team for advice, information and support
- Access to an epilepsy specialist nurse
- Clear information about your child's condition, which should include
    - A description of their epilepsy
    - How their epilepsy will be managed
    - Medicines and other treatments they might receive
    - How you and your child can get the best from their treatment
    - Emotional and behavioural support
    - Information about appropriate patient support groups and charities
    - Contact details of your child's named nurse

Referral to a CESS centre

The National Institute for Health and Care Excellence (NICE) is the independent organisation responsible for providing national guidance on treatments and care for people using the NHS in England and Wales. The guidance is to help healthcare professionals, patients and their carers make decisions about treatment and healthcare. NICE says that children with epilepsy should have regular reviews of their epilepsy and treatment.

When your child has their epilepsy review, or if they are having problems with their epilepsy at any other time, they may be referred to a CESS centre. At this point, they may be considered for epilepsy brain surgery. To be referred, they would need to be in one of the groups mentioned below.

- Children with severe epilepsy that started in the first few years of life, and which is thought to come from one part of the brain
- Children with epilepsy where a magnetic resonance imaging (MRI) brain scan has shown an abnormality in one or more parts of the brain. These abnormalities could include benign tumours, and hypothalamic hamartomas
- Children with focal epilepsy (also called partial epilepsy) that has not been controlled with two epilepsy medicines. These medicines could have been used singly or together. These children may, or may not, have an abnormality on an MRI scan
- Children with a weakness down one side of the body and epilepsy that has not been controlled with two epilepsy medicines, used either singly or together. A one-sided weakness is called hemiplegia
- Children with Sturge-Weber syndrome or Rasmussen's syndrome
- Children with drop attacks
- Children with tuberous sclerosis with epilepsy that has not been controlled by two epilepsy medicines, used either singly or together

Tests before epilepsy brain surgery

To find out if your child would be suitable for surgery, the epilepsy specialist, and a number of other specialists at the CESS centre, would thoroughly assess them. At the end of the assessment, the CESS centre would advise if surgery is possible, and also recommend where it should take place.

As part of the assessment, they would ask your child to have a number of tests. These may include some of the following.

- Electroencephalogram (EEG)/video telemetry
- Computed tomography (CT scan)
- Magnetic resonance imaging (MRI scan)
- Functional MRI scan (fMRI)
- Positron emission tomography (PET scan)
- Single-photon emission computed tomography (SPECT scan)
- Magnetoencephalography (MEG scan)
- Neuropsychology tests
- Neuropsychiatry tests

Information about the tests

You will want to know more about what the various tests involve. What follows is some brief information. Your child's paediatrician, or staff where your child is going for tests, should be able to give you more detailed information.

Electroencephalogram (EEG)/video telemetry

The EEG tells doctors about the electrical activity in the brain. During the EEG, a technician places harmless electrodes on the

scalp, using a special glue or sticky tape. The electrodes are then connected to the EEG machine, which records the electrical signals in the brain on a computer.

In video telemetry, a video recording is done at the same time as an EEG. This means that if your child has a seizure, doctors can see exactly what happens. An EEG/video telemetry can be done while your child is awake or asleep, or both.

Computed tomography (CT scan)

This is a type of X-ray that shows the structure of the brain. It wouldn't show if your child has epilepsy. However, it might show if there is an abnormality that could cause epilepsy. CT is now an old investigation, which has mostly been replaced with magnetic resonance imaging (MRI scan).

Magnetic resonance imaging (MRI scan)

The MRI uses radio waves and a magnetic field, rather than X-rays. It can show if there's a structural cause for someone's epilepsy. The MRI is more powerful than the CT scanner, so it can pick up small or subtle abnormalities that the CT scanner can't find (see above).

Functional MRI scan (fMRI scan)

This works in a similar way to an MRI scan but, during the scan, your child would be asked to do something. For example, they might be asked to tap their thumb against their fingers. Or they may be asked to look at pictures, or answer questions, on a

computer screen. These activities increase the flow of oxygen-rich blood to a particular part of the brain. This type of MRI scan will help to show exactly which part of the brain manages important tasks such as thought, speech, movement, and sensation.

Positron emission tomography (PET scan)

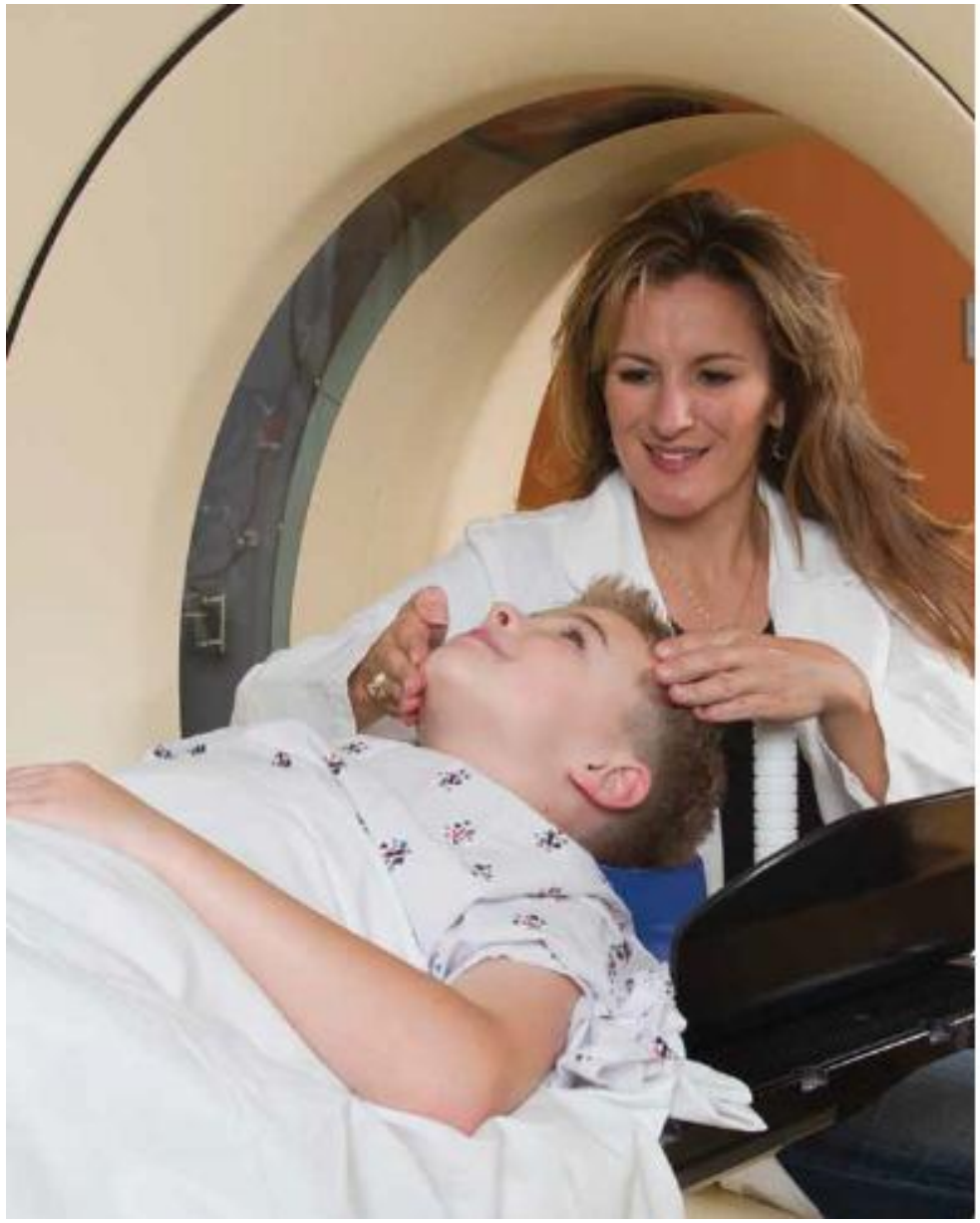
This scan uses a radioactive substance, called a tracer, to look for information about how the brain is working. It can also show any abnormalities.

Single-photon emission computed tomography (SPECT scan)

This scan shows different parts of the brain in different colours. Your child would be given an injection of a radioactive dye, which would go to their brain. The different colours show how much blood flow is in each part of the brain. Usually, blood flow is higher in the part of the brain where seizures start. There are two sorts of SPECT scans. One is the inter-ictal SPECT scan, which is done between a child's seizures. 'Inter' means between and 'ictal' refers to a seizure. The other is the ictal SPECT scan, which is done just after a child has had a seizure.

Magnetoencephalography (MEG scan)

This is a new type of scan, and is only available in very special circumstances. The scanner would sit outside your child's head and measure their brain activity. It can tell which parts of a child's brain are active during a certain task.



Neuropsychology tests

These tests would show if your child has any memory and learning problems. The tests may take up to eight hours, split into different sessions, and involve a number of games and puzzles. They can show whether the part of the brain that will be operated on is responsible for any functions that other parts of their brain can't take over. This is to try to make sure your child would not have problems after surgery that they didn't have before.

Neuropsychiatry tests

A psychiatrist with experience of epilepsy brain surgery would see you and your child, as part of the initial assessment. Emotional and behavioural problems are common in children with epilepsy. Because of this, the psychiatrist would consider whether your child has these types of problems. They would also be able to suggest any treatment your child might need for these problems. This treatment would be available, whether or not your child goes on to have surgery.

The psychiatrist would also be one of the people who checks with you and your child what your aims and expectations are for surgery.

Other assessments

Other types of assessment might be organised, depending on the type of epilepsy, and the type of problems, your child has.

These may include the following.

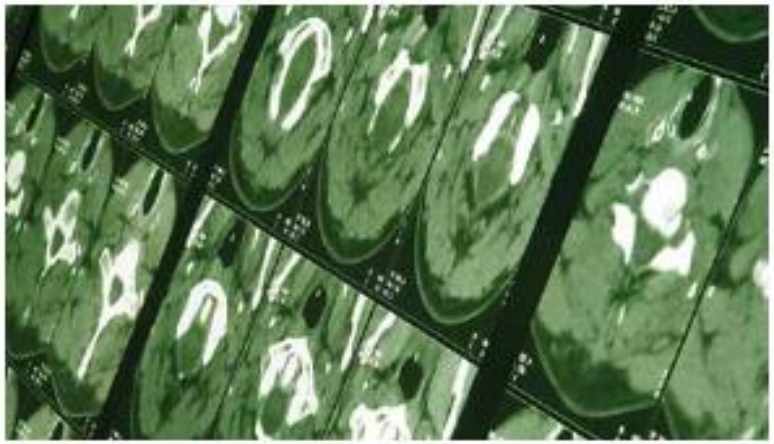
- Speech and language
- Development
- Vision, particularly peripheral vision
- The need for occupational therapy
- The need for physiotherapy

Types of epilepsy brain surgery

There are many different types of epilepsy brain surgery. The type your child might have depends on their type of seizures, and where the seizures begin in their brain. Here are some of the most commonly performed types of epilepsy surgery.

Focal resection

This is done when surgeons are sure which part of the brain the seizures start in. Children having this type of surgery have a



small part of their brain removed. Although this sounds worrying, the surgeon would only take away damaged parts that aren't needed. If the part of the brain causing the seizures is in the temporal lobe, the surgery is called a temporal resection. If the part of the brain causing the seizures is in one of the other lobes, it is an extra-temporal resection.

Multiple subpial transection

This surgery is not very common, but is performed when it's not possible to remove the part of the brain that's causing the seizures. The surgeon will make a series of cuts to separate the damaged part of the brain from the surrounding area. This stops seizures moving from one part of the brain to other parts.

Corpus callosotomy

This surgery separates the two hemispheres (halves) of the brain. It is mainly used for generalised seizures, particularly frequent drop attacks. It is sometimes used for myoclonic seizures that affect the whole body. It is also sometimes used for severe focal seizures that start in one hemisphere and spread to the other.

Hemispherectomy/Hemispherotomy

This is major surgery to separate, or remove, one half of the outer layer of the brain from the other. It is performed in children who have seizures because one half of their brain is badly damaged or not working properly. Sometimes the hemisphere is not removed, but completely disconnected from the rest of the brain. This is called 'hemispherotomy'.

What happens during epilepsy brain surgery

What happens during brain surgery for epilepsy will depend on the type of surgery. Most surgery involves making a small opening in the skull to get to the brain. The surgeon may remove some bone.

Children are put to sleep with a general anaesthetic. On rare occasions, the surgeon may wake the child up during part of the operation. This is so they can find the part of the brain that controls language and movement. The surgeon would explain this to the child. Waking children up during the operation is only usually done in children older than 12 years. After the surgery, the bone is replaced and fixed to the skull for healing.

Most epilepsy brain surgery takes at least four to six hours.

After epilepsy brain surgery

After surgery, your child's head and face would be swollen and painful, and they would need to take painkillers for a few days. The pain and swelling should settle after a few days, or a week or two.

Your child would need to rest and relax in the first few weeks after the surgery, and gradually become more active. It's usual for children to stay off school for around two to three months. Children should not play any contact sports for about four to six months.

Leaving hospital

Once your child leaves hospital, their care will be shared between the CESS centre and the doctor who referred them for surgery. If your child has surgery locally, there will be an agreed plan with the CESS about your child's follow-up care.

Generally, children continue to take epilepsy medicine for between six months and two years after the epilepsy surgery. The exact length of time will vary, depending on whether your child has stopped having seizures completely. It will also depend on what you and your child's epilepsy specialist think is best for your child. They may be able to reduce, or even stop the medicine after a while. If your child's epilepsy medicine does need reducing, their doctor will tell you how to do this. They will also keep in regular contact with you during this process.

Your child will have a follow-up appointment with their healthcare team to check on their progress after surgery. The team will keep in touch, to see how your child is doing, possibly for several years. If your child needs any further development, emotional or behavioural assessments, they will arrange these. The healthcare team will also stay in contact with you, to make sure your child is well, and that any local services they need are made available.

Success rates for epilepsy brain surgery

The success rate depends on the type of surgery. Many children stop having seizures after epilepsy surgery. If they do still have seizures, they usually have a lot fewer than before. If seizures continue, most children will usually continue to take their epilepsy medicine. Children who have a temporal resection usually do better than those who have an extra-temporal resection. (See **Focal resection** on page 15.)

Benefits and risks

Although the tests before epilepsy brain surgery are very thorough, it's still not always possible to predict what the risks are for each child. However, the test results will help the doctors decide whether to recommend surgery for your child. They will be able to discuss this with you fully before any decision about surgery is made.

Doctors will only go ahead with epilepsy brain surgery if the tests show that the benefits are likely to be higher than the risk of complications. The risks depend on the type of epilepsy brain surgery. Here are some possible risks.

Memory problems

The temporal lobes handle memory and language. This means that any surgery on the temporal lobes can cause difficulties in remembering, understanding and speaking. The memory problems can be for things that a child has seen ('visual memory') or for things that a child has heard ('verbal memory').

More seizures than before

Cutting the connections between the two hemispheres (sides) of the brain in corpus callosotomy stops seizures spreading from one hemisphere to the other. However, it doesn't stop all the seizures, only the drop attacks. In fact, some children may have more focal (partial) seizures, but they are less severe.

Visual symptoms

After hemispherectomy (where the outer layer of one half of the brain is removed), a child's vision may be reduced or they may have double vision. This is usually temporary. They may also have some difficulties with their peripheral vision. This may be temporary or permanent and will depend on how much of the brain has been removed.

One-sided paralysis

After hemispherectomy (where the outer layer of one half of the brain is removed), a child may have limited use of one side of their body. This one-sided paralysis is called a hemiparesis or hemiplegia. Physiotherapy and occupational therapy can help with this.

Behavioural problems

Some children may have had behavioural problems before the surgery. Or they may have had problems communicating or relating to other people. Epilepsy surgery itself will probably not help these problems. It is even possible that in a very few children, these problems may become a little worse.

Contact details for the CESS centres

Birmingham Children's Hospital NHS Foundation Trust
Steelhouse Lane
Birmingham
B4 6NH
Tel: 0121 333 9999
Website: bch.nhs.uk

North Bristol NHS Trust
Frenchay Hospital
Frenchay Park Road
Bristol
BS16 1LE
Tel: 0117 970 1212
Website: nbt.nhs.uk
Transferring to University Hospitals Bristol NHS Foundation Trust during 2014. The phone number will change to 0117 342 0185.

Great Ormond Street Hospital for Children NHS Foundation Trust
Great Ormond Street
London
WC1N 3JH
Tel: 020 7405 9200
Website: gosh.nhs.uk

King's College Hospital NHS Foundation Trust
Denmark Hill
London
SE5 9RS
Tel: 020 3299 9000
Website: kch.nhs.uk

Alder Hey Children's NHS Foundation Trust
Eaton Road
West Derby
Liverpool
L12 2AP
Tel: 0151 228 4811
Website: alderhey.co.uk

Central Manchester University Hospitals NHS Foundation Trust
Royal Manchester Children's Hospital
Hathersage Road
Manchester
M13 0JH
Tel: 0161 276 1234
Website: cmft.nhs.uk

About this publication

This booklet is written by Epilepsy Action's advice and information team, with guidance and input from people living with epilepsy and medical experts. If you would like to know where our information is from, or there is anything you would like to say about the booklet, please contact us.

Epilepsy Action makes every effort to ensure the accuracy of information in its publications but cannot be held liable for any actions taken based on this information.

Date: May 2013; Due for review: May 2015; Code: B157.01

Acknowledgements

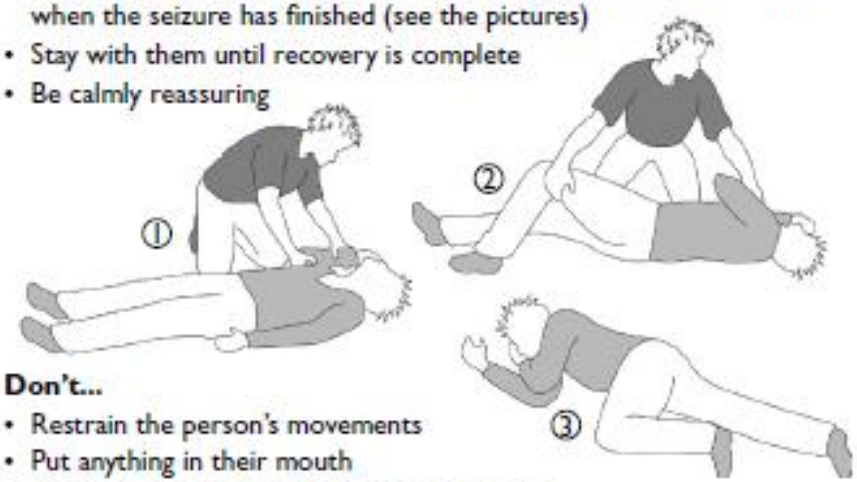
Epilepsy Action wishes to thank Dr Richard Appleton, consultant paediatric neurologist at Liverpool's Alder Hey Children's Hospital, for his contribution. Dr Appleton has declared no conflict of interest.

First aid for tonic-clonic seizures

The person goes stiff, loses consciousness and falls to the floor.

Do...

- Protect the person from injury (remove harmful objects from nearby)
- Cushion their head
- Aid breathing by gently placing the person in the recovery position when the seizure has finished (see the pictures)
- Stay with them until recovery is complete
- Be calmly reassuring



Don't...

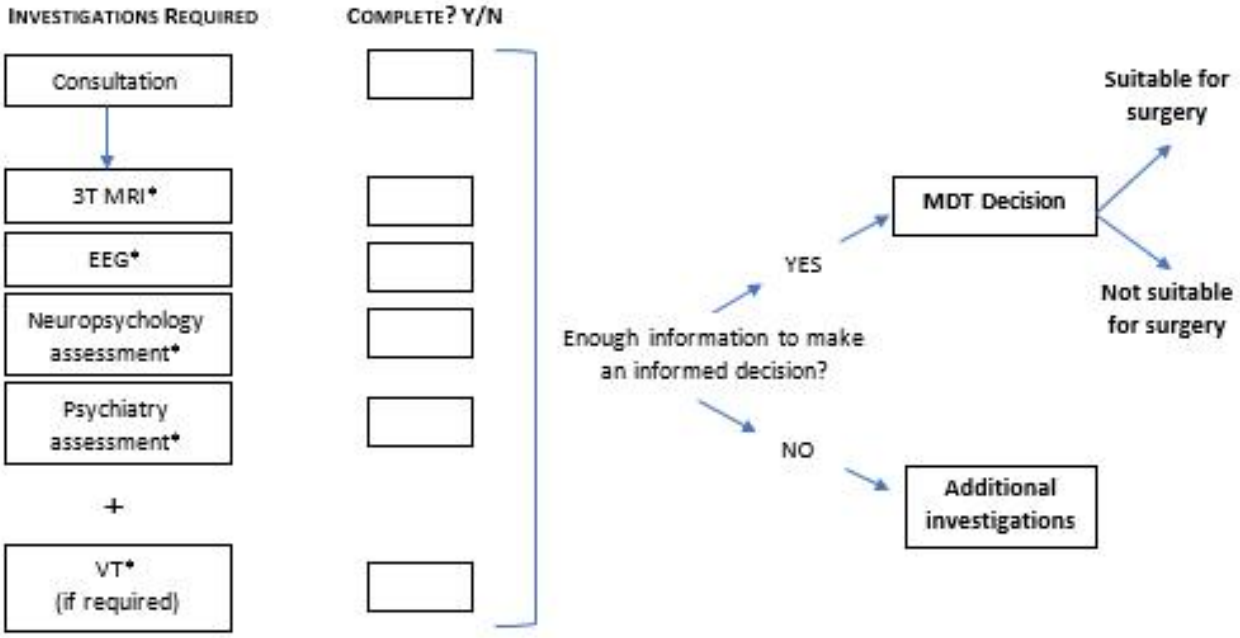
- Restrain the person's movements
- Put anything in their mouth
- Try to move them unless they are in danger
- Give them anything to eat or drink until they are fully recovered
- Attempt to bring them round

Call 999 for an ambulance if...

- You know it is the person's first seizure
- The seizure continues for more than five minutes
- One seizure follows another without the person regaining consciousness between seizures
- The person is injured
- You believe the person needs urgent medical attention

Appendix P

Children's Epilepsy Surgery Service (CESS) 'Pathway' flow diagram



* If the information from a previous investigation is under 6 month old then it does not need to be repeated.

POSSIBLE ADDITIONAL INVESTIGATIONS (ONLY IF FURTHER INFORMATION IS REQUIRED)