Epilepsy Research 145 (2018) 110–115

Contents lists available at ScienceDirect

Epilepsy Research

journal homepage: www.elsevier.com/locate/epilepsyres

Comparison of telephone with face to face consultation for follow up of Neurocysticercosis

Ramesh Konanki[a,1], Sheffali Gulati[a,*], Kameshwar Prasad[b], Lokesh Saini[a,2], Ravindra Manohar Pandey[c], Vinod Kumar Paul[d]

[a] Division of Child Neurology, Department of Pediatrics, All India Institute of Medical Sciences, New Delhi, India
[b] Department of Neurology, All India Institute of Medical Sciences, New Delhi, India
[c] Department of Biostatistics, All India Institute of Medical Sciences, New Delhi, India
[d] Department of Pediatrics, All India Institute of Medical Sciences, New Delhi, India

ARTICLE INFO

Keywords:
Neurocysticercosis
Telemedicine
Teleneurology
Telephone
Seizures
Epilepsy

ABSTRACT

Objectives: There is significant scarcity of specialists to provide care for children with epilepsy in many parts of the world. Telemedicine is a potential future option. This study was planned to estimate the diagnostic accuracy of telephone consultation to identify Critical Clinical Events (breakthrough seizures, drug non-compliance, drug adverse events, features of raised intracranial pressure, and other disease-related events),compared to the Face-to-Face consultation (gold standard), in children with Neurocysticercosis (NCC) and symptomatic seizures, following the completion of cysticidal therapy.

Methods: Children aged 2–15 years attending a tertiary health care facility with a diagnosis of NCC and symptomatic seizures were enrolled after completion of the cysticidal therapy. The parents were contacted by a Pediatric Neurology Resident on Telephone before the scheduled hospital visit. Subsequently, all the children were seen directly in hospital the next day by another Pediatric Neurology Resident. The information was noted on a structured questionnaire. The diagnostic accuracy of telephone consultation for identifying the Critical Clinical Events was estimated using Face-to-Face consultation as the gold standard.

Results: A total of 1145 potential events were evaluated. Of these, the face-to-face consultation identified 56 events that would need hospital visit for detailed evaluation (breakthrough seizures in 19, drug non-compliance in 15, adverse drug events in 11, features of raised intracranial pressure in 8, and other disease-related events in 3), and 1089 events that did not require hospital consultation. The sensitivity, specificity, positive and negative predictive values of telephone consultation were 89.28% (78.12–95.96), 97.61% (96.52–98.43), 65.79% (54.01–76.30), and 99.43% (98.78–99.79) respectively. The likelihood ratios when telephone consultation was positive and negative were 37.3 and 0.11 respectively.

Significance: Telephone consultation is an acceptable mode of follow-up for children with mild Neurocysticercosis and symptomatic seizures after completion of cysticidal therapy.

1. Introduction

Telemedicine is the use of telecommunication and information technologies to provide health services in which the distance separates care provider and receiver (Wootton, 2001). The usage and scope of telemedicine is rapidly advancing in the field of neurology (Teleneurology). Beginning with the acute stroke care, it is fast expanding to care of persons with multiple sclerosis, Parkinson's disease and epilepsy (Ahmed et al., 2008, 2009, 2010; Finkelstein et al., 2008; Hart, 2010).

The highest percentage of total cost of childhood epilepsy is because of hospital services, especially in the first year after diagnosis. The direct medical and non-medical expenses account for nearly 80% of costs in childhood epilepsy (Argumosa and Herranz, 2004; Pugliatti et al., 2007; Hong et al., 2009; Pato Pato et al., 2011). The charges can be brought down significantly if children with uncomplicated epilepsy are followed up by GPs (General Physicians/Pediatricians) and only those with treatment-resistant seizures receive care from the specialists directly. However, given the limited knowledge of Pediatricians/GPs

* Corresponding author at: Division of Child Neurology, Department of Pediatrics, All India Institute of Medical Sciences, New Delhi 110 029, India.
E-mail addresses: rameshkonanki@gmail.com (R. Konanki), sheffaligulati@gmail.com (S. Gulati), prasad2006.k@gmail.com (K. Prasad), drlokeshsaini@gmail.com (L. Saini), rmpandey@yahoo.com (R.M. Pandey), vinodkpaul@hotmail.com (V.K. Paul).
[1] Current address: Rainbow Hospital for Women and Children, Hyderabad, India.
[2] Current address: Division of Pediatric Neurology, PGIMER Chandigarh, Chandigarh, India.

https://doi.org/10.1016/j.eplepsyres.2018.06.005
Received 30 January 2018; Received in revised form 7 June 2018; Accepted 11 June 2018
Available online 12 June 2018
0920-1211/

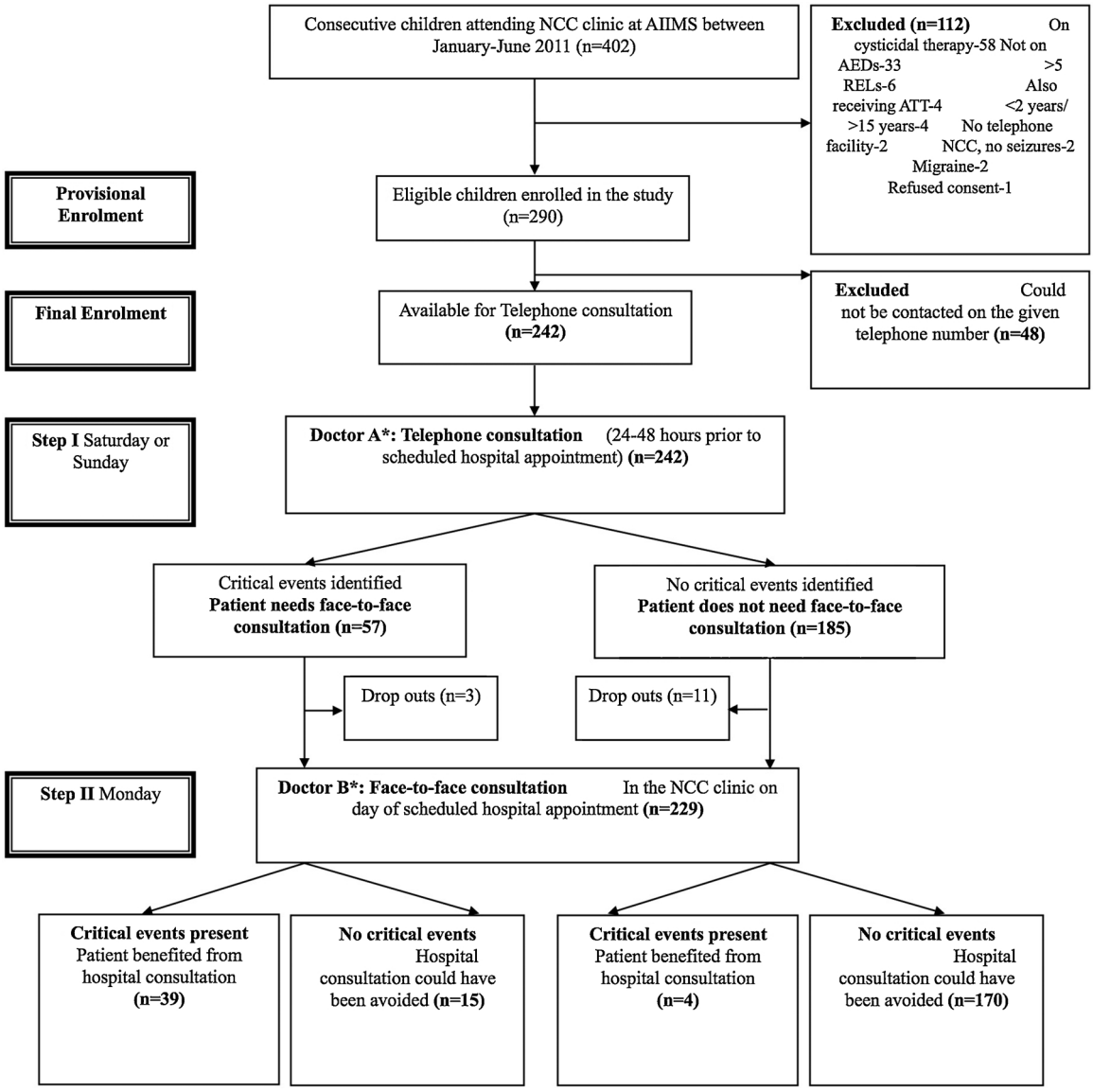

Fig. 1. Flow of the study.

regarding standard treatment protocols for epilepsy and neurocysticercosis, the tangible solution would be telephone follow-up by the specialists after the initial evaluation and completion of cysticidal therapy. Apart from reducing the hospital visit-related costs to the patients, reduced waiting period for visits, and decreased workload on already over-loaded specialists, this will also allow more specialists' time to be directed for complicated cases. Neurocysticercosis (NCC) is the most prevalent acquired and preventable cause of seizures and epilepsy in many developing countries (Garcia and Del Brutto, 2005). Seizures are the most common presentation of NCC and occur in nearly 90–95% of cases (Singhi et al., 2000). During and after cysticidal therapy, seizures, raised intracranial pressure, drug non-compliance, and drug-related adverse events are the critical clinical events in these children (Carpio et al., 1995; Garcia et al., 2004; Sotelo et al., 1990; Takayanagui and Jardim, 1992). Although there are some studies on utility of telemedicine in epilepsy (primarily adults), the data regarding utility of telemedicine (effectiveness, level of satisfaction with the services, cost-effectiveness, and effect on outcomes) in childhood neurological conditions is scarce (Haddad et al., 2015; Schreiber, 2018). Childhood epilepsy is an area with high potential for maximizing the benefits of telemedicine. In light of the potential benefits of telemedicine in childhood epilepsy, the present study was conducted to answer the question: Following the initial evaluation and completion of cysticidal therapy in children with NCC, how accurate is telephone consultation to identify Critical Clinical Events that necessitate Face-to-Face consultation?

2. Methods

2.1. Study site, duration, and objectives of the study

The study was conducted in the Child Neurology Division, Department of Pediatrics at a tertiary level healthcare facility, in Northern India over a 6-month period (January–June 2011).

The primary objective was to estimate the diagnostic accuracy of telephone consultation to identify Critical Clinical Events compared with the Face-to-Face consultation (gold standard), in children with NCC and symptomatic seizures, following the completion of cysticidal therapy. The study design was 'evaluation of new diagnostic modality by a cross-sectional study'.

2.1.1. Sample size

Assuming the sensitivity and specificity of telephone consultation to identify Critical Clinical Events to be 85% as compared with the Face-