Journal of Rare Cardiovascular Diseases
ISSN: 2299-3711 (Print) | e-ISSN: 2300-5505 (Online)
www.jrcd.eu

RESEARCH ARTICLE

Impact of Referral Accuracy on the Yield of Video EEG Monitoring in a Tertiary Epilepsy Unit

Aya Salah Ahmed Agamy[1]*, Saly Hassan Elkholy[2], Nirmeen Adel Kishk[3], Amani Mahmoud Nawito[2], Reem Atef El Hadidy[2]

[1]Assistant lecturer at Clinical Neurophysiology Unit, Faculty of Medicine, Cairo University, Egypt.
[2] Professor of Clinical Neurophysiology, Faculty of Medicine, Cairo University, Egypt.
[3] Professor of Clinical Neurology, Faculty of Medicine, Cairo University, Egypt.

*Corresponding Author
Aya Salah Ahmed Agamy

Article History
Received: 07.10.2025
Revised: 05.11.2025
Accepted: 08.12.2025
Published: 16.12.2025

Abstract: ***Background:*** Accurate referral information is essential to optimize the diagnostic yield of video electroencephalography (VEEG). Incomplete or inaccurate semiology in referral forms can reduce efficiency, increase costs, and delay appropriate treatment. Methods: We conducted a retrospective observational study of 121 patients referred for video EEG monitoring (VEM) at Cairo University Epilepsy Unit between January and December 2019, excluding presurgical evaluations. Referral data, including seizure semiology, suspected seizure type, family history, and imaging, were compared with VEM outcomes. Concordance between referral semiology and electroclinical findings was analyzed. ***Results:*** Of 121 referrals, 87 (71.9%) were for seizure type classification, 24 (19.8%) for diagnostic confirmation, 9 (7.4%) for psychogenic non-epileptic seizures (PNES), and 1 (0.8%) for antiseizure drug withdrawal evaluation. Although 111 referrals (91.7%) included semiology, more than half were discordant with VEM results ($p < 0.001$). Generalized seizures were over-represented in referrals (62.8%) compared with confirmed VEM findings. Overall, 66 records (54.5%) were normal, and 55 (45.5%) abnormal. Latency to first interictal epileptiform discharge (IED) was short (median 7 minutes), with 78.8% occurring within the first 30 minutes. No new discharges were recorded after 2 hours. ***Conclusion:*** Referral accuracy significantly impacts the yield of VEM. Inaccurate semiology reporting can misdirect resource allocation and prolong diagnosis. Standardized referral forms, history-taking by specialized epileptologists, and use of home videos are recommended to improve diagnostic efficiency. Tailoring VEM duration to early findings may further optimize cost-effectiveness.

Keywords: Video EEG monitoring, epilepsy, referral accuracy, seizure semiology, diagnostic yield.

INTRODUCTION

Epilepsy is among the most common chronic neurological disorders, affecting over 50 million people worldwide [1]. Accurate and timely diagnosis is vital to improve outcomes, quality of life, and healthcare efficiency [2,3]. Video electroencephalography monitoring (VEM) is a cornerstone of epilepsy diagnosis, providing correlation between electroencephalographic patterns and clinical semiology [4].

However, the diagnostic yield of VEM depends heavily on the accuracy of referral information. Seizure semiology descriptions in referral sheets often lack precision or are misleading, resulting in misclassification of seizure types and inefficient use of epilepsy monitoring units (EMUs) [5,6]. Studies have shown that clinical descriptions alone are significantly less accurate than video-based assessments, with concordance rates as low as 54% compared to 85% when using video evidence [7].

Given these limitations, the accuracy of referral semiology is a critical determinant of VEM efficiency. This study aimed to evaluate the concordance between referral semiology and VEM outcomes, determine the diagnostic yield of short-term monitoring, and assess the implications for optimizing clinical practice in a tertiary epilepsy center.

MATERIAL AND METHODS

Study Design and Setting

This retrospective observational study included all patients referred for VEM at the Cairo University Epilepsy Unit from January to December 2019. Patients referred for presurgical monitoring were excluded. The study received institutional ethics approval (I-341017).

Data Collection

Referral sheets were reviewed for demographic data, epilepsy-related history, imaging results, and antiseizure medication status. VEM reports were reviewed for recording duration, background activity, epileptiform discharges, latency to first abnormal discharge, and clinical events captured on video.

Data Analysis

Patients were categorized into normal VEM and abnormal VEM groups. Referral semiology was compared with electroclinical VEM results. Statistical analyses were performed using SPSS v25, with significance set at $p < 0.05$.

RESULT

Table 1. Clinical parameters of the participants from their referral sheets

Variable	n (%) or Median (range)
Referring physician	Junior 17 (14.0); Mid-senior 55 (45.5); Senior 42 (34.7); Not mentioned 7 (5.8)
Family history of epilepsy	Positive 32 (26.5); Negative 82 (67.7); Not mentioned 7 (5.8)
Age at onset (years)	Median 16 (range 1–50)
Suspected seizure type	Generalized 76 (62.8); Focal 16 (13.2); Combined 10 (8.3); Other 9 (7.4); Not mentioned 10 (8.3)
Timing of habitual event	Diurnal 66 (54.5); Nocturnal 24 (19.8); Both 28 (23.1); Not mentioned 3 (2.6)
Frequency of habitual events (per month)	Median 4 (range 1–90)
Mentality	Normal 88 (72.7); Abnormal 28 (23.1); Not mentioned 5 (4.2)
Brain structure abnormalities	Normal 79 (65.3); Abnormal 27 (22.3); Not mentioned 15 (12.4)
Antiseizure medication	On medication 97 (80.2); Not yet 24 (19.8)
Sleep deprivation	Yes 55 (45.5); No 22 (18.2); Not mentioned 44 (36.4)

Table 2. Classification of EEG records regarding abnormality

EEG finding	n (%)
Normal EEG	66 (54.5)
Abnormal EEG	55 (45.5)
- Focal IEDs	39 (32.3)
- Generalized IEDs	13 (10.7)
- Diffuse slowing	3 (2.5)

Table 3. Comparison of referral and clinical data between groups

Variable	Normal EEG (n=66)	Focal IED (n=39)	Generalized IED (n=13)	p-value
Age at onset (years)	18.5 (1–50)	16.0 (1–43)	10.0 (2–40)	0.024*
Positive family history (%)	**18.0 (27.3)**	**6.0 (15.4)**	**8.0 (61.5)**	0.004*
Gender (Male %) (Female %)	**38 (55.1)** **31 (44.9)**	**27 (69.2)** **12 (30.8)**	**9 (69.2)** **4 (30.8)**	0.286
Frequency of attacks/month	**4 (1-30)**	6 (1–90)	6 (1–30)	0.297
Cognitive impairment (%)	**12 (18.5)**	**14 (36.8)**	**2 (15.4)**	0.081
Lesional MRI (%)	**11 (18)**	**13 (40.6)**	**3 (23.1)**	0.058
Latency to first IED (minutes)		**12 (0.05-103.3)**	**4 (0.03-60)**	0.026*
Duration of EEG record (hours)		**4.0 (0.5-9.0)**	**4.0 (0.5-9.0)**	0.014*

Table 4. Concordance between referral semiology and VEM findings

Referral semiology	VEM focal (%)	VEM generalized (%)	p-value
Focal (n=51)	13 (25.5)	0 (0.0)	<0.001*
Generalized (n=88)	26 (51.0)	12 (23.5)	

DISCUSSION

This study demonstrates that referral accuracy plays a decisive role in the diagnostic yield of VEM. Despite detailed semiology being present in over 90% of referrals, more than half were discordant with electroclinical findings, confirming prior reports that clinical descriptions are often unreliable [7,8]. Over-representation of generalized seizures in referrals suggests systematic misclassification that could affect diagnostic pathways and resource allocation.

Our findings highlight the importance of standardized referral forms and history-taking by specialized epileptologists. Incorporating home video recordings has been shown to significantly improve diagnostic accuracy, particularly for paroxysmal or ambiguous events [9,10].

Efficiency of VEM was also reinforced: nearly 80% of IEDs appeared within the first 30 minutes, and none after 2 hours. These results align with previous studies reporting earlier discharge onset in generalized epilepsies compared with focal [11–13]. This suggests that short-term VEM, with early review by neurophysiologists, may optimize resource utilization in most cases.

Nonetheless, in drug-resistant epilepsy populations, longer recordings with sleep deprivation may be necessary, as ictal events often occur preferentially during sleep [14–16]. Tailoring VEM protocols to clinical context remains essential.

CONCLUSION

Referral accuracy significantly influences the diagnostic value of VEM. Inaccurate semiology increases misclassification, prolongs evaluation, and misuses resources. We recommend:

1. Standardized referral forms capturing essential clinical details.
2. History-taking and referral triage by experienced epileptologists.
3. Incorporation of home video recordings where possible.
4. Tailoring of VEM duration, with early auditing of results, to improve efficiency.

These strategies could enhance diagnostic accuracy, reduce waiting lists, and optimize resource use in epilepsy monitoring units.

Declarations:

- Ethics approval:

This study was performed in line with the principles of the Declaration of Helsinki. The study was approved by the research ethics committee of the Faculty of Medicine- Cairo University. It received institutional ethics approval number I-341017.

- Informed Consent to participate and for publication:

The study was a retrospective one and the data retrieved from the epilepsy unit archive. The availability of direct consent was not feasible as there was no patient enrolment in the study. However ethical committee approval was obtained to ensure patients' privacy.

- Data Availability:

The data sets analysed during the current study are available from the corresponding author on reasonable request.

- Competing interest:

The authors have no relevant financial or non-financial interests to disclose.

- Funding Sources:

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

- Authorship contributions:

All authors contributed to the study conception and design.
Material preparation, data collection and analysis were performed by Aya Salah and Reem El Hadidy.
The first draft of the manuscript was written by Amani Nawito and Nirmeen Kishk.
The manuscript was revised Saly Elkholy.
All authors read and approved the final manuscript.

- Acknowledgement:

Not applicable

REFERENCES

1. Beghi E, Giussani G, Nichols E, Abd-Allah F, Abdela J, Abdelalim A, et al. Global, regional, and national burden of epilepsy, 1990–2016: a systematic analysis for the Global Burden of Disease Study. Lancet Neurol. 2019;18(4):357-375.
2. Nascimento FA, et al. Focal epilepsies: Update on diagnosis and classification. Epileptic Disord. 2023;25(1):1–24. doi:10.1002/epd2.20045.
3. Riney K, Bogacz A, Somerville E, Hirsch E, Nabbout R, Scheffer IE, et al. ILAE classification and definition of epilepsy syndromes with onset at a variable age: position statement by the ILAE Task Force. Epilepsia. 2022;63(6):1443–1474.

4. Amin U, Benbadis SR, Frontera AT Jr. Outcome of prolonged video-EEG monitoring in a new VA monitoring unit. Epilepsy Behav. 2020;102:106699.
5. Celik SY, Headley AJ, Shih JJ. Clinical characteristics of video-EEG patients: Limited utility of prolonging VEEG study duration beyond 5 days. Epilepsy Behav. 2020;103:106878.
6. Gülşah Y, et al. Evaluation of patients monitored in long-term video EEG monitoring unit. Arch Epilepsy. 2024;30(1):25–32.
7. Benbadis SR, Tatum WO, Vale FL. Clinical characteristics of patients referred to a comprehensive epilepsy center for video-EEG monitoring: accuracy of clinical diagnosis. Neurology. 2002;59(8):1203-1205.
8. Beniczky S, Aurlien H, Brogger JC, et al. Standardized computer-based organized reporting of EEG: SCORE. Epilepsia. 2013;54(6):1112-1124.
9. Ricci L, Boscarino M, Assenza G, Tombini M, Lanzone J, Di Lazzaro V, et al. Clinical utility of home videos for diagnosing epileptic seizures: a systematic review. Neurol Sci. 2021;42(4):1301-1309.
10. Ramanujam B, Dash D, Tripathi M. Can home videos made on smartphones complement video-EEG in diagnosing psychogenic nonepileptic seizures? Seizure. 2018;62:95–98.
11. Liu C, Qi Y, Wang L, Zhang C, Kang L, Shang S, et al. Latencies to the first interictal epileptiform discharges recorded by EEG in different epileptic patients. BMC Neurol. 2023;23:427.
12. Koc G, Morkavuk G, Akkaya E, Karadas O, Leventoglu A, Unay B, et al. Latencies to first IEDs in different seizure types during video-EEG monitoring. Seizure. 2019;69:235–240.
13. Oehl B, Götz-Trabert K, Brandt A, Lehmann C, Schulze-Bonhage A. Latencies to first typical generalized spike-wave discharge in idiopathic generalized epilepsies. J Clin Neurophysiol. 2010;27(1):1-6.
14. Sunwoo JS. Influence of sleep on seizures and interictal discharges in epilepsy. Encephalitis. 2025;5(1):1–5.
15. Tavşanlı ME, Kınay D. Effect of sleep on epileptic discharges in idiopathic generalized epilepsy. Clin EEG Neurosci. 2023;54(5):489–496.
16. Hannan S, Thomas J, Jaber K, El Kosseifi C, Ho A, Abdallah C, et al. The differing effects of sleep on ictal and interictal network dynamics in drug-resistant epilepsy. Ann Neurol. 2024;95(1):42–56.