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Tissue Plasminogen Activator Effects On Stroke And Physical Therapy Outcomes In Acute Care: A Case Report

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PTH 608/708: 2019 Case Report Template

Name: Lyndsey Leboeuf Abbreviated (Running) Title: TPA, Stroke, Physical Therapy

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The patient signed an informed consent allowing the use of medical information and video footage for this report and received information on the institution's policies regarding the Health Insurance Portability and Accountability Act.

The author acknowledges Melissa Glass, PT, DPT, for supervision and assistance with collecting data, Christine Scialdone, PTA for assistance with treatment, and Jennifer Audette PT, PhD, for assistance with this case report conceptualization.

Key Words: tPA, Stroke, Acute Care

ABSTRACT

Background and Purpose: An ischemic stroke occurs when blood flow to an area of the brain is restricted and can cause numbness or weakness on one side of the body, facial droop, trouble speaking, and trouble walking. Patients who seek medical attention for symptoms within three hours of their onset can be eligible to receive tissue plasminogen activator (tPA). These patients often have less resultant disability than their counterparts who did not receive the drug. The purpose of this case reports is to display the positive effects of tPA and physical rehabilitation following a stroke in the acute care setting.

Case Description: The patient was an 83-year-old Caucasian female with an acute right thalamic stroke and complaints of left sided weakness with numbness and tingling. tPA was administered within one hour of symptom onset. Strength, sensation, coordination, and functional mobility were evaluated before and after the administration.

Outcomes: The patient in this case report showed improvements in strength (grossly 2-/5 to 4-/5), sensation (numbness to intact), and coordination (unable to perform to slowed and decreased accuracy) as a result of tPA administration following a stroke. The patient was discharged home with minor impairments in functional mobility.

Discussion: This case report demonstrates the importance of early stroke symptom recognition so that eligible patients can receive tPA to decrease impairments and to have better outcomes in the area of functional mobility.

Word count: 222

BACKGROUND and PURPOSE

An ischemic stroke occurs when blood flow to an area of the brain is restricted [1]. Stroke is the fifth leading cause of death in the U.S. and kills 140,000 each year[2]. Symptoms of stroke include sudden numbness or weakness on one side of the body, facial droop, trouble speaking, and trouble walking. Patients who seek medical attention for symptoms within 3 hours of their onset can be eligible to receive tissue plasminogen activator (tPA). With ischemic strokes, tPA

works by dissolving the blood clot to enhance blood flow in the brain which helps decreases the damage caused by the stroke. Patients who receive tPA within 3 hours often have less resultant disability than their counterparts who did not receive the drug[3].

Pharmacological and physical therapy interventions are important to reduce effects of stroke. Patients affected by stoke can display decreased strength, decreased balance, numbness and/or tingling, ataxia, flaccidity, spasticity, inattention or neglect, visual changes, and speech disturbances[4]. While tPA targets the area of the brain affected by the stroke to help decrease these impairments, physical therapy is important to help the patient regain their functional mobility and independence. The purpose of this case reports is to display the positive effects of tPA and physical rehabilitation following a stroke in the acute care setting.

CASE DESCRIPTION

Patient History

The patient provided written consent to participate in this case report. The patient was an 83-year-old Caucasian female suspected to have had a cerebrovascular accident (CVA). The patient presented to the emergency department with complaints of a stroke-like symptoms with sudden onset at 18:00 that day. The patient reported she was eating dinner with her husband when he noticed the patient had a left facial droop. The patient also experienced numbness and tingling in her left foot and reported her throat felt like it was closing. Upon emergency medical service (EMS) arrival, she had a severe left sided facial droop and her left side was completely flaccid. tPA was administrated at the hospital at 18:50. Magnetic resonance imaging (MRI) carried out 24 hours after the administration of tPA confirmed an acute right thalamic CVA. See Figure 1 for MRI.

The patient's past medical history included hypertension and lipidemia, which she was controlling with medications. See Appendix 1 for full list of medications. No significant or

relevant surgical history was deemed to interfere with tPA or physical therapy intervention. The patient stated that she would like to return to her prior level of function (PLOF) with the help of physical therapy.

Systems Review

A systems review was performed in the emergency department before and after tPA was administered. Overall, all systems were impaired before and after tPA administration; but improvements in the musculoskeletal and neuromuscular systems were evident after the tPA was administered. See Table 1 for systems reviews.

Clinical Impression

The patient's primary complaint was left sided weakness with numbness and tingling. The differential diagnoses, before the MRI confirmation, included cardioembolic stroke, small vessel disease/lacune, thromboembolic, hypercoagulable state-related infarct, and transient ischemic attack. Physical therapy was determined necessary to address impairments in areas such as strength, sensation, coordination, and gait. The patient was a good candidate for this case report as she was motivated to return to her PLOF and was compliant with all medical and therapy inventions.

Examination – Tests and Measures

The patient was agreeable to a physical therapy examination that included strength, sensation, coordination, and functional mobility assessment. Manual Muscle Testing (MMT) of myotomes C5-C8, L2-L4, and S1-S2 was performed with patient sitting at the edge of the bed and graded by the system adopted by Kendall[5]. Light touch of dermatomes L2-L5 and S1 was assessed. Coordination of upper and lower extremities was tested using rapid alternating movements (RAMs), finger to nose test with increasing speed and eyes closed, and heel to shin test. Bed mobility, transfers, and ambulation were also assessed during the initial examination[6]. Refer to Table 2 for findings.

Outcome Measures

A variety of outcome measures were used to assess the patient's progress over the course of the hospital stay. The National Institution of Health (NIH) Stroke Scale is used with patients that have suffered an acute ischemic stroke, hemorrhagic stroke, or transient ischemic attack. It assesses acute status, treatment efficacy, and helps predict outcomes. It is only used when the patient is initially assessed. The scale has a high reliability and validity when used by providers who use the scale on a daily basis[7]. The patient scored a 6 on the NIH scale at admission, which is indicative of a mild stroke.

The Modified Rankin Handicap Scale compares the patient's functional independence after suffering a stroke to his/her pre-stroke function. Scores are determined based on how the patient performs activities of daily living (ADLs), their neurological deficits, and other aspects of their life. For the stroke population it has an excellent test-retest reliability and inter-rated and intra-rated reliability[8]. The patient was determined to score a 0 (no symptoms or disability) before admission, and a 1 (no significant disability despite symptoms) at discharge.

The Activity Measure for Post-Acute Care (AM-PAC) "6-Clicks" Inpatient Short Forms uses 6 questions to assess functional outcomes of patients in post-acute care settings. It measures difficulty, assistance, and limitations in mobility and/or ADLs. It also helps predict discharge. It has a high test-retest reliability and interrater reliability between medical professionals. There is no validity reported for this outcome measure. The patient received 3's in all parts of the mobility domain at both evaluation and discharge, which suggested that the patient would need "a little" help with the mobility activities and had a 40.47% decrease in function [9]. Refer to Table 3 for results and interpretation of all outcome measures for this patient.

Clinical Impression: Evaluation, Diagnosis, Prognosis

The patient presented to the emergency department with left facial droop, left side

weakness, and left lower extremity numbness. The patient and spouse were able to identify symptoms immediately and sought medical attention. The medical team was able to administer tPA within one hour of symptom onset. An MRI confirmed that the patient experienced an acute right thalamic stroke. The patient was agreeable to further medical treatment and physical therapy interventions. At the time of physical therapy evaluation, the patient presented with left side weakness, impaired coordination of the left upper and lower extremities, and gait abnormalities; but the symptoms had improved from the initial evaluation in the emergency room. The patient also agreed that she already noticed improvement of symptoms since tPA administration.

The medical diagnosis was determined to be cerebral infarction (I63.9). The physical therapy diagnoses included hemiparesis (I69.354) and ataxia following cerebral infarction (I69.393). The patient had a good prognosis with physical therapy. The patient was able to receive tPA within the most effective window[10], and prior to tPA, she had been exercising 3 days a week, had a supportive spouse and family, and she was motivated to return to her prior level of function[11]. The patient also had an initial NIH Stroke Scale score of 6 before tPA and her symptoms improved after. A NIH score of $\leq$5 is a strong predictor of being discharged home[12].

Occupational therapy and speech therapy were also consulted as part of the stroke team. Patient was scheduled for a right carotid endarterectomy (CEA) three days after physical therapy evaluation. See Figure 2 for a description of the surgery. The patient received a physical therapy treatment by a physical therapy assistant before the surgery to prevent deconditioning. A physical therapy re-evaluation was ordered and performed 1-day post-operation to determine further needs for the patient once discharged. After the re-evaluation, it was recommended that the patient receive home health physical therapy (HHPT) to improve strength, balance, coordination, and mobility. Short-term goals for the patient were developed. Refer to Table 4 for

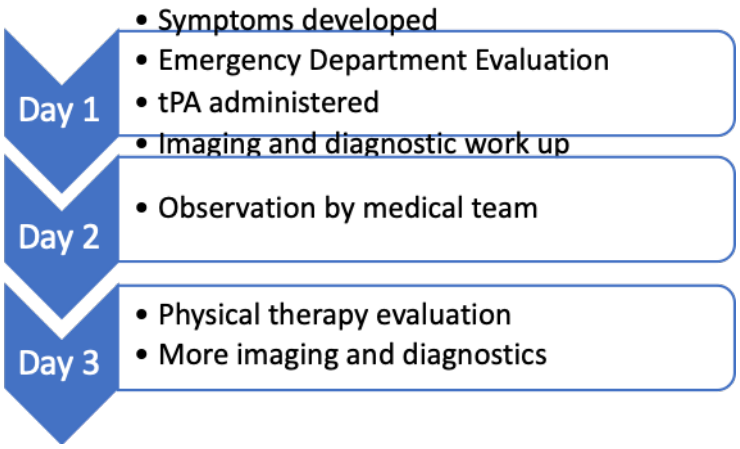
specific goals.

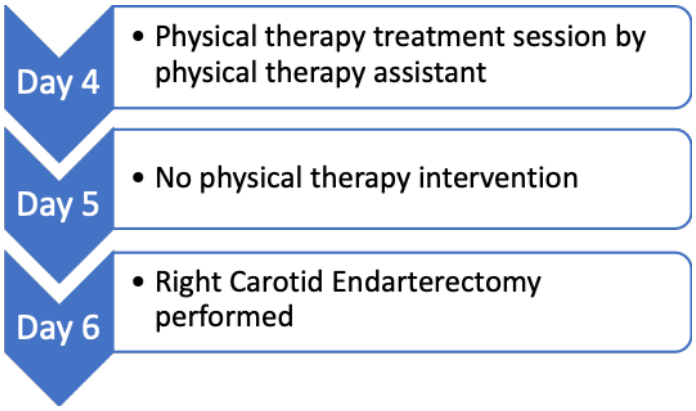
Intervention and Plan of Care

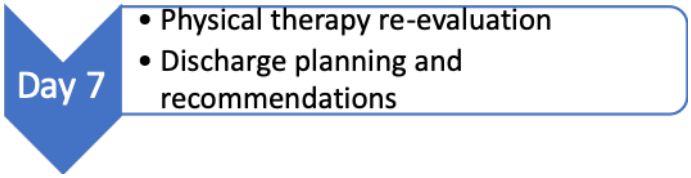
Before performing the initial evaluation with the patient, the student physical therapist (SPT) performed a record review. The SPT consulted the patient's nurse to receive any other updates in the patient's care and status. An evaluation that involved a patient history, assessed strength, sensation, coordination, bed mobility, transfers, and gait was carried out. After the evaluation, important information about the patient's performance and further recommendations for therapy were relayed to the nurse. All information gathered by the SPT was recorded in the electric medical record system, EPIC. The patient was also evaluated by occupational and speech therapy, but therapy was not indicated. The patient was informed by the medical team that she was eligible for a right CEA to remove plaque in the carotid artery to decrease her risk of future stroke. The patient was agreeable to surgery and participated in a physical therapy treatment session with a physical therapy assistant (PTA) to prevent deconditioning and learn new movement strategies prior to surgery. The session with the PTA focused on functional mobility. During that session the PTA had the hospital bed mimic the patient's bed at home (i.e. head of bed flat, height of bed, railings down) and gave instruction for rolling, performing supine to sit, and sit to supine. The PTA gave verbal cues and broke the task down into parts as needed. The patient was educated on momentum strategies and limb and trunk positioning to make bed mobility the most effective. The patient also practiced transfers from surfaces that most closely mimic the patient's home environment (i.e. height of bed, height of chair, height of toilet). The PTA educated the patient on "nose over toes" and pushing up with arms from the surface instead of on other objects in the room. Again, the PTA gave verbal cues and broke the task down into parts as needed. To end the session the patient ambulated in the halls. The PTA gave feedback for heel strike, arm swing, and posture and recorded the distance ambulated. The patient did not

require an assistive device during the treatment session. A physical therapy re-evaluation was performed after the surgery to determine if there were any further impairments that required discharge recommendations. Refer to Table 5 for specific interventions.

Timeline







Outcomes

The patient in this case report showed improvements in strength, sensation, and coordination as a result of tPA administration following a stroke. The patient was discharged home with HHPT and minor impairments in functional mobility. Follow-up in the neurologist's

office was scheduled. It is likely that her good outcomes following her stroke were because she was able to recognize the symptoms at onset, sought appropriate medical attention, did not smoke, exercised regularly, and participated in all physical therapy and medical interventions. Refer to Table 6 for detailed outcomes.

Discussion

This case report displayed how tPA decreased the impairments experienced by this patient after the onset of a stroke. Table 2 which compares the systems review both before and after tPA was administered. The improvements seen at that time were maintained throughout the patient's hospital and stay a CEA procedure. The patient was able to be discharged home and receive HHPT.

The effects observed in this case are consistent with the literature that states that tPA received within 3 hours of symptom onset reduces impairments. Additionally, this patient had several positive prognostic indicators. These factors yield a good prognosis after stroke, so it is difficult to determine whether her positive outcome was solely impacted by the tPA, and thus limiting the generalizability of this study. Perhaps this patient would have regained most of her function without receiving the prompt medical attention that she did. Future case reports including patients with poor prognostic factors may enhance the literature that supports the use of tPA.

The strengths of this case included the thorough documentation and prompt medical attention provided by all members of this patient's healthcare team. The testing and re-testing of systems and function were performed in a timely manner so that outcomes were accurate. In conclusion, this case report demonstrates the importance of early stroke symptom recognition in order to receive tPA to decrease functional impairments and to have better outcomes with physical therapy.

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TABLES and FIGURE

Table 1 Systems Review in Emergency Department

System	Before tPA	After tPA
Cardiovascular/Pulmonary	CTA scan of neck: 70% diameter reduction of the right carotid artery 50% diameter reduction of the left carotid artery	Unchanged
Musculoskeletal	Left UE Strength: Grossly 2+/5 Left LE Strength: Grossly 3/5	Left UE Strength: Grossly 4-/5 Left LE Strength: Grossly 4-/5
Neuromuscular	Left facial droop Finger-to-nose: Intact on right Unable to perform on left Numbness/tingling in left lower extremity	Facial droop absent Finger-to-nose: Intact on right Slow and decreased accuracy on left Light touch: intact throughout
Integumentary	Clammy and diaphoretic	Intact
Communication	Slight slurred speech	Intact
Affect, Cognition, Language, Learning Style	Alert and orientated to person, place, and time	Alert and oriented to person, place, time, situation

*CTA= Computed tomography angiography

* UE= Upper Extremity

* LE= Lower Extremity

Table 2 Tests and Measures during Initial Evaluation

Tests & Measures	Initial Evaluation Results
Manual Muscle Testing	Right UE Grossly 5/5 Right LE Grossly 5/5 Left UE Grossly 4-/5 Left LE Grossly 4-/5
Sensation	Light touch intact throughout but hypersensitivity left lateral thigh
Coordination	RAMs: Intact on right upper and lower extremities Decreased speed and slight delay on left UE and LE Finger-to-nose: Intact on right Slow and decreased accuracy on left Heel-to-shin: Intact on right Slow and decreased accuracy on left
Bed Mobility	The patient required supervision for rolling, supine to sit, sit to supine, and scooting activities with HOB elevated and use of handrails
Transfers	The patient required minimal assistance to perform transfers from bed to chair and chair to bed.
Gait analysis	The patient required minimal assistance on the right side with a hand-held assist for ambulation. The patient was able to walk 450 feet with a 30 second standing rest break due to fatigue. The patient demonstrated a flat foot on the left, slight genu recurvatum on the left when fatigued, and scissoring gait during dual tasks.

*UE= Upper Extremity

*LE= Lower Extremity

*RAMS= Rapid Alternating Movements

* HOB= Head of Bed

321 Table 3 Outcome Measures

Outcome Measures	Results	
NIH Stroke Scale Before tPA	NIH Stroke Scale Level of Consciousness (LOC) = 0 LOC Question = 0 LOC Commands = 0 Best Gaze = 0 Visual = 0 Facial Palsy = 0 Motor Arm - Left = 1 Motor Arm - Right = 0 Motor Leg - Left = 1 Motor Leg - Right = 0 Limb Ataxia = 2 Sensory = 2 Best Language = 0 Dysarthria = 0 Extinction and Inattention = 0 **NIH Stroke Scale Score = 6 (mild stroke)**	
Modified Rankin Scale	**0 No symptoms at all: Before Admission** **1 No significant disability despite symptoms; able to carry out all usual duties and activities: At Discharge** 2 Slight disability; unable to carry out all previous activities, but able to look after own affairs without assistance 3 Moderate disability; requiring some help, but able to walk without assistance 4 Moderately severe disability; unable to walk without assistance and unable to attend to own bodily needs without assistance 5 Severe disability; bedridden, incontinent and requiring constant nursing care and attention 6 Dead	
AM-PAC "6 clicks" Basic Mobility Domain	**At evaluation and discharge:** Bed mobility- 3 Sit to stand; stand to sit- 3 Supine to sit- 3 Seated transfers- 3 Ambulation- 3 Ascending stairs- 3 **40.47% decrease in function**	Scoring related to difficulty: 1 = Total; dependent 2 = A lot; maximum or moderate assistance 3 = A little; minimum assistance, contact guard assistance, supervision 4 = None; no human assistance needed

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Table 4 Goals

Short Term Goals
1. Patient will perform all bed mobility safely, independently, and with no assistance or cueing.
2. Patient will perform all transfers with supervision and no assistive device
3. Patient will ambulate 500 ft with supervision and no assistive device with stable vital signs.

Table 5 Interventions

	Evaluation (after tPA)	Rx	Re-evaluation (after CEA)
Bed mobility Purpose: functional mobility	Assessed how the patient rolled, performed supine to sitting, sitting to supine, and scooting.	Log rolling to left and right x5 each Supine < > sit x5 Sit < > supine x5	Assessed how the patient rolled, performed supine to sitting, sitting to supine, and scooting. Compared changes, if any, from initial evaluation.
Manual Muscle Testing Purpose: track progress	Myotomes C5-C8 and L2-L4 and S1-S2	N/A	Myotomes C5-C8 and L2-L4 and S1-S2. Compared changes, if any, from initial evaluation.
Sensation Purpose: track progress	Light touch L2-L5 and S1	N/A	Light touch of L2-L5 and S1. Compared changes, if any, from initial evaluation.
Coordination Purpose: track progress	Finger-to-nose test, heel-to-shin test, rapid alternating movements of upper and lower extremities.	N/A	Finger-to-nose test, heel-to-shin test, rapid alternating movements of upper and lower extremities. Compared changes, if any, from initial evaluation.
Transfers Purpose: functional mobility	Transfers to and from bed, chair, and toilet.	Sit < > stand bed x5 Sit< > stand chair x5 Sit < > stand toilet x5	Transfers to and from bed, chair, and toilet. Compared changes, if any, from initial evaluation.
Gait Purpose: functional mobility	Assessed gait pattern of patient. Recorded the distance ambulated by the patients and any impairments of gait.	Ambulated in halls 500 feet with focus on quality of gait	Assessed gait pattern of patient. Recorded the distance ambulated by the patients and any impairments of gait. Compared changes, if any, from initial evaluation.

Vital Signs Purpose: ensure pt is responding well to therapy	Assessed heart, oxygen saturation, and blood pressure of patient as patient became symptomatic and at end of session and reported to nurse.	Assessed heart, oxygen saturation, and blood pressure of patient as patient becames symptomatic and at end of session and reported to nurse.	Assessed heart, oxygen saturation, and blood pressure of patient as patient became symptomatic and at end of session and reported to nurse.

Table 6

Outcomes	Before tPA	At Discharge
Strength	Left UE Strength: Grossly 2+/5 Left LE Strength: Grossly 3/5	Left UE Strength: Grossly 4-/5 Left LE Strength: Grossly 4-/5
Sensation	Numbness/tingling in left lower extremity	Light touch intact throughout but hypersensitivity left lateral thigh
Coordination	Failed finger-to-nose test on left	Slow and decreased accuracy with finger-to-nose test on left
Bed mobility	Not tested-was independent before admission	Supervision
Transfers	Not tested- was independent before admission	Supervision
Gait	Not tested- was independent before admission	Minimum Assistance
Modified Rankin Scale	Not tested- 0 (no symptoms) before admission	1-No significant disability despite symptoms; able to carry out all usual duties and activities
AM-PAC	Not tested- was independent before admission	40.47% decrease in function

Figure 1 MRI

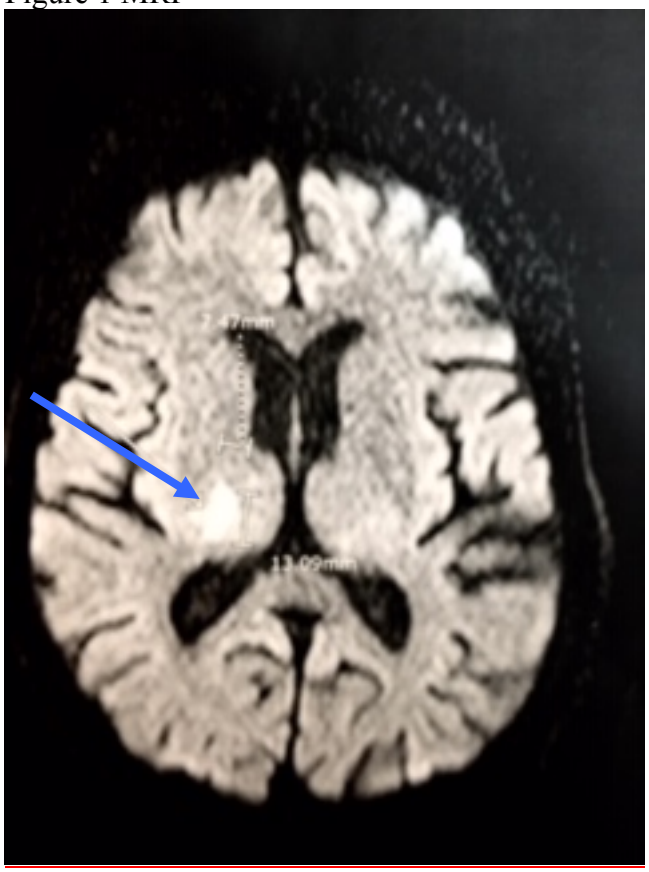

Figure 2 CEA description

Appendix 1 Home Medications

Home Medications	Indications
Gemfibrozil (LOPID)	High Cholesterol
Atenolol (TENORMIN)	High Blood Pressure
Ezetimibe (ZETIA)	High Cholesterol
Venlafaxine XR (EFFEXOR-XR)	Nerve pain or antidepressant
ASCORBIC ACID	Low Vitamin C
CHOLECALCIFEROL	Low Vitamin D
Sulfamethoxazole-trimethoprim (BACTRIM DS, SEPTRA DS)	Treat/prevent infections

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377 **CARE Checklist**

CARE Content Area	Page
1. **Title** – The area of focus and "case report" should appear in the title	2
2. **Key Words** – Two to five key words that identify topics in this case report	2
3. **Abstract** – (structure or unstructured) a. Introduction – What is unique and why is it important? b. The patient's main concerns and important clinical findings. c. The main diagnoses, interventions, and outcomes. d. Conclusion—What are one or more "take-away" lessons?	3
4. **Introduction** – Briefly summarize why this case is unique with medical literature references.	3-4
5. **Patient Information** a. De-identified demographic and other patient information. b. Main concerns and symptoms of the patient. c. Medical, family, and psychosocial history including genetic information. d. Relevant past interventions and their outcomes.	4-5, 18
6. **Clinical Findings** – Relevant physical examination (PE) and other clinical findings	5-7, 12-14
7. **Timeline** – Relevant data from this episode of care organized as a timeline (figure or table).	9
8. **Diagnostic Assessment** a. Diagnostic methods (PE, laboratory testing, imaging, surveys). b. Diagnostic challenges. c. Diagnostic reasoning including differential diagnosis. d. Prognostic characteristics when applicable.	7,17
9. **Therapeutic Intervention** a. Types of intervention (pharmacologic, surgical, preventive). b. Administration of intervention (dosage, strength, duration). c. Changes in the interventions with explanations.	8-9 15-16
10. **Follow-up and Outcomes** a. Clinician and patient-assessed outcomes when appropriate. b. Important follow-up diagnostic and other test results. c. Intervention adherence and tolerability (how was this assessed)? d. Adverse and unanticipated events.	9-10 16
11. **Discussion** a. Strengths and limitations in your approach to this case. b. Discussion of the relevant medical literature. c. The rationale for your conclusions. d. The primary "take-away" lessons from this case report.	10
12. **Patient Perspective** – The patient can share their perspective on their case.	N/A

13. **Informed Consent** – The patient should give informed consent.	2