

Stroke

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Dr. Rowland is a graduate of Rush Medical College in Chicago, Illinois, and completed residency at Advocate Illinois Masonic Medical Center and a fellowship at the University of Chicago. She is an associate medical editor for the AAFP's *FP Essentials* and serves on the editorial board for *Journal of Family Practice*. She enjoys teaching about topics that require research, synthesis, and empathy to understand. In addition, she enjoys teaching about evidence-based medicine topics. Dr. Rowland strives to make her lectures relevant to practice, thought provoking, and informative.

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Learning Objectives

1. Diagnose and evaluate patients presenting with possible signs of TIA or stroke.
2. Counsel patients on the warning signs of a stroke.
3. Use current evidence-based guidelines in selecting appropriate imaging study for diagnosing acute ischemic stroke.
4. Develop evidence-based treatment plans that focus on risk factor modification and medical therapy, emphasizing shared decision making and motivational interviewing.

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Audience Engagement System

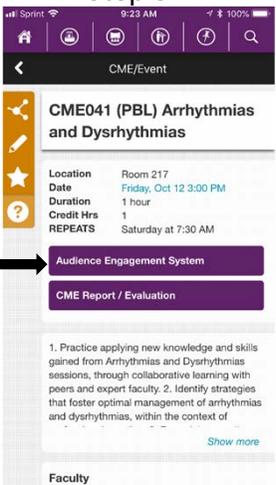
Step 1



Step 2



Step 3



The diagram illustrates the three steps of the Audience Engagement System. Step 1 shows the app's dashboard with a grid of icons for navigation, including 'My Schedule', 'CME/Events', 'Faculty', 'Exhibit Hall', 'Maps', 'Event Pulse', 'Claim CME', 'Attendee Profiles', 'Social Media', and 'Local Places'. Step 2 shows the 'CME/Events' screen with a calendar view and a list of events. Step 3 shows the details for a specific event, 'CME041 (PBL) Arrhythmias and Dysrhythmias', including its location, date, duration, and credit hours. The event details screen also features an 'Audience Engagement System' button and a 'CME Report / Evaluation' button.

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Stroke facts

- Almost 800,000 strokes a year in the US
- 3/4 of strokes are first strokes
- 1/3 occur in people < 65
- Stroke rates are decreasing in the US and other high-income countries

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Stroke facts

- 6.8 million stroke survivors in the US
- A leading cause of functional impairment
- 1/4 of stroke survivors >65 remain dependent on others for care
- 1/2 of people at risk for stroke view a major stroke as “worse than death”

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Definitions

- Transient ischemic attack:
 - Neurologic deficit caused by ischemia with complete resolution within 24 hours, without signs on imaging
 - Resolution often within 1 hour
- Cerebral vascular accident:
 - Neurologic deficit caused by an acute focal injury to the central nervous system
 - Ischemic
 - Hemorrhagic
 - Subarachnoid

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AES Question

Which of the following is the most common symptom of an acute ischemic stroke?

- A. Arm weakness
- B. Leg weakness
- C. Speech disruption
- D. Facial weakness
- E. Paresthesia

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Most common symptoms of ischemic stroke

Symptoms	Prevalence
Sudden onset	96%
Arm weakness	63%
Leg weakness	54%
Speech disturbance	53%
Facial weakness	23%
Arm paresthesia	20%
Leg paresthesia	17%
Headache	14%
Dizziness	13%

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Most common signs of ischemic stroke

Sign	Prevalence
Arm paresis	69%
Leg paresis	61%
Dysarthria	57%
Ataxia	53%
Facial paresis	45%
Eye movement asymmetry	27%
Visual field defect	24%

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Differential for stroke symptoms

- Migraine/hemiplegic migraine
- CNS infection
- Trauma
 - Acute
 - Subacute
 - Chronic
- Encephalopathy
 - Metabolic
 - Hypertensive
- Seizure
- Reversible cerebral vasoconstriction syndrome
- Tumor/lymphoma
- Intoxication
 - Legal or illegal
 - Intentional or not
- DKA/Hyperosmolar hyperglycemia
- Conversion reaction

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Evaluation of stroke symptoms

- CBC
- CMP
- Coags
- TSH
- EKG/troponin

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Imaging for stroke symptoms

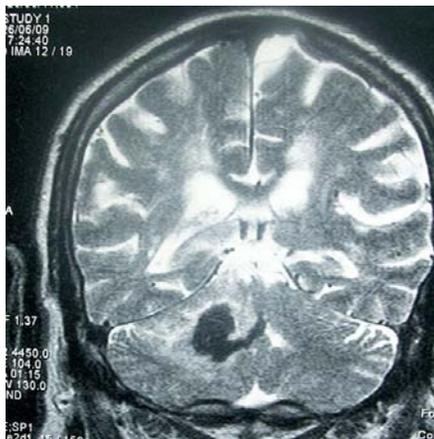
- CT head without contrast within 1 hour of presentation to ED
 - Ideally within 30 minutes
 - Assess for hemorrhagic vs ischemic stroke
- CT angio may also be used to confirm a clinical diagnosis or plan treatment



Image credit: https://commons.wikimedia.org/wiki/File:Head_CT_stroke.jpg

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Imaging for stroke symptoms



https://commons.wikimedia.org/wiki/File:Head_MRI_stroke.JPG

- Consider MRI as first imaging modality if MRI can be completed within 1 hour of presentation
 - Better specificity and equivalent sensitivity
- Otherwise, MRI ideally within 12-24 hours to confirm dx and guide treatment

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Risk factors for stroke



AES question

Which of the following is not a risk factor for stroke?

- A. Being born LGA
- B. Being born SGA
- C. Having pre-eclampsia during pregnancy
- D. Poverty
- E. Migraine headaches



Major risk factors for all cardiovascular disease

1. Physical inactivity
2. Unhealthy diet
3. Overweight/obesity
4. Smoking

1. Age
2. Sex
3. Family history
4. Race and ethnicity

1. Diabetes
2. Hypertension
3. Hyperlipidemia

1. Other comorbidities
 1. Autoimmune diseases
 2. Depression
2. Chronic stress
3. Poverty

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Risk factors for stroke

- Low birth weight
 - Unclear if causal or correlative
- Sickle cell disease
- Migraine
- Pre-eclampsia

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Race, ethnicity and stroke

- Compared with white patients, African-American patients are
 - More likely to experience stroke (about double)
 - More likely to die from stroke
 - Most prominent <55 years
 - Effect vanishes >85 years
- May be due to disparities in other diseases (hypertension, diabetes)
 - Incidence
 - Recognition
 - Treatment

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Race, ethnicity and stroke

- Compared with white patients, Caribbean Hispanic patients (Dominican, Puerto Rican) are
 - More likely to experience stroke
 - More likely to have hypertension
 - Less likely to have atrial fibrillation
 - Less likely to be physically active than either white or African-American patients

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Poverty, inequity, and stroke

- Lower childhood SES increases adult rates of stroke and CVD
- Adult poverty and low wealth, even controlling for education and public assistance, increase rates of CVD in African-American patients (F>M)
- Stroke rates for the African-American communities with the lowest poverty rates (<5% below FPL; 230/100,000) were approximately equivalent to white communities with higher poverty rates (10-25% FPL; 229/100,000)

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Low birth weight and stroke

- Babies born <2500 g have double the risk of stroke of those born >4000g—*50 years later!*
- Babies with LBW may also be more likely to:
 - Have inadequate nourishment
 - Come from disadvantaged families
 - Be multiples or have other birth/congenital issues
 - Have other health issues
- Which makes a causation-vs-correlation relationship tough to assess

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Sickle cell disease and stroke

- Begins in childhood
 - 1 in 10 children with SCD will have a stroke on MRI by age 20
- Patients with abnormal transcranial doppler (TCD) exams have 10x the risk of patients with normal exams
 - Annual TCD screening recommended for patients with SCD ages 2-16 years
- Children with worsening TCD receive RBC transfusion

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Migraine and stroke

- Most documented in young women
 - Some studies find no association for men
- MA/SR found RR=2 (95% CI 1.72-2.43)
 - MA/SR found RR for migraine with aura: 2.51 (95% CI 1.52-4.41)
- CDC MEC recommends against COCs for women with migraine with aura at any age
- For women with menstrual migraine or migraine without aura, okay to use if no other significant ASVCD risks or other contraindications

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Pre-eclampsia and stroke

- Pre-eclampsia increases risk of stroke in pregnancy
- Women with a history of pre-eclampsia also have 2-3x risk of stroke or other cardiovascular events after 30 years of follow up
- Pre-eclampsia requiring delivery <34 weeks increases risk

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Women and stroke

- After age 55 women have a higher lifetime prevalence of stroke than men
- 60% of stroke deaths occur in women
 - Age-specific stroke mortality is higher in men in all but the oldest groups

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Women and stroke

- Women are more likely to have a stroke with hypertension
- Women are more likely to be prescribed antihypertensive medications
 - And to take them
 - Yet they are *less* likely to have controlled BPs!

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Women and stroke

- Women have female-specific RFs:
 - Pregnancy
 - Increases risk from 21 to 34/100,000 woman-years
 - Pre-eclampsia
 - Increases risk of future hypertension 2-10x
 - Estrogen
 - Affects hypertension and response to medications
 - Desire for contraception
 - COCs increase risk of HTN and stroke, although risks are not synergistic

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Comorbidities and the risk of stroke

The logo for FMX, consisting of the letters 'FMX' in a bold, sans-serif font. The 'F' and 'M' are black, and the 'X' is orange. It is positioned on the right side of a horizontal bar with a grey and white diagonal striped pattern.

AES question

Studies show that when sedentary people become active, their risk of stroke decreases.

- A. True
- B. False

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AES question

Weight loss, in people who are overweight or obese and at risk of stroke, has been shown to reduce the risk of stroke.

- A. True
- B. False

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Exercise and stroke

- Active people are less likely to have strokes than sedentary people
- No studies done to test whether getting sedentary people to be more active reduces their risk, but it's a reasonable, low-harm assumption!

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Obesity and stroke

- Obesity correlates with stroke risk factors
 - Hypertension
 - Diabetes
 - Other CVD
 - Metabolic syndrome
- No evidence to support weight loss to reduce stroke risk

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Lipids and stroke

- Turbulent relationship between cholesterol or LDL levels and stroke risk
 - Higher cholesterol: lower risk of hemorrhagic stroke
 - Higher cholesterol: higher risk of ischemic stroke
- Statins reduce the risk of stroke
 - 2008 MA/SR 120,000 patients: 0.84 (95% CI, 0.79–0.91)
 - No change in all-cause mortality
 - No change in risk of hemorrhagic stroke
 - Higher risk=bigger effect
 - Secondary>>primary prevention

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Diabetes and stroke

- Diabetes is a risk factor for stroke
- Tight glycemic control does not reduce the rate of stroke
 - A1c targets <8% may reduce other complications
- Patients with diabetes should aggressively control other risk factors, like hypertension and hyperlipidemia

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Smoking and stroke

- Smoking is a risk factor for ischemic stroke
- Second-hand smoke appears to be a risk factor for CVD
- Combination of counseling + medication leads to higher quit rates than either method alone
- Varenicline is superior to NRT or bupropion for quit rates and sustained quitting

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Counseling on lifestyle modification to reduce stroke risk

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Risk factor reduction

- World Health Organization and CDC reports find that modifiable risks contribute to approximately half of early deaths in the US:

Smoking	Obesity
Poor diet	Physical inactivity

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The AHA has “Life’s Simple 7”

- Manage blood pressure
- Control cholesterol
- Reduce blood sugar
- Get active
- Eat better
- Lose weight
- Stop smoking

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Counseling and available choices

- Preventing CVD is a public health level problem
- We ask patients to make individual choices to overcome the environment around them (+ history + habit) without adequately equipping them with healthier environments and opportunities for choices

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Shared decision making and choice

- We want to prevent or reduce that CVD death rate!
- Lifestyle changes can and do work
- Family physicians are motivated to counsel and educate patients.
- Patients are motivated to be engaged in their care
- Patients do better when engaged

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Physician counseling for lifestyle change

- Unfortunately there's little evidence that physician counseling for lifestyle change creates lifestyle change
- The best evidence is for intensive programs
 - At least 6 contact hours
- 15 minute visits may not be effective
 - This doesn't mean we don't counsel, but we shouldn't be surprised when it doesn't work

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Motivational interviewing

- Patients prefer motivational interviewing to traditional counseling
- Outcomes may be better
- Outcomes tend to be best with intensive MI training for the practitioner (physician, mental health provider, health coach, etc)
- Mental health providers = better outcomes
- More contact time = better outcomes

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USPSTF recommendations for counseling

- Counsel adults who are overweight/obese and have additional CVD risk factors
- Use intensive methods or refer to intensive counseling programs
- SOR=B

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AHA recommendations for counseling

- Counsel all patients for risk factor reduction
- Set specific goals with a specific timeframe in mind
- Help patients monitor their own progress
- Provide feedback on progress
- Have a clear plan for follow-up
- Use motivational interviewing
- Build patient self-efficacy

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Counsel to access healthcare

- Outcomes are best if patients present within 3 hours
 - Thrombolysis window 3 hours (up to 4.5 in some cases)
- Patients should know stroke signs/symptoms and what to do

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FAST Stroke

- F: Facial asymmetry
- A: Arm weakness
- S: Speech slurred
- T: Time to call emergency services

Can be taught to patient or family

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AES question

Which of the following is included in the DASH diet?

- A. 1 alcoholic drink/day or alcohol abstinence
- B. <60 grams of carbohydrates per meal/snack
- C. 2+ servings of oily fish per week
- D. <10% of fat from saturated fat
- E. Avoidance of concentrated sweets

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(A) DASH diet

- ≥ 4.5 cups of fruits/vegetables daily
- < 450 calories from sugar-sweetened beverages weekly
- > 2 servings (3.5oz) of oily fish weekly
- > 3 servings (1oz) of fiber-rich grains daily
 - (1.1 g fiber per 10g of carb)
- < 1.5 g sodium daily

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DASH reduces the risk or severity of many conditions

- Hypertension
- Gout
- Diabetes
- Obesity
- Asthma*
 - (One small trial, results statically but not clinically significant)
- CKD
- Renal stones
- Safe for children
- Easy to teach
 - Not as easy to adopt



Image credit: Flickr user muammerokumus

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Other dietary options to reduce stroke

- Mediterranean diet
 - Fruits and vegetables
 - Whole grains
 - Fish
 - Olive oil
 - Red wine
 - Nuts
 - Limited
 - Red meat
 - Butter
 - Salt
 - Dairy
- RCT in Spain
 - 7500 patients with CVD
 - Randomized to Med diet
 - Olive oil supplement
 - Nut supplement
 - Control
 - Med diet associated with a reduction in MI, stroke, and all-cause mortality (RR: 0.7, 95% CI: 0.54-0.92)

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If stroke prevention plans all your menus

- Virtually all dietary information comes from observational studies and should be taken with a grain of Low-Sodium Salt Substitute
- Low sodium foods
 - Reduces BP
 - May have independent effects also
- Association of stroke and red meat consumption is higher in Asian countries than in Western countries
- High potassium foods
 - May reduce BP
 - May reduce the effects of sodium on BP
 - Caution in CKD
- Sweet potatoes
- Squash
- Beans
- Avocado (2x as a banana!)
- Salmon
- Spinach

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Exercise for cardiovascular health

- 150 minutes a week of moderate-intensity cardiovascular exercise
- 75 minutes of week of vigorous-intensity cardiovascular exercise
- *And*
- Moderate- to high-intensity muscle strengthening exercise 2x week
- For hypertension and hyperlipidemia, 40 minutes of moderate to vigorous-intensity cardiovascular exercise 3-4 days a week

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Exercise for cardiovascular health

Borg Rating of Perceived Exertion

#	Level of Exertion
6	No exertion at all
7	
7.5	Extremely light (7.5)
8	
9	Very light
10	
11	Light
12	
13	Somewhat hard
14	
15	Hard (heavy)
16	
17	Very hard
18	
19	Extremely hard
20	Maximal exertion

Heart rate correlation (roughly)

- Moderate intensity:
 - Borg 11-14
 - HR: $\text{Borg} * 10 = 110-140$ BPM
- Vigorous intensity:
 - Borg 14+
 - HR: 140+

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Management of comorbidities to reduce stroke risk



Aspirin to prevent ASCVD

- USPSTF recommendation:
 - Patients 50-59
 - 10-year ASCVD risk of at least 10%
 - No increased risk of bleeding
 - At least a 10-year life expectancy
 - Willing to commit to 10 years of therapy
 - B recommendation (for ASCVD and colorectal cancer!)
 - C recommendation for those 60-69
 - I recommendation for those under 50 or over 70



Aspirin to prevent ASCVD

- AHA recommendation:
 - Adults (no age restrictions)
 - 6% 10-year risk or greater
 - Without an increased risk of bleeding

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Statins to prevent ASCVD

<ul style="list-style-type: none">• LDL > 190	<ul style="list-style-type: none">• Diabetes• Age 40-75• LDL 70+
<ul style="list-style-type: none">• LDL 70-189• ASCVD $\geq 7.5\%$*: moderate to high intensity statin• ASCVD 5-7.4%: consider statin	<ul style="list-style-type: none">• People with known CVD, PAD are at much higher risk and aren't included in this discussion

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AES question

- Which of the following is true regarding statins therapy?
 - A. Monitor LFTs every 3 months while on statin therapy
 - B. Screen patients on statins for diabetes at least every 3 years
 - C. Statins are safe in breastfeeding moms
 - D. About 1 in 25 patients will have muscle pain and/or weakness attributable to statins

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Statin therapy

- ACC/AHA guideline no longer recommends baseline or periodic monitoring of AST/ALT
- Check lipids within 4-12 weeks “to assess adherence”, then every 3-12 months
- Screen for diabetes (annually)
- NNT for 1 year for primary prevention:
 - To prevent 1 nonfatal MI: about 220
 - To prevent 1 death....
- NNH for 1 year:
 - To cause muscle pain: about 25
 - To cause diabetes: about 220
- Statins are category X; avoid in breastfeeding

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Statins to prevent ASCVD

Low intensity statin	Moderate intensity statin	High intensity statin
Simvastatin 10	Atorvastatin 10 or 20	Atorvastatin 40 or 80
Pravastatin 10 or 20	Simvastatin 20 or 40	Rosuvastatin 10 or 20
Lovastatin 20	Pravastatin 40 or 80	
Fluvastatin 20 or 40	Lovastatin 80	
	Fluvastatin 40	
	Rosuvastatin 10	

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Hypertension goals

- Primary prevention:
 - <140/90
- Secondary prevention:
 - Initial management: avoid antihypertensives
 - 72 hours after TIA/CVA: start or restart BP meds to keep BP <130/80
 - Do not start if BP <120/70

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Practice change recommendations

1. Recommend aspirin in patients between 50 and 59 who have at least a 10% 10-year ASCVD risk, are likely to live 10 years, and have no increased risk of bleeding. (SOR B) Consider aspirin for patients ages 60-69 who meet those same criteria. (SOR C)
2. Individualize recommendations for risk factor reduction in patients who are overweight or obese and have other risk factors for stroke. Recommend intensive programs for patients who are ready to make changes. (SOR B)
3. Recognize risk factors specific to women, including increased risk of stroke after pre-eclampsia and increased risk of stroke with migraine, and the risk of atypical symptoms of stroke specific to women. (SOR C)

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Questions



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