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Improving Diagnostic Quality and Safety/Reducing Diagnostic Error: Measurement Considerations

Committee Web Meeting 6

May 19, 2020

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Agenda

- Welcome, Review of Meeting Objectives, and Introductions
- Discuss Use Cases 3 and 4
- Discuss Cross-Cutting Recommendations
- Review Structure and Format of Final Report
- Opportunity for Public Comment
- Next Steps

Welcome and Introductions

NQF Project Staff

- **Meredith Gerland,** MPH, CPHQ, CIC, Director
- **Chelsea Lynch,** MPH, MSN, RN, CIC, Director
- **Deidra Smith**, PMP, Senior Project Manager
- **Udobi Onyeuku**, MSHA, Project Analyst
- **Jesse Pines**, MD, Consultant

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Committee Roster

- David Andrews
- David Newman-Toker, MD, PhD
- Flavio Casoy, MD, FAPA
- Karen Cosby, MD
- Sonali Desai, MD
- Jane Dickerson, PhD
- Andreea Dohatcu, PhD, DABR, MRSC, CMQ
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- Lavinia Middleton, MD
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- Shyam Prabhakaran, MD
- Ricardo Quinonez, MD, FAAP
- Roberta Reed
- Hardeep Singh, MD, MPH
- Colleen Skau, PhD
- Michael Woodruff, MD
- Ronald Wyatt, MD

Federal Liaisons

Nonvoting Committee Representatives

- Andrea Benin, MD
- David Hunt, MD
- Marsha Smith, MD, MPH, FAAP

Overview of Use Case Approach

Purpose of Use Cases

- Uses cases will:
  - Apply to various systems, settings, stakeholders, and populations
  - Describe a specific diagnostic error
  - Identify causal factors and diagnostic challenges
  - Share solutions to overcome the diagnostic error
  - Identify measurement approaches and concepts to assess the degree to which the solutions are being implemented
- Case exemplars will be included to assist with identifying barriers and solutions, and to demonstrate granular solutions in practice
  - The case exemplars should illustrate the error in practice, highlight diagnostic challenges and causal factors, and offer global and granular solutions

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Approach

1. **Clinical Context:** Identify the clinical context for the specific error occurring
2. **Case Exemplars:** Discuss specific case exemplars to thread through the rest of the questions
3. **Diagnostic Challenges/Casual Factors:** Identify the diagnostic challenges and causal factors that contribute to the error
4. **Solutions:** Identify global and granular solutions to prevent and overcome the diagnostic error
5. **Quality Measurement:** Identify opportunities for performance measures

Discuss Use Cases 3 and 4

Overview of Use Cases 3 and 4

- **Use Case 3: Cognitive Error – Information Overload**
  - Information overload in complex, critically ill patients when the disease "signal" is too high
- **Use Case 4: Cognitive Error – Dismissed Patient**
  - Prolonged diagnostic odyssey for chronic symptoms when the disease "signal" is minimal or ignored

Use Case 3: Cognitive Error—Information Overload

Information overload in complex or critically ill patients when the disease “signal” is too high

Clinical Context for Cognitive Error—Information Overload

- There is increasing complexity in both the content of clinical care (e.g., aging population, multiple chronic comorbidities, sicker hospitalized patients) and the delivery of that care (e.g., faster pace of care, more complex and disconnected teams, increased regulatory oversight, complicated electronic health records [EHR], novel technologies)
- The sheer volume of information and how its presented to clinicians can sometimes lead to errors
- The requirement to process a high volume of information may lead clinicians to miss an otherwise apparent diagnosis due to information and task overload
- Excessive cognitive load, both intrinsic and extraneous loads, serves as one of the key underlying causes
- Distractions and interruptions in the environment can disrupt a clinician's overall cognitive capacity to address both extraneous and intrinsic tasks and can result in diagnostic error

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Possible Case Exemplar 1

- An Emergency Department (ED) physician is working an overnight shift in a busy urban hospital, and her patient load includes multiple patients at different stages in their clinical workup
- A 50-year old male with a history of diverticulitis who is three weeks post-operative colon resection surgery presents with fever, nausea, vomiting, and abdominal pain for three days
- The physician treats the abdominal pain patient with pain medication and orders a CT scan; however, she misses the CT scan result stating the patient has a possible small intra-abdominal abscess because she was so busy
- The patient is discharged home, but returns the next day in septic shock and with an increased size of the abscess
- His treatment requires immediate surgery to remove the infection, which could have been treated the day before with antibiotics and drainage through the skin

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Possible Case Exemplar 2

- A 65-year old man with a history of hypertension and atrial fibrillation undergoes mitral valve repair due to stenosis
- The patient is sent to the ICU post-operatively and placed on continuous cardiac and blood pressure monitoring, with vital signs obtained every two hours and heart rhythm checked daily
- Laboratory testing is performed daily with a subtly increasing anion gap
- On day 5, the patient becomes tachycardic and febrile, and is started on antibiotics for bacterial sepsis
- A few days later, his blood culture grows *Candida albicans,* a yeast that causes a fungal infection
- The early signs of lactic acidosis are missed, and fungal sepsis was not initially considered
- The delay in appropriate treatment led to his fungemia infecting his valve and resulted in a prolonged ICU stay and additional surgery

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Possible Case Exemplar 3

- A 45-year old female presents with symptoms of generalized weakness to a primary care physician (PCP) for her first visit to the practice
- She has a complicated history with multiple medical and mental health comorbidities
- In her previous primary care practice, she saw several different PCPs who each attempted to integrate all findings and recommendations from her previous clinic visits and hospitalizations; however, no one was able to synthesize a coherent diagnostic approach
- The new PCP attempts to review the information, but is unable to process all of it
- Over six months, the patient has multiple clinic visits
- A neurologist recommends an MRI and eventually confirms a diagnosis of multiple sclerosis (MS)
- While reviewing the MRI, the neurologist loads records from a health information exchange and finds an old MRI with similar findings that was originally provided to the PCP
- The old MRI was not reviewed originally due to the large volume of information provided by the patient, resulting in a delay in follow up with a neurologist and subsequent delay in diagnosing of MS

Diagnostic Challenges and/or Causal Factors

Clinician Factors:

- Physical fatigue
- Mental fatigue
- Alarm fatigue
- Distractions
- Decreased ability to handle high cognitive load due to limited clinical experience or older clinician age

Systems Factors:

- Poor organization of information within the EHR
- Process complexity
- Interruptions
- Multiple care settings and providers involved in the patient's care
- Information complexity
- Ambiguous information

Disease/Condition Factors:

- Clinical complexity

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Potential Solutions

- Leverage technology as a tool to manage complex information
- Support clinicians in managing large and/or complex patient loads
- Provide patients opportunities to help manage information

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Potential Solution: Leverage Technology as a Tool to Manage Complex Information

Process:

- Enable technology to identify important changes in clinical information
  - Collaborate with EHR vendors and IT teams to understand the capability of the EHR to perform data visualization methods and trend clinical values
  - Educate clinicians on EHR data visualization and trend analysis capabilities
  - Use AI to recognize data patterns to support identification of clinically relevant findings
- Increase the usability of EHRs
  - Partner with EHR vendors to identify future opportunities for data visualization methods
  - Use a human factors engineering approach when designing EHRs
  - Engage frontline staff and end-users in discussions with EHR vendors around current use and opportunities for improved usability
  - Request that vendors perform education with frontline staff
  - Build multidisciplinary teams to analyze current EHR notifications and make recommendations
  - Examine current EHR notifications and identify opportunities to increase clinical salience of the notifications

Potential Solution: Support Clinicians in Managing Large and/or Complex Patient Loads

Process:

- Employ a team approach to help distribute and/or offset the cognitive load on a single clinician
  - Engage multidisciplinary team members to support clinical decision making
  - Understand current patient load and create capacity limits for a single clinician
  - Limit the number of patients cared for by a single clinician based on data findings
  - Rotate or shift repetitive tasks at pre-identified scheduled intervals
  - Reduce extraneous tasks performed when finding information to enable clinicians to focus on clinical tasks
- Increase access to mechanisms and tools that help clinicians process complex clinical information
  - Develop diagnostic algorithms and/or protocols for clinical circumstances that address known pitfalls
  - Use simulation training to prepare clinicians for managing situations with high cognitive load
  - Increase access to specialists through telemedicine, especially in rural settings
  - Provide access to online textbooks and/or online journals
  - Provide access to diagnostic tools
  - Create an accessible tool containing information that can assist on-call clinicians and specialists with complex cases or large patient loads

Potential Solution: Provide Patients Opportunities to Help Manage Information

Process:

- Create opportunities for patients to highlight important clinical information
  - Encourage patients and families to actively monitor their own care and escalate issues as they arise
- Ensure patients understand what diagnoses are being considered and what has been ruled out
  - Explain to patients what diagnostic tests are being performed
  - Communicate frequently with patients about updates to the differential diagnosis when certain diagnoses have been ruled out
  - Provide education materials that are suitable for patients and their families about their diagnosis.
  - Provide patient access to medical records

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Use Case 3: Discussion Questions

- Are any causal factors/diagnostic challenges missing?
- Are any solutions missing?
- What specific actions can payers take to support the solutions?
- What specific actions can researchers take to identify and test new solutions, and build an evidence base to support existing solutions?
- How can the solutions be operationalized?

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Use Case 3: Measurement Considerations *(1 of 2)*

Measurement Approach	Measure Concepts	Rationale
Assess the usability of EHR platforms by users	• Clinician-reported assessments of usability • Presence of data visualization methods that meet quality standards within the HER	• Measuring the usability of EHRs, such as the presence of data visualization methods and other tools to identify EHRs that are more successful in managing information and those with opportunities to improve usability, in particular to display and management of complex information
Measure clinician productivity as a proxy for cognitive load	• Number of patients seen per hour by a clinician	• Gathering information on the number of patients seen by a single clinician in a given time frame and also during times of peak demand may serve as a proxy for understanding the burden, clinical load, and/or cognitive load on particular clinicians • Analyzing information on clinical load and diagnostic errors may help inform if certain thresholds should be in place to help manage cognitive load
Measure the time to identify important clinical events	• Time to detection of important clinical events (e.g., sepsis)	• Understanding the time it takes to detect important clinical events will help identify opportunities where diagnostic odysseys are occurring, as well as provide data for root-cause analysis and follow-up to pinpoint remediable key causes of delays

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Use Case 3: Measurement Considerations *(2 of 2)*

Measurement Approach	Measure Concepts	Rationale
Assess data sharing	• Rate of participation in a health information exchange	• Participation in a health information exchange supports the use of data to improve accessibility of information and reduce diagnostic errors
Assess patients' perceptions of if they are part of the diagnostic team	• Patient-reported perceptions of patient input into the diagnostic process	• Gathering information directly from the patient may be a useful way to measure if a patient feels that his/her opinions are heard and he/she is part of the diagnostic team
Measure relational coordination	• Coordination of Care Index (COCI)	• Measures of relational coordination, which focus on coordination and communication of teams, could serve as a proxy for if information and tasks are being successfully addressed by the team

Use Case 3 Measurement Considerations: Discussion Questions

- Are any measurement approaches missing?
- What specific actions can developers and payers take to facilitate the measurement solutions?

Use Case 4: Cognitive Error – Dismissed Patient

Prolonged diagnostic odyssey for chronic symptoms when the disease "signal" is minimal or ignored

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Clinical Context for Cognitive Error – Dismissed Patient

- Patients with uncommon conditions, or unusual presentations of more common conditions, sometime experience long diagnostic delays in the assessment of chronic symptoms that are mild, non-specific, or evolving slowly
- Patients may be labeled as having “medically unexplained symptoms” and the search terminated, may undergo a “diagnostic odyssey” to find a diagnosis, or may be dismissed as having functional symptoms, somatization, or hypochondriasis
- Delays may occur because a condition is rare and indolent, and is unfamiliar to the clinician
- Non-specific symptoms are especially prone to diagnostic odysseys because symptoms may cross many specialty lines and multidisciplinary communication may be lacking
- In some cases, the patient may have tried to communicate something critical to the correct diagnosis, but it as not heard or appreciated by the clinician
- Affective bias also contributes to these errors, with clinicians not listening, not hearing, or giving up on the patient entirely

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Possible Case Exemplar 1

- A 23-year old female with three-year history of intermittent abdominal pain, bloating, and diarrhea who is uninsured goes to ED when she has symptoms
- Over three years, she has had six normal CT scans and has been admitted twice for observations with no clear diagnosis
- After exploring the internet between visits to identify the cause of her symptoms, she learns of celiac disease and concludes that the condition fits her symptoms perfectly
- She brings up this self-diagnosis to her clinicians at subsequent appointments, but is disregarded and told that there are many possible causes of abdominal pain that must be explored
- She has been referred to a gastroenterologist as an outpatient after each visit, but she cannot afford to pay upfront and be seen
- She gains insurance coverage through new employment and sees a gastroenterologist, who conducts an endoscopy and blood testing, and diagnoses the patient with celiac disease

Possible Case Exemplar 2

- A 40-year old female with no medical history develops widespread muscle pain, tenderness, and numbness with increased fatigue, and depression
- Her PCP diagnoses her with fibromyalgia and prescribes anti-inflammatory and muscle relaxant medication
- She sees multiple specialists including a psychiatrist, a chiropractor, and a massage therapist
- She sees Rheumatologist and neurologist, who both treat her symptoms as functional and agree with the PCP's diagnosis of fibromyalgia without considering alternatives
- She wakes up one morning with more severe abdominal pain, and goes to the ED and is evaluated for possible appendicitis with a CT
- She is diagnosed with metastatic ovarian cancer, which was causing her symptoms

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Possible Case Exemplar 3

- A 45-year old woman with a history of anxiety and schizoaffective disorder presents to the ED with reports of longstanding, intermittent headaches over a 1-year period and has history of migraines
- She is homeless and has been dismissed from the ED many times due to her history and frequent visits
- She usually receives a cursory physical examination, which is typically normal, is given acetaminophen, is referred to a social worker, and is told to follow-up with a PCP
- She presents to the ED one day after a fall with a scalp hematoma, and receives a head CT
- The CT does not demonstrate intracranial bleeding, but does demonstrate a moderate-sized mass in her medial temporal lobe and midline shift, which was the cause for her indolent headaches and was missed during her multiple ED visits

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Diagnostic Challenges and/or Causal Factors

Clinician Factors:

- Lack of PCP who synthesizes information from multiple sources
- Tendency to undervalue patients' knowledge and contributions
- Cognitive biases, including implicit bias, confirmation bias, overconfidence, and affective bias
- Failure to explain to the patient diagnostic tests previously performed

System Factors:

- Lack of interoperability across EHRs
- Over-emphasis and over adherence to protocols
- Multiple care settings and providers involved in the patient's care

Disease/Condition Factors:

- Rarity of the condition
- Condition may not be diagnosable with commonly used tests
- Non-specific nature of symptoms

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Potential Solutions

- Enhance opportunities for patient engagement through education and training
- Empower patients to raise concerns and share their perspectives
- Identify opportunities for technology and data to recognize potential diagnostic odysseys

Potential Solution: Enhance Opportunities for Patient Engagement Through Education and Training

Process:

- Provide education to support clinicians actively engaging patients and families as part of the diagnostic team
  - Require clinician education on patient-centered diagnostic decision-making and shared decision making
  - Create diagnostic checklists with items that pertain to getting input from the patient and/or family
  - Share information about diagnostic tests performed and diagnoses ruled in or out with patients
- Support clinicians in overcoming common biases that may limit their ability to hear the perspectives of patients
  - Educate clinicians on common types of biases that contribute to dismissing the perspectives of a patient
  - Support clinicians in identifying mechanisms to identify and overcome bias
  - Create protocols for initiating consultations and/or second opinions
- Encourage clinicians to act early on the concerns voiced by patients and families
  - Support the use of early referrals for genetic counseling, specialist care, and other high-risk situations
  - Educate clinicians that deviations from protocols may occur based on patient needs
  - Engage patients to share stories with clinical teams where diagnostic errors occurred when the patient concerns and inputs are not listened to

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Potential Solution: Empower Patients to Raise Concerns and Share Their Perspectives *(1 of 2)*

Process:

- Invite patients to be part of the diagnostic team
  - Request input directly from patients and families when trying to understand the clinical picture
  - Provide frequent opportunities for patients and families to share important information and/or raise concerns
  - Offer feedback to patients to reinforce how the information shared helps contribute to the diagnosis
  - Use shared decision making to co-create a diagnostic plan together with patients and families
  - Use signage throughout the organization that encourages patients to speak up
- Ensure patients understand what diagnoses are being considered and what has been ruled out
  - Explain to patients what diagnostic tests are being performed
  - Communicate frequently with patients about updates to the differential diagnosis when certain diagnoses have been ruled out
  - Provide patient access to medical records

Potential Solution: Empower Patients to Raise Concerns and Share Their Perspectives *(2 of 2)*

Process:

- Engage the Patient and Family Advisory Council (PFAC)
  - Partner with the PFAC to identify opportunities to increase patient engagement in the diagnostic process
  - Identify opportunities to engage the PFAC in co-designing activities that promote accurate diagnoses
  - Offer education for how patients can be their own advocate
- Engage patients who have experienced diagnostic odysseys to help prevent diagnostic errors in the future
  - Create processes to support patients initiating a retrospective case review or root cause analysis of diagnostic odysseys and/or errors
  - Connect patients who have experienced diagnostic odysseys to participate on PFACs and Quality Committees to facilitate continuous improvement and learning
  - Enable patients to participate in Morbidity & Mortality conferences to describe the impacts of their concerns being dismissed and the diagnostic error they experienced
  - Encourage patients with conditions that commonly experience diagnostic odysseys to participate in support groups with other patients to support learning and improvement

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Potential Solution: Identify Opportunities for Technology and Data to Recognize Potential Diagnostic Odysseys

Process:

- Use technology as a learning tool
  - Perform data analytics to identify known diagnostic pitfalls
  - Use information on known diagnostic pitfalls to identify opportunities for targeted improvement
  - Use AI and/or machine learning to detect patterns for diagnostic odysseys in EHRs and/or claims data
  - Leverage AI analytics as learning opportunities and share feedback to clinicians
- Use data to understand the impacts of diagnostic odysseys
  - Partner with payers to use claims data to retrospectively analyze time and cost impacts
  - Use claims data to pinpoint opportunities for improvement in the diagnostic process
  - Harvest data obtained from patients and surveys to identify trends to inform organization-specific solutions
  - Partner with data-focused organizations to support measurement and data-mining as a performance improvement tool
- Increase information sharing and interoperability across EHRs and settings
  - Build and support regional health information exchanges
  - Ensure access to patient information across health systems through information sharing requirements

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Use Case 4: Discussion Questions

- Are any causal factors/diagnostic challenges missing?
- Are any solutions missing?
- What specific actions can payers take to support implementation of the solutions?
- What specific actions can researchers take to identify and test new solutions, and build an evidence base to support existing solutions?
- How can the solutions be operationalized?

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Use Case 4: Measurement Considerations *(1 of 2)*

Measurement Approach	Measure Concepts	Rationale
Assess when team-based approaches are initiated	• Presence of a protocol for escalation of the diagnostic approach (e.g., second-opinions, consults, and/or additional testing) for patients with continued undiagnosed symptoms	• Using team-based approaches to diagnosis, including second-opinions, expert consults, and more expansive testing will help reduce the likelihood of a single clinician's biases closing off potential diagnostic pathways and/or dismissing the patient's concerns and perspectives
Measure the time to diagnosis for rare conditions	• Days from original patient chief complaint until final, accurate diagnosis	• Measuring the time to diagnosis for rare conditions will help increase understanding of the delays that patients experience and will help identify changes and improvements over time • Understanding the diagnostic delays that occur and how they impact treatment delays may help identify specific opportunities for improvement and efficiency in the diagnostic process
Measure the total cost of the diagnostic odyssey	• Total cost of the diagnostic odyssey	• Measuring the total cost of a diagnostic odyssey experienced by the patient will help increase understanding of the impacts of delayed diagnoses and diagnostic errors

Use Case 4: Measurement Considerations *(2 of 2)*

Measurement Approach	Measure Concepts	Rationale
Measure the volume and impact on diagnostic testing	• Number of consultations and/or second opinions	• Using a balancing measure will help understand how new protocols and processes for escalation of care for patients with undiagnosed symptoms are impacting the volume of consultations, second opinions, and/or diagnostic testing
Assess patient experience with diagnostic odysseys	• Patient-reported satisfaction with the diagnostic process	• Gathering information directly from the patient may help understand the patient-level impacts of diagnostic odysseys and how these experiences share their perception of the healthcare system

Use Case 4 Measurement Considerations: Discussion Questions

- Are any measurement approaches missing?
- What specific actions can developers and payers take to facilitate the measurement solutions?

Review Cross-Cutting Recommendations

Cross-Cutting Recommendations

Cross-cutting recommendations for measurement from the use cases to reduce diagnostic error and improve patient safety include:

- Engage patients to provide feedback and share information
- Use technology as a measurement tool
- Identify how specific outcomes can provide information on delayed diagnoses and subsequent harm
- Measure effectiveness of clinician education and training for specific diagnostic errors
- Assess information sharing within and across teams and organizations

Review: Final Report Structure and Format

Final Report

- Executive summary
- Introductory and background materials (e.g., overview of environmental scan findings, review of diagnostic process and outcomes domain of original framework, approach for use cases)
- Four Use Cases
- Recommendations for applying the framework
- Appendices (e.g., Committee roster, measure inventory and concepts, public comments)

Structure of the Use Cases

- Use Cases will be organized in the following manner:
  - Background information
    - » A narrativities describing the clinical context, detailed information on causal factors and diagnostic challenges, relationship to the subdomains of the original framework
  - Use Case table
    - » A Table highlighting the causal factors and diagnostic challenges, with the primary solutions and process steps for implementing each solution
  - Case exemplars
    - » Narrative case exemplars depicting the error in practice, highlighting case-specific challenges, and detailing how the stakeholders within the case exemplar might operationalize the solutions
  - Measurement considerations
    - » A Table highlighting measurement approaches, measure concepts, and the rationale for how the measure concepts help reduce diagnostic errors and drive improvements

Opportunity for Public Comment

Next Steps

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Next Steps for Reducing Diagnostic Error

Meeting	Date
Web Meeting 7: Finalize cross-cutting recommendations for measurement to reduce diagnostic error, improve patient safety	June 30, 2020
Web Meeting 8: Final review of report, public comments	September 1, 2020
Final Report	October 7, 2020

Project Contact Information

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Questions

THANK YOU.

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