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

Committee Web Meeting 4

January 29, 2020

Agenda

- Welcome, Review of Meeting Objectives, and Introductions
- Discuss Use Cases 1 and 2
- Review Cross-Cutting Recommendations
- Identify Use Cases 3 and 4
- Opportunity for Public Comment
- Next Steps

Welcome and Introductions

NQF Project Staff

- **Meredith Gerland,** MPH, CIC, Director
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Committee Roster

- David Andrews
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Federal Liaisons

Nonvoting Committee Representatives

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

Discuss Use Cases 1 and 2

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
- To assist with identifying barriers and solutions, and to demonstrate granular solutions in practice, we will review three possible case exemplars for each use case
  - 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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Overview of Use Cases 1 and 2

- **Use Case 1: Cognitive Error—Missed Subtleties**
  - Subtle clinical presentation of dangerous conditions when the disease "signal" is too low
- **Use Case 2: Systems Error—Communication Failure**
  - Failure to "close the loop" on communicating diagnostic test results for important conditions

Use Case 1: Cognitive Error—Missed Subtleties

Use Case 1: Cognitive Error—Missed Subtleties

- Diagnostic errors by clinicians related to cognitive error broadly fall into two categories:
  - Cognitive biases
  - Limited expertise
- The use of heuristics (or shortcuts) help clinicians quickly determine a provisional diagnosis in the face of common symptoms
  - When heuristics go wrong, they are often called biases
- Failures of expertise often occur when clinical cases are due to uncommon causes or when symptoms are subtle

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Use Case 1: Cognitive Error—Missed Subtleties

Possible Example 1

Case Example:

- 55-year old male with a history of hypertension presents to the ED with vertigo and vomiting for 3 hours since awakening
- On examination, the patient has left-beating nystagmus that changes to slight right-beating when looking right (which goes undetected) and difficultly walking, but he can ambulate
- Neurological examination is otherwise normal
- No “HINTS” examination is documented
- A noncontrast head CT is performed that demonstrates no acute stroke, and the patient improves somewhat with oral meclizine
- The family voices concern that the patient is having trouble with balance
- The ED diagnosis is peripheral vertigo (“labyrinthitis”), and the patient is discharged on meclizine treatment to follow up in 2-3 days with his primary care provider
- The patient returns to a different hospital the next day with hemiplegia from a progressive brainstem stroke
- The original ED and physician are never informed

Use Case 1: Cognitive Error—Missed Subtleties

Possible Example 2

Case Example:

- 65-year old woman with a history of chronic obstructive pulmonary disease (COPD) presents with fever of 101, diffuse myalgias, and shortness of breath during viral season
- The ED is very busy that day, with numerous patients who have fevers and apparent viral syndromes
- EKG shows sinus tachycardia but is otherwise normal, chest x-ray and routine laboratory tests are normal, but no blood or urine cultures are sent
- The patient symptomatically improves with albuterol/ipratropium nebulizers in the ED and is discharged with presumed viral syndrome and COPD exacerbation
- The patient dies at home of sepsis

Use Case 1: Cognitive Error – Missed Subtleties

Possible Example 3

Case Example:

- 80-year old woman living independently with only a history of hypertension and mild osteoarthritis of the knees presents to an outpatient primary care clinic with one week of new, bifrontal headache
- After assessing that the symptoms are worse when the patient places her head between her legs, the provider diagnoses a “pressure” phenomenon from sinusitis and prescribes antibiotics
- No laboratory tests are obtained
- The patient returns twice more, at weekly intervals, with persistent headache symptoms
- On the third visit, the provider obtains a head CT to “rule out a brain tumor”
- Within one week of the CT, the patient goes blind in both eyes from untreated giant cell arteritis

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Use Case 1: Challenges and Solutions *(1 of 3)*

Diagnostic Challenge/ Causal Factor	Global Solution(s)	Granular Solution(s)
Subtle or nonclassical presentation with gaps in expertise ("low signal" is overlooked or missed)	• Enhance clinician expertise through education or feedback • Increase access to consultants with specialized expertise • Deploy artificial intelligence (AI) enhanced diagnostics	• Educate clinicians about known pitfalls for common, high-risk chief complaints • Use simulation or symptom-oriented education to hone bedside skills in diagnosing uncommon causes of common, high-risk chief complaints • Provide systematic feedback on patient outcomes (e.g., re-visits, hospitalizations, adverse events, deaths) to providers • Provide peer-to-peer feedback on diagnostic performance using a combination of chart and video review • Create symptom-specific diagnostic protocols and consult teams • Increase access to specialists by leveraging telemedicine capabilities • Provide access to evidence-based AI diagnostics once validated and available

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Use Case 1: Challenges and Solutions *(2 of 3)*

Diagnostic Challenge/ Causal Factor	Global Solution(s)	Granular Solution(s)
"Red herrings" and other cognitive distractors ("low signal" is overshadowed)	• Use meta-cognitive "forcing" strategies • Encourage external input from "curbside" second opinions or consultations • Increase real-time access to computer-based diagnostic tools, knowledge repositories, and diagnostic decision support systems • Reduce unnecessary cognitive loading through "live" or "digital" workflow enhancements	• Use cue-based diagnostic time-outs with general diagnostic error checklists (e.g., consider bias, ask "what else?") • Use cues to initiate second opinion (e.g., patient re-visiting for same complaint, diagnosis of "new" symptom is attributed to "old" disease) • Create "phone-a-friend" hotlines for access to other providers for same discipline and other disciplines • Provide access to online risk calculators and validated decision support tools or systems, where such systems exist • Decrease time pressures and distractions • Improve EHR usability via user interfaces and data visualization tools • Improve EHR interoperability for easy access to relevant patient data

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Use Case 1: Challenges and Solutions *(3 of 3)*

Diagnostic Challenge/ Causal Factor	Global Solution(s)	Granular Solution(s)
Premature closure from "common-things-are-common" complacency or clinical overconfidence ("low signal" is ignored)	• Create an environment where all care team members take shared ownership for getting the correct diagnosis and are expected to voice concerns about the diagnostic process or diagnosis • Implement externally-driven diagnostic reminder tools (e.g., checklists, differential diagnosis generators, or virtual image databanks) and/or EHR-based decision support reminders • Empower patients, nurses, and allied health professionals to be part of the diagnostic care team • Implement clinician education on patient- and family-centered diagnosis	• Mandate the use of symptom/sign-specific checklists or differential diagnosis generators in all encounters • Create EHR alerts/rules to address specific known pitfalls in diagnosis (e.g., ordering CT rather than MRI for stroke in dizziness/vertigo) • Teach patients how to prepare for an office or ED visit • Build and encourage use of active listening skills by providers • Leverage "open notes" platform for patient input and diagnosis plan co-creation

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Use Case 1: Discussion Questions

- Are any causal factors/diagnostic challenges missing?
- Are any solutions missing? Which solutions rise to the top?
- 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?

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Use Case 1: Measurement Considerations

Measurement Approach	Measure Concepts	Rationale
Measure short-term outcomes of acute care visits	• Rate of accurate diagnosis of peripheral vestibular disorders based on follow-up • Rate of misdiagnosis-related harms from stroke as assessed by SPADE method	• Linking visits that are potentially related will allow for further review
Link outcome measures with measures of utilization	• Rate of utilization for consultation, CT imaging, MRI imaging, and/or hospital admission • Match/mismatch between process measures and diagnosis rendered (e.g., rate of CT use for diagnosis of inner ear disease benign paroxysmal positional vertigo [BPPV])	• Using balancing measures will help ensure clinical teams are using testing appropriately
Detect deviations from protocols	• Availability/access to neurology consultants, MRI neuroimaging • Diagnostic teamwork and culture measures in ED	• Conducting chart, image, and/or video review will identify cases where protocols and/or decision support was not adhered to and will support feeding this information back to clinical teams
Ask for patient feedback	• Patient-reported understanding of diagnosis/diagnostic uncertainty after discharge	• Engaging the patient to understand medical history, visits over time, and potential misdiagnoses will help overcome fragmented systems and records

Use Case 2: Systems Error—Communication Failure

Use Case 2: Systems Error—Communication Failure

- Medical care is becoming increasingly more complex with the advancement of medical technologies and treatments
  - Oftentimes, multiple care team members in different specialties, disciplines, and locations care for the same patient
- Increased complexity can raise the likelihood of a communication failure when important test results go unrecognized
  - The communication failures may lead to delayed or missed diagnosis, and subsequent patient harm

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Use Case 2: Systems Error—Communication Failure

Possible Example 1

Case example:

- 56-year old male smoker presents to the ED at 3 am with a 4-day history of cough
- No radiologist is available at night
- A chest x-ray is performed and read by the clinician as negative, and the patient is sent home with a diagnosis of bronchitis with an albuterol inhaler, cough suppressant, and is counseled on smoking session
- The next day, there is an overread by the radiologist of a 6 mm non-calcified pulmonary nodule and a follow-up x-ray is recommend in 6 months
- This is communicated back to the ED physician on duty who tries to contact the patient, but the patient is homeless, unemployed, and has no working cell phone or stable address to be reached at
- 18 months later, the patient is diagnosed with a large lung mass that has metastasized to his spine

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Use Case 2: Systems Error—Communication Failure

Possible Example 2

Case example:

- 70-year old female, Spanish-speaking only with atrial fibrillation on apixaban is admitted to a surgical service with a diagnosis of appendicitis diagnosed on CT scan
- Given the early stage nature of the appendicitis and that she is on anticoagulants, she is treated conservatively with antibiotics (as opposed to operatively) and clinically recovers after 3 days
- However, on the CT report, a follow-up CT is suggested at 3 months to ensure resolution of the radiographic finding
- The surgeon communicates this to the patient in broken Spanish, without a formal interpreter, and she also assumes the patient's primary care physician will order the follow-up test
- The patient nods but does not understand because she does not wish to offend the surgeon
- The primary care physician sees the report and assumes the surgeon will order the test and follow up with the patient
- Two years later, the patient is diagnosed with large appendiceal carcinoma that has metastasized to the liver

Use Case 2: Systems Error—Communication Failure

Possible Example 3

Case example:

- 4-year old female is seen in an urgent care clinic for cough illness and fever
- A chest radiograph is performed and is read as negative by the treating clinician
- An overread by a radiologist detects a healing posterior rib fracture with concern for child abuse
- The report is sent by e-mail to the patient's pediatrician
- The email is not explicitly flagged to have an important finding
- The pediatrician opens the email, but does not do anything to follow up on the findings as he receives approximately 40-50 emails per day about his patients
- One year later, the same patient returns with major trauma secondary to child abuse and is admitted to the intensive case unit

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Use Case 2: Challenges and Solutions *(1 of 3)*

Diagnostic Challenge/ Causal Factor	Global Solution(s)	Granular Solution(s)
Incomplete handoffs or diffusion of responsibility across clinical providers	• Enhance diagnostic handoffs and transitions of care • Create rules that assign follow-up to a specific team member • Define requirements for synchronous communication	• Standardize forms, protocols, and communication methods • Create secondary safety nets to identify and remedy failures during transitions • Design EHR systems to facilitate clearer assignment of responsibility • Create requirements for phone or face-to-face exchanges for critical results or actionable revised results

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Use Case 2: Challenges and Solutions *(2 of 3)*

Diagnostic Challenge/ Causal Factor	Global Solution(s)	Granular Solution(s)
Failures of test results receipt	• Eliminate secondary distractions and competing priorities • Increase interoperability of EHRs • Automate clinical actions in the EHR based on high-risk results (e.g., scheduling follow-up appointments or follow-up tests) • Create EHR "safety nets" • Empower patients to ensure test result follow-up	• Reduce alerts and alert fatigue for low-risk or low-importance items • Decrease unnecessary documentation requirements • Create visual presentations in EHRs that enhance recognition of outstanding tests or findings • Use flags and other electronic processes to highlight e-mails containing test results • Improve data visualization for trends • Use electronic trigger tools to identify and remedy "dropped the ball" scenarios (e.g., new iron-deficiency anemia not followed up by colonoscopy within a specified time frame) • Educate patients that "no news" is not "good news"

Use Case 2: Challenges and Solutions *(3 of 3)*

Diagnostic Challenge/ Causal Factor	Global Solution(s)	Granular Solution(s)
Patient-clinician communication failures	• Create a communication plan prior to discharge for how results will be communicated to the patient, caregiver, and/or family • Empower patients to ensure test results follow-up and to ask questions about test results • Ensure patients understand their diagnosis and results	• Confirm contact information prior to discharge to ensure clinicians have a way to follow up • Provide direct-to-patient results reporting and use patient portals • Optimize patient portals to overcome language and health literacy challenges • Use read-back and hear-back techniques • Use interpreters to support communicating in a patient's native or desired language • Train employees on communication techniques, listening skills, and empathy

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Use Case 2: Discussion Questions

- Are any causal factors/diagnostic challenges missing?
- Are any solutions missing? Which solutions rise to the top?
- 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?

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Use Case 2: Measurement Considerations

Measurement Approach	Measure Concepts	Rationale
Ask about communication quality on patient surveys	• Patient-reported understanding of diagnosis/ diagnostic uncertainty after discharge	• Gathering information from the patient may be the only way to measure quality related to communication in instances where only the patient is aware of a miscommunication across clinicians and settings
Measure the use of electronic trigger (e-trigger) tools	• Proportion of diagnoses where an e-trigger tool is used	• Using electronic trigger tools, although still in research, may be a valuable way to identify errors across settings
Measure interoperability of health information technology	• Percentage of systems to support closed-loop communication and safety net for test results	• Holding health systems accountable for interoperability of health information and information sharing across settings may help reduce communication issues
Assess rates of delayed diagnoses	• Rates of delay in acting upon critical action lab values • Time from first symptoms to diagnosis of various cancers; number of visits • Number of missed opportunities in diagnosis antecedent to cancer diagnoses • Frequency/ number of late-stage or emergency cancer presentations	• Measuring specific outcomes (e.g., late-stage cancer) that may be related to communication errors may provide information on the rates of delayed diagnoses
Measure the use of language interpreter lines in patient's preferred language	• Rates of use of interpreters or interpreter lines when English is not a patient's preferred language	• Ensuring that patients communicate in their language of choice is important to ensure understanding, and measuring the use of interpreters may help improve communication
Audit charts for high-risk findings to ensure follow-up and verbal handoffs occur	• Proportion of policies and procedures that structure handoff communications for diagnosis	• Auditing charts could be used as a measure of system performance to ensure that high-risk findings are communicated and followed-up on appropriately

Review Cross-Cutting Recommendations

Cross-Cutting Recommendations

Cross-cutting recommendations for measurement from the first two 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

Identify Use Cases 3 and 4

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Identification of Use Cases

- Two of four use cases have been identified
  - **Use Case 1: Cognitive Error—Missed Subtleties**
    - » Subtle clinical presentation of dangerous conditions when the disease "signal" is too low
  - **Use Case 2: Systems Error—Communication Failure**
    - » Failure to "close the loop" on communicating diagnostic test results for important conditions
- There are two additional use cases for the Committee to identify from three possible options:
  - **Option A: Cognitive Error – Information Overload**
    - » Information overload in complex, critically ill patients when the disease "signal" is too high
  - **Option B: Cognitive Error – Dismissed Patient**
    - » Prolonged diagnostic odyssey for chronic symptoms when the disease "signal" is almost nonexistent
  - **Option C: Systems Error – Delayed Screening**
    - » Delayed screening for early manifestations of pre-symptomatic diseases

Option A: Cognitive Error—Information Overload

- **Clinical context:** information overload in complex, critically-ill patients
- **Diagnostic challenge:** it is obvious the patient is sick, but there is so much illness "signal" that it may be easy to miss an important underlying disease
- **Causal Factors:** sociocultural barriers to full team engagement in diagnosis; cognitive overload; competing demands (e.g., other patients, surgery, etc.)
- **Potential solutions:** enhanced teamwork (e.g., nurses, AHPs in diagnosis); improved EHR-based data visualization tools; "big data"; machine learning
- **Case exemplar(s):** hospitalized patients with severe, life-threatening illnesses (e.g., infections leading to sepsis; vascular events, such as pulmonary embolus or internal hemorrhage)

Option B: Cognitive Error—Dismissed Patient

- **Clinical context**: prolonged diagnostic odyssey for chronic symptoms
- **Diagnostic challenge:** medically unexplained symptoms (MUS) may or may not have a "diagnosable" cause; psych and non-psych cases may look similar
- **Causal factors**: oversimplified rules of thumb ("horses not zebras"); fast pace of care; demographic bias (e.g., "hysterical" women); overconfidence
- **Potential solutions:** patient preferences and shared decision making to manage uncertainty; second opinions; multispecialty team diagnoses; crowdsourcing
- **Case exemplar(s):** undiagnosed, non-lethal illnesses causing ongoing suffering (e.g., rare disease like Whipple's disease or Sjögren's syndrome leading to multiyear odyssey)

Option C: Systems Error—Delayed Screening

- **Clinical context:** delayed screening for early manifestations of disease
- **Diagnostic challenge:** the care system does not systematically emphasize prevention and/or early diagnosis and tends to lose track of patients who “no-show”
- **Causal factors:** health event-based (rather than wellness-based) EHR care tracking process; provider guideline/alert fatigue; no “timeliness” guidelines
- **Potential solutions:** patient-facing EHR redesign targeting health and wellness; routine follow-up of no-shows; wearables (in-home monitoring with AI/ML)
- **Case exemplar(s):** cases with common diseases (e.g., early recognition of hypertension, diabetes or its complications, or chronic kidney diseases)

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Discussion

- Which use case(s) are applicable to broad settings and stakeholders?
- Which use case(s) align to the *Diagnostic Process and Outcomes* domain of the original 2017 Improving Diagnostic Quality and Safety framework?
  - Subdomains within this domain include:
    - » Information gathering and documentation, information integration, information interpretation, diagnostic efficiency, diagnostic accuracy, and follow-up
- Which use case(s) identify new diagnostic challenges and causal factors that are not addressed in use cases 1 and 2?
- Which use case(s) identify new solutions that are not addressed in use cases 1 and 2?

Use Case Options:

Option A: Cognitive Error—Information Overload

» *Information overload in complex, critically ill patients when the disease "signal" is too high*

Option B: Cognitive Error—Dismissed Patient

» *Prolonged diagnostic odyssey for chronic symptoms when the disease "signal" is almost non-existent*

Option C: Systems Error—Delayed Screening

» *Delayed screening for early manifestations of pre-symptomatic diseases*

Opportunity for Public Comment

Next Steps

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Next Steps for Reducing Diagnostic Error

Meeting	Date
Web Meeting 5: Identify and obtain input on high priority use cases 3 and 4	March 12, 2020
Web Meeting 6: Continued updates to use cases 3 and 4	May 19, 2020
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

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- SharePoint: http://share.qualityforum.org/Projects

Questions

THANK YOU.

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