

Risk Factors

Closing the Loop: Streamlining Diagnostic Tracking for Improved Outcomes

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Learning Objectives

1. Identify the clinical risk and patient impact of diagnostic error and missed or delayed diagnosis.
2. Introduce “closing the loop” strategies to improve diagnostic test tracking processes, referral tracking, and follow-up care coordination after a hospital or emergency room visit.
3. Review best practices for diagnostic tracking continuous performance improvement projects.





Learning Objective #1

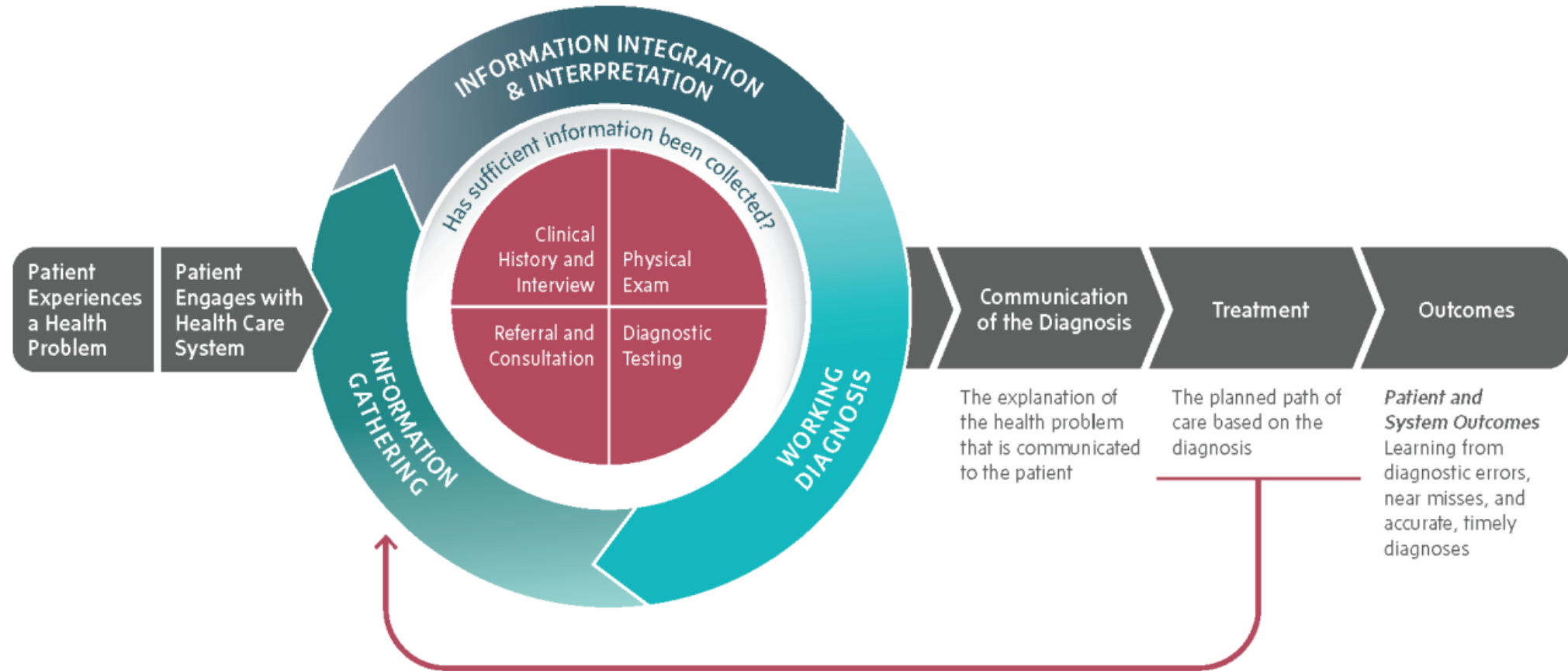
Identify the clinical risk and patient impact of diagnostic error and missed or delayed diagnosis.

Frequency and Severity of Diagnostic Errors in Outpatient Settings

At least **1 in 20** adults experience a diagnostic error annually, based on outpatient studies (Singh et al., 2014).



The Diagnostic Process



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Diagnostic Error Claims Data – Outpatient

In an analysis of 2,685 ambulatory diagnosis-related cases between 2008 and 2012, common points of breakdown were noted in (“Annual”):

- Initial diagnostic assessment: 58% of cases
- Testing and results processing: 29% of cases
- Follow up and coordination: 46% of cases

Diagnostic errors were the leading cause of closed professional liability claims against primary care physicians from 2013 through 2017, accounting for 46% of claims and 68% of indemnity paid (Hanscom et al., 2019).

- 45% of the most common injuries in diagnosis-related cases involved patient death
- 30% of claims involved ordering diagnostic/lab tests (second most frequent allegation)

Diagnostic Error Claims Data – Outpatient (2)

In an analysis (Ao & Matthews) of 226,781 paid malpractice claims data (1999-2018):

- Diagnosis-related allegations was the **second-highest proportion group** (n=60,344; 26.6%) and was the **highest proportion of total payment** (\$28,745 million; 32.9%)
- **Outpatients accounted for a higher percentage of diagnosis-related allegations** than inpatients (59.2% outpatients, 27.4% inpatients, 7.8% both inpatient and outpatient, 5.6% unknown).
- **Patient outcomes** included:
 - ▶ **Death:** 38.9%
 - ▶ **Disability:** 36.0%
 - ▶ Minor injury 24.3%
 - ▶ Not determined: 0.8%

“The inpatient setting and outpatient setting might encounter different challenges and obstacles in obtaining timely and accurate diagnoses, such as time pressure and communication barriers between diagnostic team members.”

Diagnostic Error Claims Data – Outpatient (3)

An analysis of 1,622 diagnosis-related claims closed between 2018 and 2022 (Icenhower) found that:

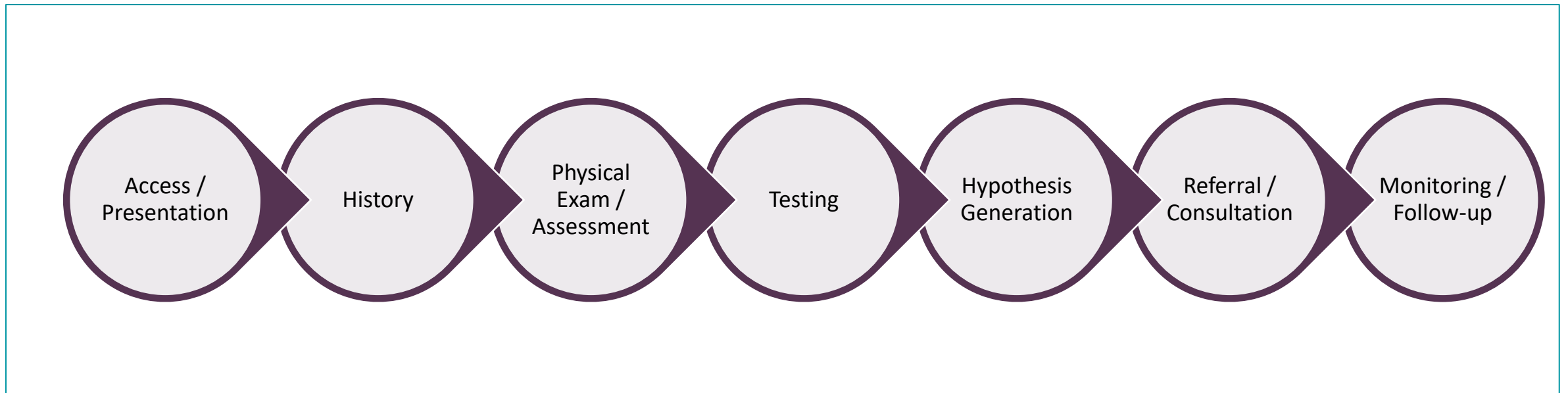
- 56% of events involved **death or high severity injuries**
- 62% of events involved mismanagement related to **interpretation of tests & evaluation of patients**
- Over half of the events initially occurred in an outpatient setting:
 - ▶ 34% events occurred in the **office setting**
 - ▶ 22% events occurred in the **emergency department**

“Despite patients’ increased involvement in their own care, the burden remains on practitioners to ensure that no patient ‘slips between the cracks’ after leaving the office or hospital. Well-designed clinical systems and a proactive risk management strategy are essential in reducing the risk of error related to the management of test results.”

Patient Safety Organization Data

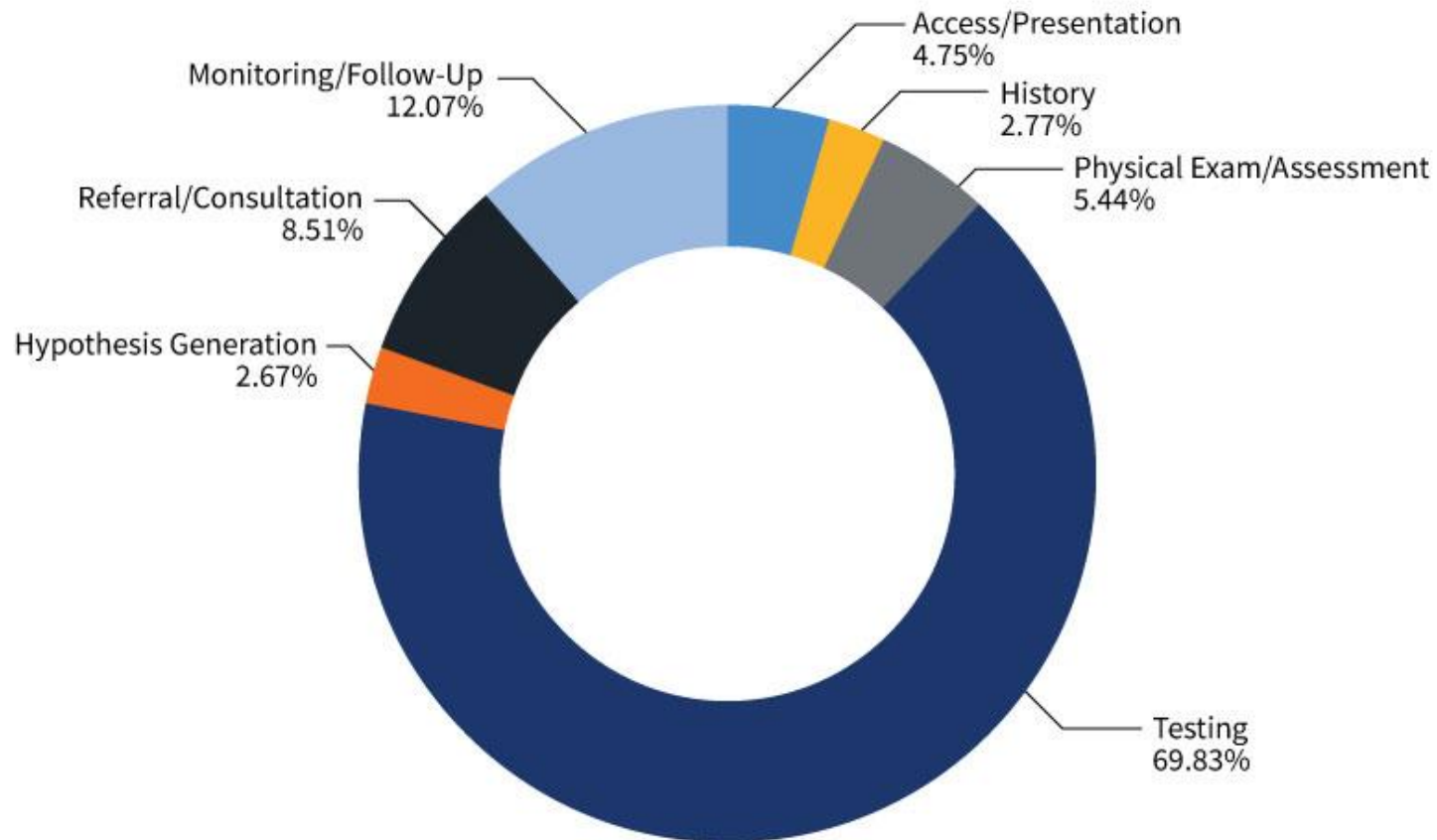
DATE RANGE: JAN 1 – DEC 31, 2023

Modified DEER taxonomy



Patient Safety Organization Data (2)

Figure 1. Diagnostic Error Evaluation and Research (DEER) Taxonomy (N=1,011)

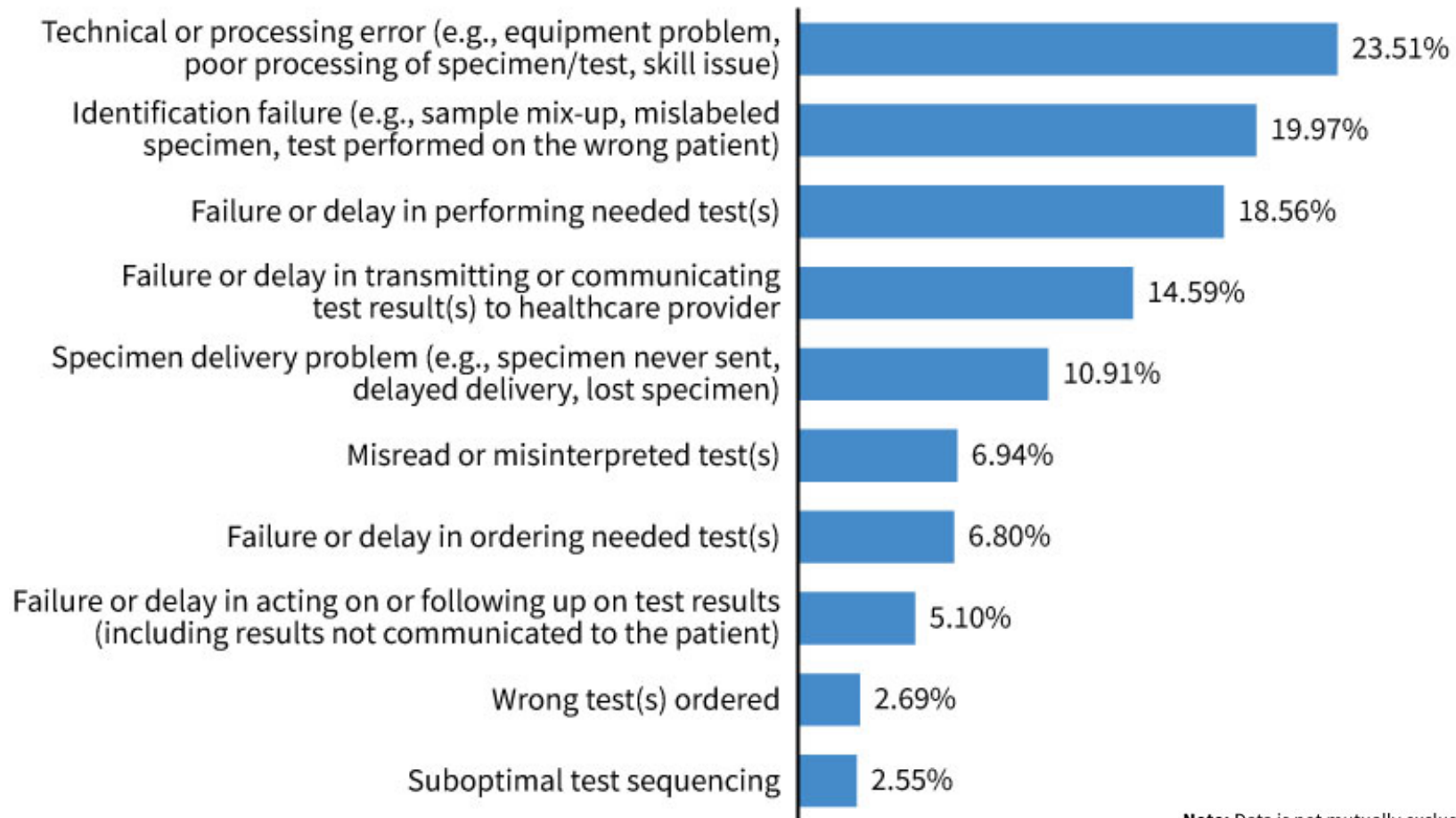


Note: Data is not mutually exclusive, therefore the percent totals more than 100. Some events have been tagged in more than one process step.

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Patient Safety Organization Data (3)

Testing: 69.8% (n = 706)

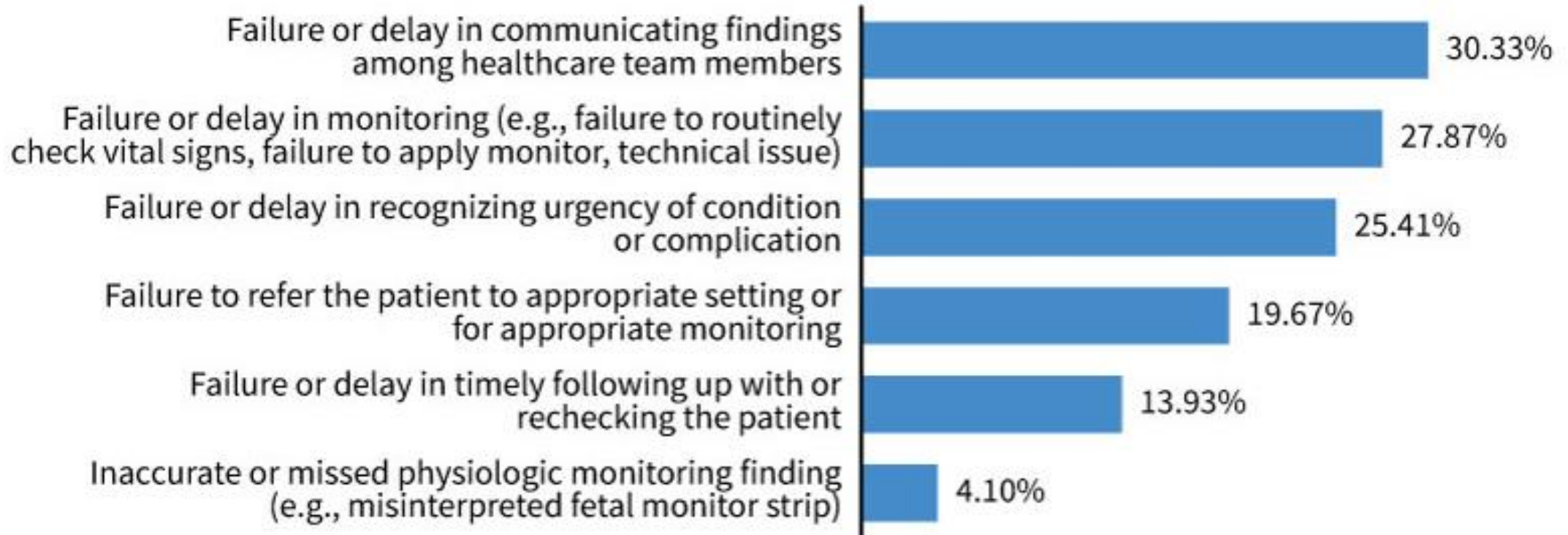


Note: Data is not mutually exclusive, therefore the percent totals more than 100. Some events have been tagged in more than one subprocess step.

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Patient Safety Organization Data (4)

Monitoring / Follow-up: 12.1% (n = 122)

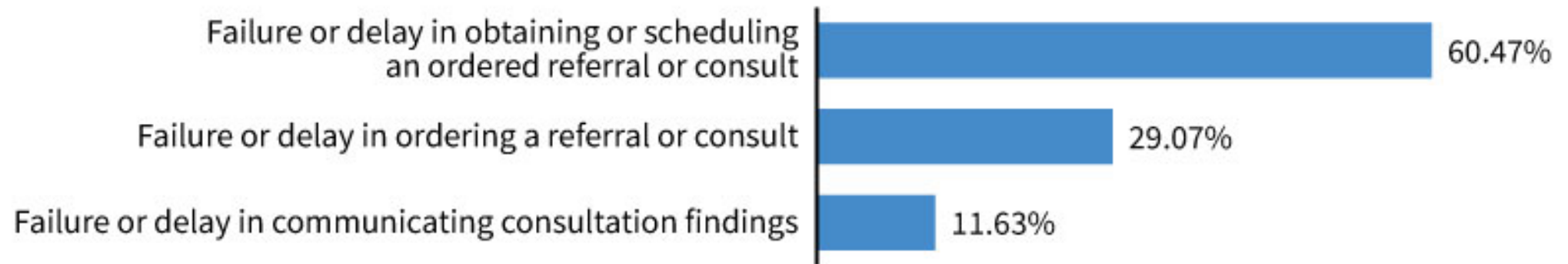


Note: Data is not mutually exclusive, therefore the percent totals more than 100. Some events have been tagged in more than one subprocess step.

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Patient Safety Organization Data (5)

Referral / Consultation: 8.5% (n = 86)



Note: Data is not mutually exclusive, therefore the percent totals more than 100. Some events have been tagged in more than one subprocess step.

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Testing – Laboratory Case Study Example



Case Study

Gynecologic samples from two patients—a mother and a daughter—were collected in the same outpatient office and submitted to the laboratory for examination. Because the lab requisition forms were folded together, the lab assistant who received them registered both orders under the daughter’s medical record and placed Epic bar-code labels on them, indicating that both samples were from the daughter. As a result, the cytology department received the specimen with two different patient identifiers but processed both under the daughter’s name, with conflicting results. When the office called to inquire about the results, the registration error was discovered, and the office was notified. This error resulted in the need to repeat the semi-invasive procedure, a delay in communicating the results, and ultimately a delay in the initiation of treatment.

Safety Alert! *This case study is an example of a diagnostic testing event that led to multiple failures and delays in the total testing process.*

Testing – Imaging Case Study Example



Case Study

A 59 y/o patient was admitted to telemetry 1 day prior for rule out MI and abdominal pain. Overnight their abdominal pain increased, and the patient was writhing in pain. They developed nausea with vomiting and was ordered a CT abdomen and pelvis with contrast STAT at 0915. Patient had CT performed at 1001. Called for CT results multiple times over the next two hours. Not resulted until 1210 after multiple phone calls from nursing and medical attending.

The radiologist who was assigned to do reads was doing procedures and this contributed to the delay in reading the CT with contrast. The result was acute cholecystitis and appendicitis.

The CT was read outside the expected 60-minute window for a STAT.

Safety Alert! *This case study is an example of a diagnostic testing event that led to delay in consulting surgery, and undue discomfort for the patient.*

delay in diagnosis,

Referral and Consultation Case Study Example



Case Study

In July 2021, a 59-year-old postmenopausal woman presented to an ambulatory care site with a complaint of abnormal vaginal bleeding that had been occurring for four months. An ultrasound was ordered and completed, and masses were noted. A nonurgent gynecologic referral was placed for January 2022; however, the patient missed the appointment. Three months later, the patient was seen for complaints of pelvic pain at the same office. The ultrasound was repeated and came back positive for a mass, and a magnetic resonance imaging (MRI) study was ordered and performed but was not reviewed. Two months later, the patient was scheduled for a telehealth visit because of worsening vaginal bleeding; the MRI was not discussed during this visit. Three weeks later, the patient again presented to the ambulatory provider with complaints of abdominal pain. Because there was no follow-up with the patient after the original MRI, an additional MRI was ordered. The first MRI was scanned and reviewed and found to have a large mass. The office called the patient and advised her to see a gynecologist as soon as possible. The patient said she tried to call the office for the referral, but no one answered the phone. When office staff called back, they were unable to communicate due to a language barrier (the patient's preferred language was Mandarin). The patient returned to the office; results were discussed and an urgent referral to a gynecologic oncologist was requested. However, the referral department reported that they could not refer directly to gynecologic oncology until after the patient had a biopsy performed. That night, the patient was admitted to the hospital due to severe pain and was diagnosed with metastatic uterine cancer.

Safety Alert! This case study is an example of a failure, error, or delay in ordering and managing an order for a referral/consult compounded by a language barrier.

To Summarize

Diagnostic testing is a foundation of the diagnostic process.

Inadequate test tracking and result management is a frequent source of severe patient harm and liability.

Failure to order and track referrals/consults and follow-up on coordination of care are also implicated in a majority of diagnostic-related medical malpractice claims.

Diagnostic errors, including events that stem from gaps in the diagnostic test tracking process, frequently occur in the outpatient setting, causing harm to patients through missed and delayed diagnoses and treatment.

Failing to Close the Loop

“Many diagnostic errors are caused by failure or delays in closing the loop (CTL) on specific processes, such as test ordering and result interpretation followed by patient communication” (Epner).





Learning Objective #2

Introduce “closing the loop” strategies to improve diagnostic test tracking processes, referral tracking, and follow-up care coordination after a hospital or emergency room visit.

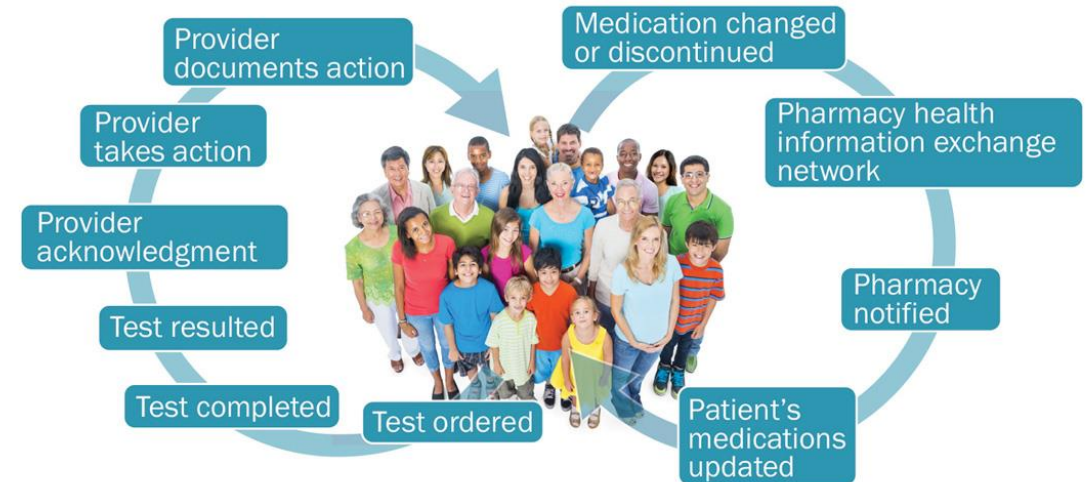
Closing the Loop

“Closing the loop” includes all mechanisms* that ensure all patient data and information that require an action are delivered and communicated:

- To the right individuals
- At the right time
- Through the right mode

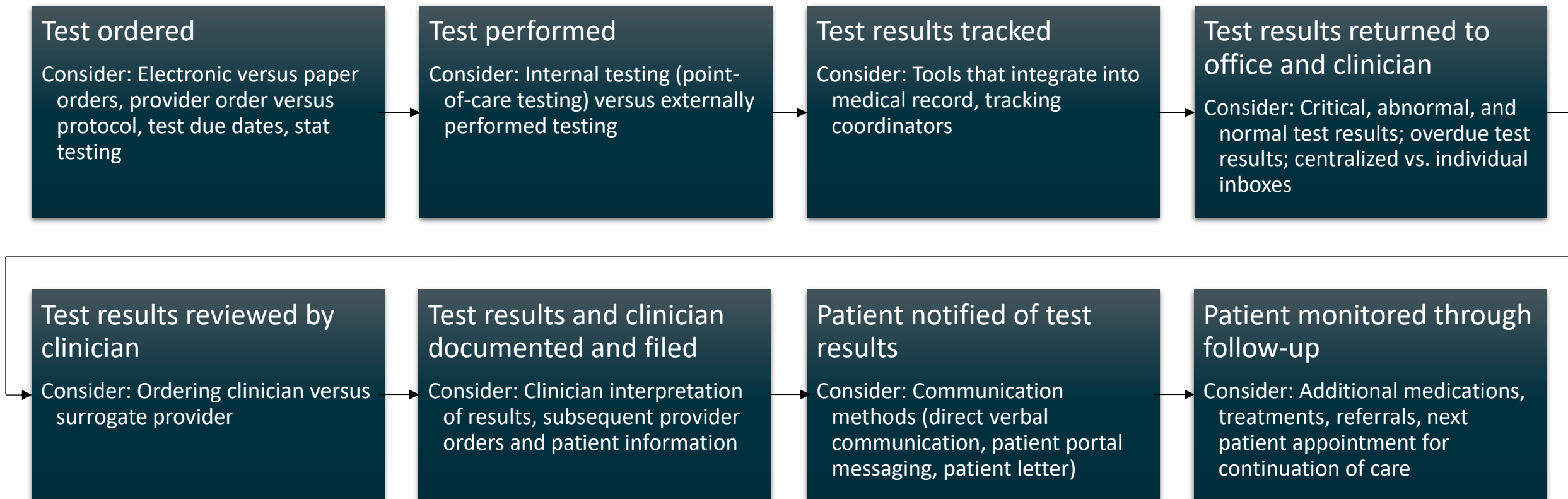
* Workflow management tools, interventions, electronic and verbal notifications, checklists, alerts, and dashboards

Figure 1. Patients are Central to Closing the Loop



Steps to Closing the Loop for Diagnostic Test Tracking

Adapted from [Improving Your Laboratory Testing Process Tool \(AHRQ\)](#)



Steps to Closing the Loop for Specialty Referrals

For more considerations, see [Closing the Loop: A Guide to Safer Ambulatory Referrals in the EHR Era \(IHI\)](#)

Referral ordered

Consider: Electronic versus paper orders, complete referral by due dates, relevant clinical information, stat referrals

Referral sent to specialist

Consider: Warm handoffs versus patient self scheduling, prior authorizations, specialty provider accessibility

Consult appointment tracked

Consider: Tools that integrate into medical record, tracking coordinator, patient cancellations and refusals

Consult documentation sent to office and clinician

Consider: Communication methods with specialty provider, documentation of attempts to retrieve information

Consult documentation reviewed by clinician

Consider: Ordering clinician versus surrogate provider, documentation tools

Consult integrated into care plan

Consider: Clinician interpretation of results, subsequent provider orders and patient information

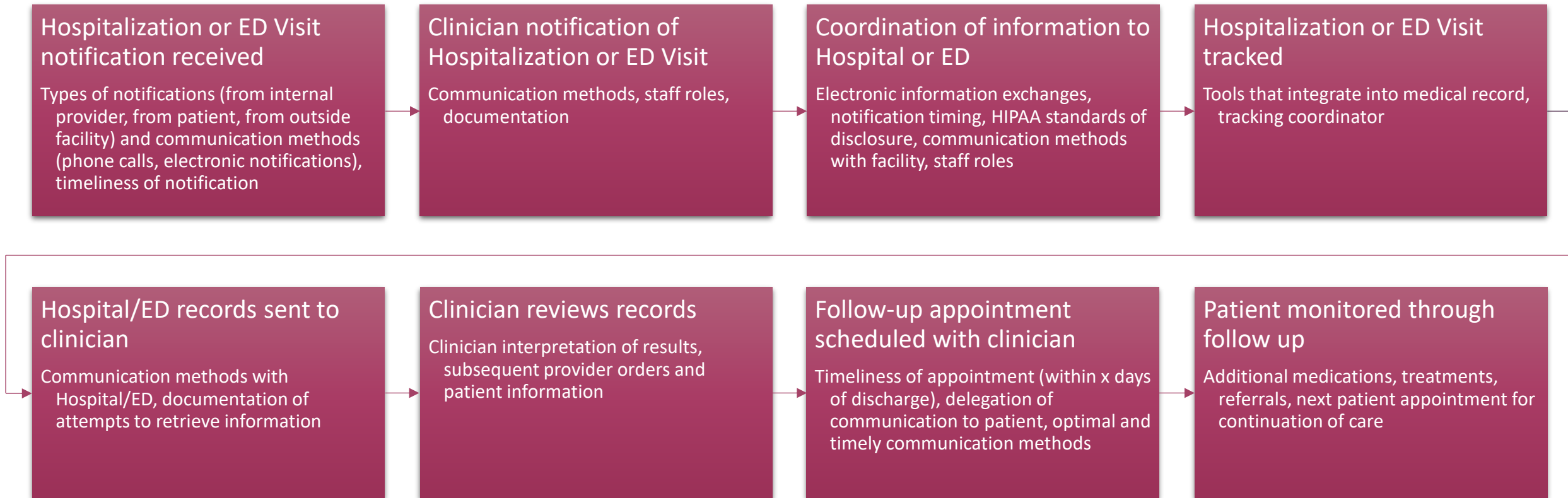
Patient notified of care plan

Consider: Delegation of communication to patient, optimal and timely communication methods

Patient monitored through follow up

Consider: Additional medications, treatments, referrals, next patient appointment for continuation of care

Steps to Closing the Loop for Hospitalizations/Emergency Department (ED) Visits



General Closing the Loop Strategies

Consider the people, processes, and tools involved with every action taken.

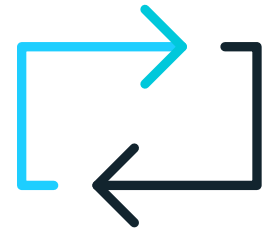
Optimize health information technology (IT) capabilities to communicate, track, link, and acknowledge information as it moves through the loop.

Ensure patients are central to the process (it begins and ends with them).

Consider nontechnological factors such as:

- Staff training
- Staff competency
- Operational workflows

See additional closing the loop resources at the end of this presentation.





Learning Objective #3

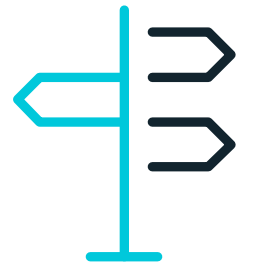
Review best practices for diagnostic test tracking as part of a continuous performance improvement project.

Implementing Closing the Loop Recommendations: Focusing on Diagnostic Test Tracking

Diagnostic test result tracking processes benefit from implementing systems-level performance improvement projects that focus on solutions to communicate, track, link, and acknowledge important information and actions taken because of that information.

The process for implementing safe practices for closing the loop can be organized into three main parts:

1. Organizing the “close the loop” improvement project
2. Identifying issues for structured focus
3. Taking steps to implement change



Organizing the “Close the Loop” Improvement Project

1. Identify safe practices to be implemented:

- Partnership for Health IT Patient Safety:
 - ▶ [Implementing Closing the Loop Safe Practices for Diagnostic Results](#)
 - ▶ [Health IT Safe Practices for Closing the Loop: Mitigating Delayed, Missed, and Incorrect Diagnoses Related to Diagnostic Testing and Medication Changes Using Health IT](#)
- HealthIT.gov: [Test Results Reporting and Follow-Up SAFER Guide](#)
- Joint Commission: [Quick Safety Issue 52: Advancing safety with closed-loop communication of test results](#)
- AHRQ: [Improving Your Laboratory Testing Process](#)
- IHI: [Closing the Loop: A Guide to Safer Ambulatory Referrals in the EHR Era](#)

Organizing the “Close the Loop” Improvement Project (2)

2. Consider common safe practice questions and your organization’s responses in advance:

- Why is provider leadership essential for this project?
- Do we need to track “all” diagnostic tests/referrals/hospitalizations?
- How many times should we reach out to patients who don’t respond to communication?
- Who should be responsible (e.g., nurses, medical assistants, nonclinical staff) for tracking and communicating results to patients?
- What is the best software for tracking?

Organizing the “Close the Loop” Improvement Project (3)

3. Identify sites, departments, and participants.

- Consider a multidisciplinary team and include provider champion, frontline staff, information technology, electronic health record vendor, risk management, patient safety, and quality improvement

4. Explain the goals and objectives of the project.

5. Evaluate organizational readiness and obtain executive commitment.

6. Gather background materials (current policies and procedures, current tracking tools, related forms, applicable safety events, user feedback, baseline performance data).

7. Establish meeting schedules (consider six months+).

Identifying Issues for Structured Focus

1. Assess current process steps (e.g., test ordering, tracking, results, clinician and patient notification).

- Which policies and procedures do we have in place for this process?
- Which forms or other tools do we use?
- How does our physical environment support or hinder this process?
- Which staff members are involved in this process?
- Which parts of this process do not work?
- Do we duplicate any work unnecessarily? Where?
- Are there any delays in the process? Why?

Identifying Issues for Structured Focus (2)

2. Identify gaps through process mapping and gap analysis

| Step | Current Process (Work-as-done) | Ideal Process (Work-as-Imagined) | Gaps Identified | Corrective Action |
|--------------|--|---|--|-------------------|
| Test Ordered | Provider orders diagnostic test on paper prescription pad, on a paper downtime form, on a paper fax form, in an electronic phone note, or in an electronic visit note. | Provider orders diagnostic test in an electronic phone note or an electronic visit note so that all required information is collected and added to the tracking tool automatically. | Paper orders do not get added to the tracking form. Downtime forms should only be used during downtime procedures, and tests should be added into the medical record after the system is restored. | |

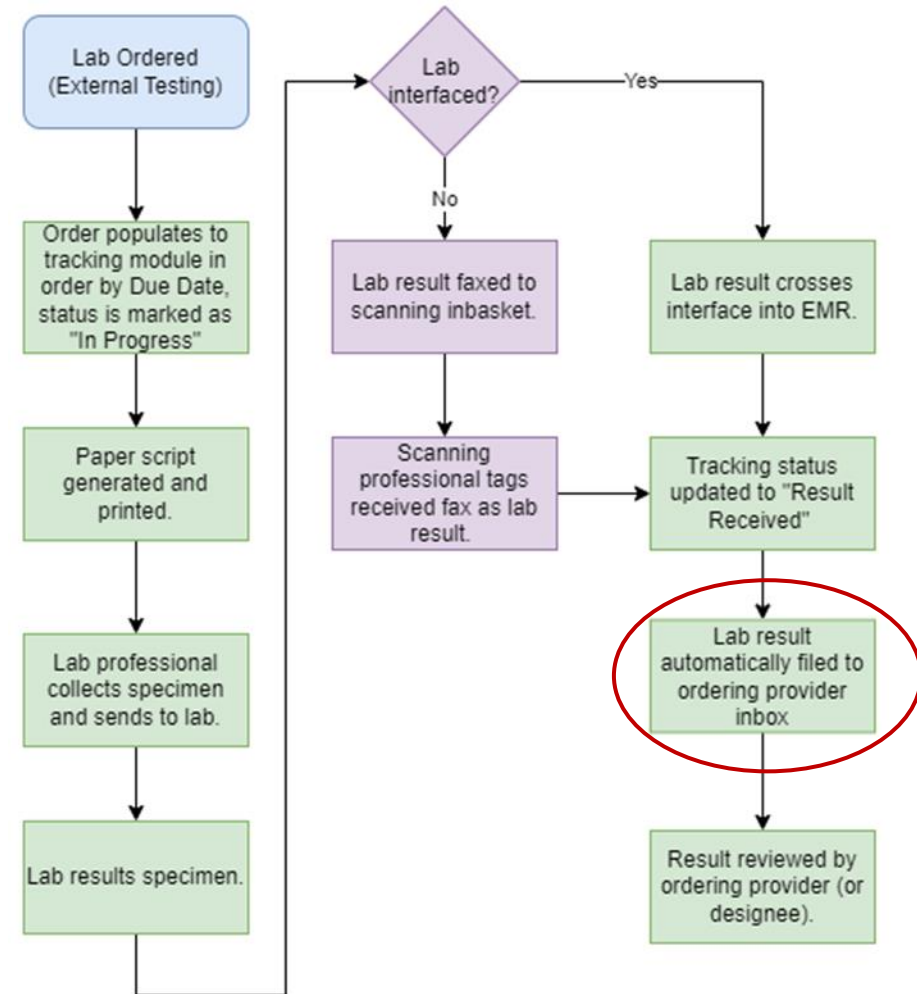
Identifying Issues for Structured Focus (3)

- Identify where improvement efforts could be focused
- Identify where technology might assist

Example Provider Concern:

We currently don't have a centralized result inbox. Each result goes to the ordering provider.

A centralized inbox would help with result review when the ordering provider is out of the office.



Identifying Issues for Structured Focus (4)

3. Consider other impediments to closing the loop:

- Diagnostic testing/referral/follow-up care coordination incomplete
 - ▶ Prior authorization denied, not completed, or not communicated to patient to schedule test/consult
 - ▶ Patient did not schedule or complete testing/referral/follow-up care (insurance, lack of understanding of importance, other barriers)
 - ▶ Need for follow-up care coordination not communicated to outpatient provider
- Diagnostic testing/referral/care coordination complete, but not within the electronic health record
 - ▶ Workflow did not perform as intended, documentation issues
- Diagnostic testing/referral/care coordination not tracked
 - ▶ Ordered/initiated but did not make it to tracking tool (order method, data capture method, tracking tool failure)
- Monitoring and evaluation of tracking process lacks feedback
 - ▶ Clinician, support staff, tracking coordinator not able to provide or receive feedback after process change

Identifying Issues for Structured Focus (5)

4. **Develop possible corrective actions linked to the gaps you identify.**
5. **Determine useful measures for monitoring the effectiveness of corrective actions. Some examples include:**
 - Volume of tests due but results not received (overdue labs)
 - Percentage of tests received with documentation of provider review
 - Percentage of tests received with documentation of patient notification
 - Percentage of critical results received and communicated to provider and patient within defined time frame
 - Percentage of specialty referrals completed within the designated timeframe (urgent, routine)
 - Percentage of discharged patients with a completed PCP visit within the designated timeframe
 - Patient satisfaction with process
 - Provider satisfaction with process
 - Tracking coordinator satisfaction with process



Taking Steps to Implement Change

1. Obtain buy-in for suggested changes.
2. Redesign and test process changes.
3. Evaluate the changes.
4. Educate and train staff.
5. Broadly implement changes.
6. Monitor effectiveness of changes.
7. Reevaluate and redesign processes as necessary.
8. Share findings routinely with executive leadership.

PDSA (Plan-Do-Study-Act) Worksheet

| | |
|----------------------|----------------|
| Site: | Change Leader: |
| Goal/Objective/Plan: | Cycle #: |
| | Dates: |

| | |
|--|--|
| Plan: (Who, What, Where, When, How) We plan to test a change by... We believe ... | Do: We tested the change by... |
| Study: After the change, we learned... | Act: We decided to: <input type="checkbox"/> Adopt <input type="checkbox"/> Adapt <input type="checkbox"/> Abandon the change because... |



Driver Diagram

How to Use a Driver Diagram



Driver Diagram Example

Diagnostic Safety Driver Diagram

Title: The Impact of Diagnostic Safety on Patient Care, Quality, and Outcomes

Aim: Understand the causes and contributing factors that may compromise diagnostic safety and develop solutions to prevent and mitigate their impact on patient safety and quality of care.

PRIMARY DRIVER

Ensure diagnostic testing in healthcare is free of preventable errors leading to harm

SECONDARY DRIVER

Select appropriate tests that help narrow the field of differential diagnosis

SECONDARY DRIVER

Optimize processes for ordering, performing, sequencing, interpreting, and communicating the results of diagnostic tests.

CHANGE IDEAS EXAMPLES

1. Create list of critical values and results and adopt efficient procedure for communicating them to providers
2. Establish a reporting and communication plan for incomplete or canceled specimens and amended results.
3. Develop diagnostic test tracking P&Ps to ensure ordered testing is conducted, tracked, reviewed by provider and communicated to the patient in timely manner

Driver Diagram Example (2)

Diagnostic Safety Driver Diagram

Title: The Impact of Diagnostic Safety on Patient Care, Quality, and Outcomes

Aim: Understand the causes and contributing factors that may compromise diagnostic safety and develop solutions to prevent and mitigate their impact on patient safety and quality of care.

PRIMARY DRIVER

Ensure that referrals, consultations, and results are made accurately and communicated to the provider and patient in a timely manner.

SECONDARY DRIVER

Verify that findings are communicated back to the ordering provider, patient, and any relevant parties within an appropriate time frame.

CHANGE IDEAS EXAMPLES

1. Consider employing an electronic referral form w video call technology that enables on-demand consultation in real-time
2. Use techniques such as active listening and teach-back to help the patient understand their plan of care
3. Consider using structured communication models such as [SBAR](#) or [PIQUED](#) to aid synchronous communication

Key Takeaways

- **Diagnostic errors, including events that stem from gaps in the diagnostic test tracking, referral tracking, and hospitalization tracking processes, frequently occur in the office practice setting, causing harm to patients through missed and delayed diagnoses and treatment.**
- **Diagnostic tracking processes benefit from implementing systems-level performance improvement projects that focus on solutions to communicate, track, link, and acknowledge important information and actions taken because of that information.**
- **Develop and apply information technology solutions to communicate the right information to the right people, at the right time, in the right format, to close the loop with patients.**
- **Consider nontechnological factors such as staff training, staff competency, and operational workflows during your continuous performance improvement project.**

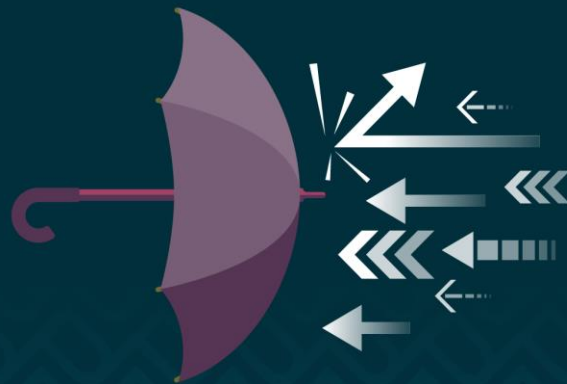
Questions?

Thank you for attending!

Next *Risk Factors* Webinar:

Preventing Sexual Misconduct

Tuesday, May 20, 2025



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Additional Resources

ECRI:

- [Close the Loop in Your Organization: A Step-by-Step Guide](#) (additional general information on closing the loop)
- [Driver Diagram Template](#) (members only link but supplied to attendees as a handout)
- [Physician Practice Referral Checklists](#) (members only link but supplied to attendees as a handout)

Institute for Healthcare Improvement:

- [Quality Improvement Essentials Toolkit](#) (see Flowchart for detailed process mapping information)
- [How to Improve: Model for Improvement](#) (Plan-Do-Study-Act information)
- [How do you Use a Driver Diagram?](#)