Ancillary Collaborations:
For Diagnostic Efficacy and Efficiency

LORELEI SCHMIDT, MT(ASCP)
DIRECTOR OF TRAINING
TRIDENTUSA HEALTH SERVICES, LLC

Objectives

• Recognize current patterns of diagnostic test utilization and identify opportunities for improved utilization of and compliance with federal and/or state regulations surrounding diagnostics, including patient medical record documentation.

• Examine and discuss in an introductory manner, the capabilities and limitations of specific highly utilized diagnostic tests and apply new understanding of these factors in their routine work practice.

• Relate and connect increased understanding on the how, when, and why of diagnostic test utilization that may impact clinical, financial, and patient satisfaction outcomes.

Skilled Nursing Facilities: 2016

- 5-Star Rating
- CJR
- Value-based Purchasing
- 2016 OIG Plan
- Impact Act

Volume to Value
Quantity to Quality
Ancillary Collaborations:
For Diagnostic Efficacy and Efficiency

How do DIAGNOSTICS play a role?

Evidence-Based Tools

INTERACT:
Interventions to Reduce Acute Transfers
https://interact2.net

AMDA:
American Medical Directors Association
Care Transitions Guidelines

AHRQ:
Agency for Healthcare Research and Quality
Training Modules on Patient Safety in Long Term Care Facilities

AHA:
American Hospital Association
Action Guide to Reduce Readmissions
http://www.hpoe.org/resources/hpoehretaha-guides/831

Project RED:
Boston University Medical Center’s Re-Engineered Discharge
https://www.bu.edu/fammed/projectred/

IHI STARR Program:
Institute for Healthcare Improvement
State Actions on Avoidable Rehospitalizations
http://www.ihi.org/engage/Initiatives/completed/STARR/Pages/default.aspx

National Coalition of Care Transitions
http://www.ntocc.org/Toolbox/

Don’t let paperwork or electronic documentation get in the way of COMMUNICATION!
Ancillary Collaborations:
For Diagnostic Efficacy and Efficiency

Let's put the pieces together...

Diagnostic Data: Collaborate for Efficiency and Efficacy

- **Ordering Practices**
  - Understand regulations portable diagnostic suppliers must adhere to
  - Turn-Around Time (TAT) Expectations

- **Result Interpretation**
  - Understand both the capabilities and limitations of exams
  - Understand Preanalytic, Analytic, and Post-Analytic Factors

- **Result Utilization**
  - Is there documentation of how the result will be / was utilized?

**Ordering Practices**

- **Federal Regulations: 42 CFR § 486.106 and 410.32**
  - Reason the x-ray exam is required
  - Area of the body to be exposed
  - Number of radiographs to be obtained
  - Views needed
  - A statement concerning the condition of the patient which indicates portable x-ray services are necessary.
  - Verification by the ordering physician or non-physician practitioner that the results of each test is used in the patient’s treatment or disease management.
Ancillary Collaborations:
For Diagnostic Efficacy and Efficiency

- **Ordering Practices**
  - **TAT Expectations**
    - Must be realistic and pertinent to how the result will be used
    - Bundling for efficiencies
    - Communication for efficacy

- **Result Interpretation**
  - Understand both the capabilities and limitations of tests
    - Patient history / Clinical status / Symptoms
      - Timing of exam
      - Views of x-ray, sonography
      - Physiologic factors
  - Understand Preanalytic, Analytic, and Post-Analytic Factors
    - Test Preparation
    - Test Specificity

- **Result Utilization**
  - Is there documentation of how the result will be / was utilized?
    - Treatment?
    - Additional Testing?
    - Follow-up Recommendation?
    - Cumulative results reviewed?
    - Comparison results reviewed?
Ancillary Collaborations:
For Diagnostic Efficacy and Efficiency

Radiology Diagnostics

Understanding the Capabilities and Limitations of Radiographs in the Diagnosis of Pneumonia

What Does an X-Ray Detect?

The National Institute of Health defines Pneumonia as an infection in one or both lungs. A radiograph detects fluid or pus that has accumulated in the lung secondary to the infection.
Radiographic Limitations in Diagnosing Pneumonia

Various factors can affect the visualization of pneumonia on an x-ray.

- Stage of illness
- Patient Positioning / Condition of Patient
- Hydration Status

---

Understanding the Capabilities and Limitations of Radiographs in the Confirmation of a Hip Fracture Diagnosis

---

Types of Hip Fractures

Hip fractures occur in the upper portion of the femur, just outside the area where the femoral head (ball) meets the acetabulum (socket) within the pelvis.

Hip fractures are generally classified into three major types, depending on the specific location of the fracture:

- Femoral neck
- Intertrochanteric
- Subtrochanteric
Ancillary Collaborations:
For Diagnostic Efficacy and Efficiency

Radiograph Utilization for Hip Fracture Confirmation

- The diagnosis of an acute hip fracture is usually based on clinical suspicion.¹
- Sometimes elderly patients can still weight-bear despite a fracture.²
- Radiography can confirm most hip fracture diagnoses.³,⁴

IMPORTANT: X-rays without evidence of fracture do not exclude or rule out the diagnosis of a hip fracture.³,⁴,⁶,⁷,⁸,¹¹

A fracture that cannot be seen or confirmed on a radiograph is referred to as an “occult fracture”.

Occult Fracture Studies

Study 1: Retrospective study performed in US ER: 13 out of 92 patients (14%) with NEGATIVE x-rays, had 23 fractures found on MRI.


Study 2: Retrospective study performed in US ER: 24 hip fractures were found using MRI in 545 patients with initial NEGATIVE x-rays (4.4%)


Study 3: Norway retrospective study revealed 34 hip fractures found on MRI exams in 52 patients with NEGATIVE hip x-ray exams (65%)

Ancillary Collaborations:  
For Diagnostic Efficacy and Efficiency

Radiograph Utilization for Hip Fracture Confirmation

• Sometimes, a hip x-ray may be negative, yet the patient has clinical symptoms that indicate a fracture. This may occur for multiple reasons:
  1. The fracture cannot easily be seen due to the positioning of the patient / radiograph views taken.1,4,6,7
  2. The amount of time the radiograph is taken after the injury/fracture occurred.4
  3. Limitations in the efficacy of radiograph exams, as well as physiologic factors such as body size and osteopenia.1

Laboratory Diagnostics

Understanding Variables in Hemoglobin and Hematocrit Testing
Ancillary Collaborations:
For Diagnostic Efficacy and Efficiency

Hemoglobin (Hgb) and Hematocrit (Hct) are 2 out of 18 parameters reported in a CBC (Complete Blood Count).
The Complete Blood Count test analyzes the cellular elements of blood.
- Red blood cells
- White blood cells
- Platelets

What Are Hemoglobin and Hematocrit?
Hemoglobin is a protein that is found inside Red Blood Cells. It carries oxygen throughout the body and is measured in weight.
Hematocrit is the volume of red cells in a blood sample and is measured as a percent.

Variables
- Preanalytic Factors: occurring as the blood is drawn, handled, and transported, but before the test is performed
- Analytic Factors: occurring while the test is performed or resulted
- Physiologic Factors: intrinsic factors related to the patient
Ancillary Collaborations:  
For Diagnostic Efficacy and Efficiency

<table>
<thead>
<tr>
<th><strong>Preanalytic factors</strong> include, but are not limited to:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Specimen collection technique:</td>
<td></td>
</tr>
<tr>
<td>• Insufficient Sample Volume</td>
<td></td>
</tr>
<tr>
<td>• Hemolysis</td>
<td></td>
</tr>
<tr>
<td>• Length of tourniquet use</td>
<td></td>
</tr>
<tr>
<td>• Clotting</td>
<td></td>
</tr>
<tr>
<td>• Dilution</td>
<td></td>
</tr>
<tr>
<td><strong>Transportation Factors:</strong></td>
<td></td>
</tr>
<tr>
<td>• Delays in Transport:</td>
<td></td>
</tr>
<tr>
<td>• Transport Conditions: Fluctuations in temperatures</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Physiologic Factors</strong> include, but are not limited to:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Body Site of Draw:</td>
<td></td>
</tr>
<tr>
<td>• Medications: Example - diuretics</td>
<td></td>
</tr>
<tr>
<td>• Hydration Status:</td>
<td></td>
</tr>
<tr>
<td>• Super-optimally - H&amp;H levels will appear LOWER</td>
<td></td>
</tr>
<tr>
<td>• Sub-optimally hydrated - H&amp;H levels will appear HIGHER</td>
<td></td>
</tr>
<tr>
<td>• Positioning:</td>
<td></td>
</tr>
<tr>
<td>• Postural Pseudoanemia</td>
<td></td>
</tr>
</tbody>
</table>

Analytic Factors include, but are not limited to:

- Instrumentation Variation
- Instrumentation Error

Analytic variables occur less frequently than do Preanalytic variables because of the tight quality control methods practiced in laboratories.
Ancillary Collaborations:
For Diagnostic Efficacy and Efficiency

Potassium

- 90% of Potassium is found INSIDE red blood cells.
- 8% is found in skin, tissue, bone cells.
- 2% is found EXTRACELLULAR

HEMOLYSIS!
- Any activity that may cause rupture of cells
  - Fist clenching
  - Small bore needles such as butterflies
  - Leaving the tourniquet on too long
  - Aggressive mixing or shaking of the tube
  - Temperature variance during transport
  - Delays in processing (removing serum from cells)
Ancillary Collaborations:
For Diagnostic Efficacy and Efficiency

Brain Natriutetic Peptide (BNP)

- Brain natriuretic peptide (BNP) - protein (cardiac hormone) made by the heart and blood vessels.
- Higher than normal levels occur when the heart cannot pump the way it should.
- Tests are used to detect and monitor heart failure.
- BNP and NT-ProBNP have different half-lives and different molecular weights, thus their values cannot be compared without using a conversions factor.
- Both tests have the same clinical utility.

NOTE: A normal serum BNP or NT-proBNP level virtually excludes cardiac dysfunction.

A Laboratory’s Involvement in Antibiotic Stewardship
Ancillary Collaborations:  
For Diagnostic Efficacy and Efficiency

Antibiotic Stewardship

Centers for Disease Control and Prevention:  
"Core Elements for Antibiotic Stewardship in Nursing Homes"

7 Core Elements

- Leadership Commitment
- Accountability
- Drug Expertise
- Action
- Tracking
- Reporting
- Education

Examples of laboratory support for antibiotic stewardship include:

- developing a process for alerting the facility if certain antibiotic-resistant organisms are identified,
- providing education for nursing home staff on the differences in diagnostic tests available for detecting various infectious pathogens (e.g., EIA toxin test vs. nucleic amplification tests for C. difficile), and
- creating a summary report of antibiotic susceptibility patterns from organisms isolated in cultures

Consultant laboratory

Understanding the Capabilities and Limitations of Clostridium difficile Testing
Ancillary Collaborations:
For Diagnostic Efficacy and Efficiency

**C. difficile Testing**
Different testing methods detect different aspects of the bacteria:
- Detection or isolation of the bacteria itself
- Detection of the toxins the bacteria produces

**NOTE:** *Clostridium difficile* toxin is very unstable.
- The toxin degrades at room temperature and may be undetectable within 2 hours after collection of a stool specimen.
- False-negative results occur when specimens are not promptly tested or kept refrigerated until testing can be done.

**Enzyme Immunoassay Tests (EIA) for C. difficile Toxins A and/or B**
- Detect Toxins A and/or B from a stool specimen.
- Until recently, were the most widely used test methods in laboratories
- Relatively inexpensive
- Easy test to perform
- Quick turn-around-time
- Low test sensitivity and specificity
  - Contributes to repeat testing (e.g., x 3 samples)
    - Contributes to inefficient use of nursing and laboratory resources
    - Contributes to overuse of Contact Precautions and additional antibiotics

**Nucleic Acid Amplification Test (NAAT); including Polymerase Chain Reaction (PCR) for Clstridium difficile:**
- Amplification of genes encoded in the bacteria responsible for the production of toxins
- High sensitivity and specificity
- Relative quick turn-around-time
- Relatively expensive
- Reduces need for repeat testing

Some PCR assays may also provide presumptive findings of Genotype (BI/NAP1/027), the “hypervirulent strain.”
Ancillary Collaborations:
For Diagnostic Efficacy and Efficiency

Antibiogram

What is an Antibiogram Used For?

• An Antibiogram is an essential tool for any clinician when treating an infection empirically
  □ Empiric treatment occurs prior to determination of a causative bacterial agent or its susceptibility results are known.
  □ An Antibiogram can serve as an alternative to a C&S report until the results of a C&S are available
  □ An Antibiogram can serve as an alternative to a C&S report if no organism is grown out of a C&S despite high clinical suspicion of an infection

Parts of an Antibiogram

The greater the number of isolates, the more accurate the sensitivity results for the given organism.

Minimum should be 10.
Ancillary Collaborations:
For Diagnostic Efficacy and Efficiency

Parts of an Antibiogram

The % Susceptible reflects the percentage of times a specific bacteria was found to be sensitive or susceptible to a specific antibiotic that the bacteria was tested against in the laboratory.

Limitations of an Antibiogram

- Concentration differences of antibiotics between site of infection in the body and in vitro (in the lab).
  - Penetration to the site of infection
  - Inactivation of drug at site of infection
  - Declining levels in vivo vs. continuous level in vitro
- Inaccurate information due to small isolate number.
- Repeat data from the same patient may skew susceptibility percentages.

Conclusion

- Reducing avoidable Acute Transfers and Hospital Readmissions will continue to be a focal point in all Post Acute Care entities.
- Collaboration and open communication amongst all health care providers and suppliers is needed in order to effectively address these matters.
- Understanding more about the role diagnostics play in the pathway of resident care can lead to improved efficiencies and efficacy.
Ancillary Collaborations: For Diagnostic Efficacy and Efficiency

References

Slide 1

Slide 2

References

Slide 3
References

Ancillary Collaborations:
For Diagnostic Efficacy and Efficiency

Question and Answer
Lorelei Schmidt, MT(ASCP)
Director of Training
Cell: 774-222-3425
Email: lorelei.schmidt@mobilexusa.com