Point Of Care Testing in Emergency Departments

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Disclosure

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Asking Questions

The question and answer period of the webinar will be interactive. We have scheduled approximately 10 minutes for questions at the end of the presentation. To submit a question, simply type your question in the designated area in the right hand column of the screen at any time during the webinar. If your question is not selected to be answered during the webinar, you can re-submit your question via email to info@urgentmatters.org.
Overview

• POC testing
• Ways that it can be used in the ED
• Case studies on POC testing
Point-of-Care Testing

• Emerging technology, miniaturization of biosensors
  – Decentralization of laboratory testing

• POC technology
  – With as little as 60 uL of blood (2 drops) can obtain labs in minutes

• Used in a range of settings
  – NICU, ICU, Dialysis Centers, Aeromedical transport units, EDs
Point-of-Care Testing

• Main benefit of POC testing in the ED
  – Faster test results

• Relationship between ED crowding and quality of care

• Improved patient care through faster test results
ED Laboratory Models

• Central laboratory model
  – Specimen sent by courier, pneumatic tube -> results returned
  – Pre and post processing delays
  – Often can be the limiting step for patient care delivery
ED Laboratory Models

• Satellite laboratory
  – Equipment, supplies, personnel placed “near” the ED

• POC testing
  – “Near” patient, ideally at the bedside
  – Pre- and post-analytic phases are shorter
POC Testing Modalities

• Glucose
• Urinanalysis, pregnancy
• Drug screens
• HIV testing
• Chemistry
  – Po2, pco2, pH, Na, K, Ca, Cl, Hematocrit, Glucose, Creatinine, Urea nitrogen, Lactate, Troponin
• D-dimer
• Lipids
• Coags
Impacts of POC testing

• Potential to shorten LOS
  – Variable reports, faster processing times, some demonstrate reduced LOS, some don’t
  – Depends on how POC testing is used
    • POC testing needs to be optimized, considered in full work-flow
    • 10K patients, RCT, on average 22 minutes faster
  – Impact on patient experience, staff experience
    • Faster results -> possibly improved satisfaction scores, improved staff satisfaction
Impacts of POC testing

• Potential to enhance early prioritization of patients
  – Lactate in sepsis
  – AMI patients
  – Creatinine in stroke
  – Potassium in missed dialysis
• At triage (Soremekun et al. Am J Emerg Med 2013)
  – 56% - Helpful to nurses
  – 15% change triage level
  – 6% brought back more quickly
Possible barriers to POC testing

• Concerns over accuracy
  – Correlates well with laboratory testing
• Additional work to conduct tests in the ED
  – Education, staff time
• Interface and connectivity
• Equipment maintenance
  – “Moderate complex” testing device by CLIA
  – 2 controls need to be run during each shift, calibration every 6 months, proficiency testing 3x a year
• Costs of implementation & savings
Personal Experience

• Central ER
  – 105,000 patients a year

• North ER
  – 36,000 patients a year
Point-of-Care Testing

- Emerging technology, miniaturization of biosensors
- Decentralization of laboratory testing

- POC technology
  - With as little as 60 \( \mu \text{L} \) of blood (2 drops) can obtain labs in minutes

- Used in a range of settings
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Goals for Implementing Point of Care

• Concept of “vein to brain”

• Decrease decision time on the workup to completion

• Control time variable by a single department
Rationale

• Memorial Health System mapped patient flow in the ED and found a delay in the provision of test results, particularly for patients presenting with chest pain

• Point of care (POC) troponin testing in the ED was recommended
  – A multidisciplinary team was formed to oversee the process change
  – ED technicians and nurses were trained to perform POC testing
Hypothesis and Objective

• **Hypothesis**
  – Optimizing troponin TATs with POC testing can help expedite patient flow and treatment decisions

• **Objective**
  – In patients presenting to ED with chest pain, determine impact of POC cTn testing on:
    • Troponin TATs
    • TATs for tests analyzed in the central lab (other than troponin)
    • Door-to-result times
    • ED length of stay (LOS)
    • Staff satisfaction with POC testing
Literature
Methods

• Single-center, open label, before-and-after study

• 68-bed ED with an annual census of >100,000 visits

• Population: consecutive patients presenting to ED with chest, abdominal, or shoulder pain AND for whom a cTn test is ordered

• Pre-POC evaluation samples were analyzed using Lab Based Testing

• Post-POC evaluation samples were analyzed using POC
Methods (cont’d)

• Prior to POC testing, testing for chest pain patients included
  – Cardiac marker testing = cTn, CK-MB, and myoglobin
  – Basic metabolic panel
  – CBC

• Following the implementation of a single marker cTnI point of care assay:
  – Testing was run at patient bedside by the ED nurse or technician
  – CK-MB or myoglobin could be ordered as needed and were not part of the standard cardiac marker order set

• In both phases, a second serial cTn test was performed at 2 hours based on physician clinical judgment
Emergency department physician Dr. George Hertner looks across the empty waiting room at Memorial Hospital Central on Thursday. Patients are spending less time in the waiting room after changes were implemented.
Personal Experience

• Slow addition of Point of Care Testing
• Establishing work process
• Collaboration with Lab
• ER buy in
• Other departments buy in
Partnership

- Understand concerns
- Understand goals
- Make a plan together
Troponin TAT

POC testing improved efficiency in the ED

-19 min decrease
63% decrease

30
11
Central Lab Testing TAT

POC testing improved efficiency in the central lab

Non-Troponin TAT

Minutes

- Before POC: 50 minutes
- After POC: 25 minutes
Door-to-Troponin Result

Before POC testing: 0% of patients had results <60 minutes
With POC testing: 74% of patients had results <60 minutes

Before POC testing, 0% of patients had results <60 minutes. With POC testing, 74% of patients had results <60 minutes.
ED Length of Stay

POC testing shortened amount of time patients spent in ED

- 35 minute savings

Comparison of ED Length of Stay:
- Central Lab: 290 minutes
- POC: 255 minutes

12% decrease
Perceived Impact of POC Testing as Reported by Physicians

- Improves workflow processes: 91%
- Facilitates clinical decision making: 96%
- Improves lab result turnaround time: 96%
- Shortens patient length of stay: 91%
Perceived Impact of POC Testing as Reported by Nurses

- POC testing positively impacts nurses
- Improves workflow processes: 100%
- Encourages communication among team: 81%
- Positively impacts my productivity: 84%
- Is easy to use: 78%
- Gives more confidence in patient care: 72%
How Does This Change Lab?

• They are free from some work which can allow them to focus on other tests
How Does This Affect the ER?

• If you increase throughput...
How Does This Affect the Hospital?

• Efficiency is the future
How Will This Affect the Patient?

• Shorter time to definitive care
How Will This Affect Physician Practice?
Impact

• 51 per day x 35 minutes
• =30 hours per day of bed occupancy saved
• Almost 11,000 hours per year
• 11,000/4 hour average stay = increase capacity by 2750
• 11,000 x bed cost per hour =
Focus on Quality
Other tests

- Lactate
- PT
- Chem-8
- BHCG
- Drug screening
Case study  Back to Back Patients

– Just moved to town from east coast, no cardiologist
– Hx CAD, stents, HTN, DM
– Unstable angina presentation
FIRST PATIENT
Case study  

Back to Back Patients

- Patient #2
- -- Burning esophageal pain after jalapenos at lunch
- -- Hx HTN
- -- Pain free in ER
SECOND PATIENT
Case study

- 78 yo female
- Altered mental status
- Temp 38, Normal BP, HR 86
- On a beta blocker
- Lactate
- 5.6
**Case Study**

**24yo Kussmaul Breathing**

- POC Chem8
- Order to resulted=6 minutes
- Call to admit 17 minutes after arrival

**Sweet**

**Altered**

- Lab based Chem8
- Order to lab intake=
- 13 minutes
- Lab to result posted=43 minutes
- Two phone calls with lab
- Total time 56 minutes
- Potential Call to admit at 67 minutes
Conclusions

• POC testing in the ED can reduce door-to-troponin-result times and ED length of stay, two measures that will be important for future reporting and payment determination.

• ED staff satisfaction with POC testing was high, supporting the benefits of POC testing on improved patient flow, quality of care, and employee productivity.
Conclusions (cont’d)

- Glucose
- Urinalysis, pregnancy
- Drug screens
- HIV testing
- Chemistry
  - Po2, pco2, pH, Na, K, Ca, Cl, Hematocrit, Glucose, Creatinine, Urea nitrogen, Lactate, Troponin
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Conclusions

• Team approach

• Patient care is priority

• Take a great History
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