Bilirubin turnaround time in an outpatient pediatric clinic: improving efficiency of time-sensitive lab results

Samantha Curtis
Unified Quality Improvement Symposium
February 5, 2020
Collaborative Team Members

- Samantha Curtis, Medical Student
- Amanda Higginson, MD, Physician
- Dmitry Tumin, PhD, Research Associate Professor
- Fraley Greene, Mary Mayancsik, Laboratory Technologist
- Donna Spain, Nurse Specialist
Background

- 60% of newborn infants exhibit clinical jaundice annually
- AAP recommendation
- ECU’s Outpatient Pediatric Clinic bilirubin specimen processing times
AIM Statement with Numerical Goals

Part 1 Aim Statement (PDSA #1-3): To decrease the mean turnaround time (TAT) from bilirubin orders originating from the ECU Pediatrics Outpatient Clinic to result report in the outpatient electronic medical record (EMR) by 10 minutes over 8 months.

Part 2 Aim Statement (PDSA #4-5): To decrease the variability in TAT from bilirubin orders originating from the ECU Pediatrics Outpatient Clinic to result report in the outpatient electronic medical record (EMR) by 50% over 3 months.
Doctor orders bilirubin stat lab

Patient enters Outpatient Pediatric Laboratory

Patient information found on Epic Patient's lab order sheet verified

Patient's blood drawn Custom barcode CREATED by laboratory technician

Laboratory specimen sent to Outreach Laboratory Patient's lab order sheet printed

Tube received by Outreach laboratory Tube picked up by Outreach laboratory technician Tube brought back to technician desk Patient's information and order found in Epic Patient's name updated in Epic Patient's lab reordered in Epic Patient's barcode printed and tube specimen labeled Patient's lab reordered in Epic Specimen reloaded into transport tube

Tube received by Main laboratory Specimen placed in table top centrifuge for 2 minutes Plasma removed and separated from specimen Tube with serum transferred to a different test tube Tube with serum sample relabeled Lab attendant walks open tube to "stat uncapped" centrifuge processing line Line records results once processed (~10 - 12 minutes)

Normal Results Automatically uploaded into EPIC Physician notifies patient

Abnormal Results Abnormal results appear on separate computer and checked every minute Abnormal test tube walked to beginning on process line and rerun Normal Results Automatically uploaded into EPIC Physician notifies patient

Critical Care Center notified Critical Care Center notifies physician Physician notifies patient
Part 1: PDSA Cycles

1. Doctor orders bilirubin stat lab
2. Patient's lab order sheet printed
3. Patient enters Outpatient Pediatric Laboratory
4. Patient information found on Epic
5. Patient's lab order sheet verified
6. Patient's blood drawn
7. Custom barcode CREATED by laboratory technician
8. Place fluorescent STAT sheet within transport tube
9. Call Outreach Laboratory and record time called
10. Laboratory specimen sent to Outreach Laboratory
11. Tube received by Outreach laboratory
12. Tube picked up by Outreach laboratory technician
13. Tube brought back to technician desk
14. Patient's information and order found in Epic
15. Patient's name updated in Epic
16. Patient's lab reordered in Epic
17. Patient's barcode printed and tube specimen labeled
18. Specimen reloaded into transport tube
19. Specimen tube sent to Main Laboratory
20. Record call by Outpatient Pediatrics

Place fluorescent STAT sheet within transport tube
Call Outreach Laboratory and record time called
Laboratory specimen sent to Outreach Laboratory
Record call by Outpatient Pediatrics
Specimen tube sent to Main Laboratory
Outcomes for Part 1

- Pre-intervention: 92±42 minutes (n=19)
- Post-intervention: 81±23 minutes (n=73)
- Mean TAT was not statistically significant t-test p=0.144; 95% CI: -25, +3
- Significant decrease in the standard deviation F-test of equal variances p<0.001
Development of Part 2

- Residents noticing increased TAT with "stat" bilirubin labs
- High turnover of workers in the Pediatric Outpatient setting after implementation of PDSA cycles 1-3
- Assess the sustainability of PDSA cycles 1-3

**Part 2 Aim Statement (PDSA #4-5):** To decrease the variability in TAT from bilirubin orders originating from the ECU Pediatrics Outpatient Clinic to result report in the outpatient electronic medical record (EMR) by 50% by December 2019.
Part 2: PDSA Cycles

Doctor orders bilirubin stat lab

Patient enters Outpatient Pediatric Laboratory

Patient information found on Epic

Patient’s lab order sheet verified

Patient’s blood drawn

Custom barcode CREATED by laboratory technician

Tube received by Outreach laboratory

Tube picked up by Outreach laboratory technician

Tube brought back to technician desk

Patient's information and order found in Epic

Patient's name updated in Epic

Patient’s lab reordered in Epic

Patient’s barcode printed and tube specimen labeled

Specimen tube sent to Main Laboratory

Place fluorescent STAT sheet within transport tube

Call Outreach Laboratory and record time called

Laboratory specimen sent to Outreach Laboratory
Outcomes for Part 2

- Pre-intervention: 113 ± 75 minutes (n=24)
- Post-intervention: 81 ± 20 minutes (n=24)
- Mean TAT was not statistically significant t-test p=0.054; 95% CI: -64, +1)
- Significant decrease in the standard deviation F-test of equal variances p<0.001
Lessons Learned Through QI Efforts

- **Technological Barriers**
  - EPIC vs. Sunquest
  - Time spent duplicating tasks

- **Communication Barriers**
  - Outpatient Pediatric Clinic Laboratory and Outreach laboratory
  - Project team and Outpatient Pediatric Clinic Laboratory
Next Steps

- Analyze the impact of Epic Beaker on bilirubin TAT
- Analyze the sustainability of previous PDSA cycles during PDSA 6
- Determine how current PDSA cycles affect other laboratory results
Questions?

Presenter Contact Information

Samantha Curtis
forlenzas16@students.ecu.edu

Special thanks to Dr. Robin Collin and Michelle Rotante in the Pediatric Clinic for all your help and support
Changes with Epic Beaker

1. **Doctor orders bilirubin stat lab**
   - Patient’s lab order sheet printed
   - Patient enters Outpatient Pediatric Laboratory
   - Patient information found on Epic
   - Patient’s lab order sheet verified
   - Patient’s blood drawn
   - EPIC BEAKER barcode printed
   - Laboratory specimen sent to Outreach Laboratory

2. **Tube received by Outreach laboratory**
   - Tube picked up by Outreach laboratory technician
   - Tube brought back to technician desk
   - Patient’s information and order found in Epic
   - Patient’s blood ordered in Epic
   - Patient’s name updated in Epic
   - Patient’s lab reordered in Epic
   - Patient’s barcode printed and tube specimen labeled
   - Specimen tube SCANNED sent to Main Laboratory

3. **Tube received by Main laboratory**
   - Specimen placed in table top centrifuge for 2 minutes
   - Plasma removed and separated from specimen
   - Tube with serum transferred to a different test tube
   - Tube with serum sample relabeled
   - Lab attendant walks open tube to “stat uncapped” centrifuge processing line
   - Line records results once processed (~10-12 minutes)
   - Normal Results
     - Automatically uploaded into EPIC
     - Physician notifies patient
     - Critical Care Center notified

4. **Abnormal Results**
   - Abnormal results appear on separate computer and checked every minute
   - Abnormal test tube walked to beginning on process line and rerun
   - Abnormal Results
     - Automatically uploaded into EPIC
     - Critical Care Center notified
     - Physician notifies patient
     - Physician notifies patient
**PDSA 6:**
- Mean TAT: 81(40) minutes
- Comparing PDSA 5 vs. PDSA 6:
  - Test of means $p=0.951$
  - Test of variances $p=0.004$