Lean Journey at Seattle Children's Hospital

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Measurable Learning Objectives

At the end of this activity the participant will be able to:

- 1. Describe SCH microbiology's development of lean culture.
- 2. Identify institutional gains.
- 3. Understand the importance and challenges of sustaining change.

Background

- **Seattle Children's Hospital**
  - 323 bed tertiary hospital serving 4 states.
  - Pediatric academic referral hospital.
  - All specialty services offered including neonates, solid organ transplant, oncology, and bone marrow transplant.

- **Microbiology**
  - Divided into 4 subsections: molecular, cystic fibrosis, AFB/mycology, routine
  - Volume: ~200 routine cultures/day
  - Staff: 1 technical director, 2 supervisors, 1 LIS analyst, 14 technologists, 2 MLT, 2 NRT, 1 lab assistant
  - Hours: 24/7
  - Previous Lean experience

- **Lean and ISE (Industrial Engineering)**

GOAL: Improve patient care by delivering quality results sooner.

- Provide doctors with timely, meaningful, and predictable results.
- Improve the hospital's antibiotic stewardship.
- Decrease length of stay in the hospital.

Modest Beginnings: How to develop a lean culture.

- Understand your lean philosophy.
- Started with small wins.
- Build on your experiences and understanding.

Seattle Children's Microbiology Timeline:

- 5s 2007
- Blood RPIW 2008
- Urine RPIW 2008
- Stool culture A3 2009
- Cerner millennium conversion 2010
- Lab system conversion 2011-2012
- Lab system PDCA 2013

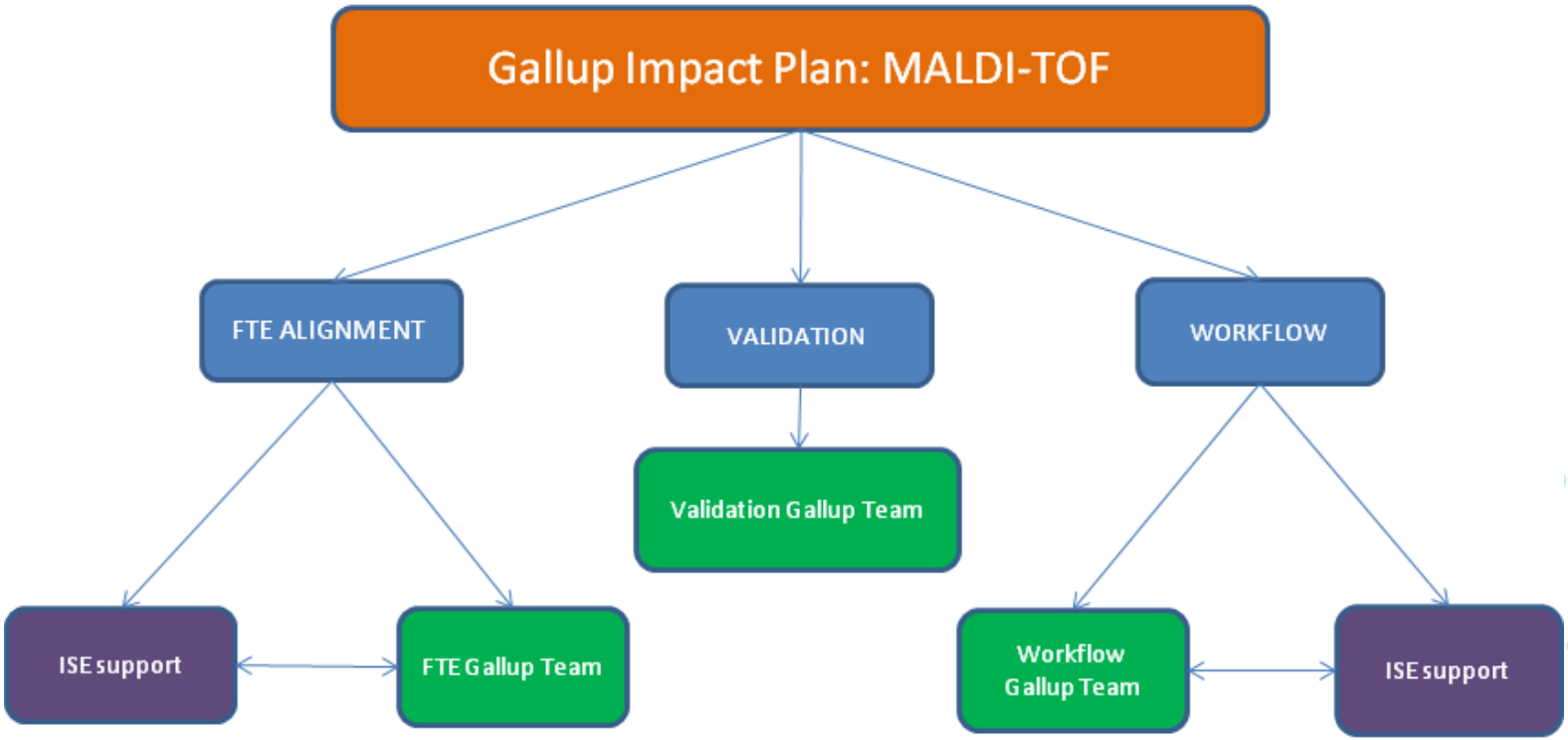
What's our foundation for success?

- An institution that has invested and implemented lean philosophy in a deep and meaningful way.
- A senior management guidance team that actively participates in removing obstacles.
- Engaged frontline staff willing to transform microbiology to improve patient care.
- Partnership with ISE engineers.
- Project management tools.

Do we understand Change Management?

- Understand perception
  - Vision statement
- Understand organization
  - Use project management organizational tools such as charters, work breakdown structures, and meeting minutes
  - Timeline and milestones
  - Communication
- Understand motivation
  - Staff involvement

Organization of MALDI-TOF CONVERSION

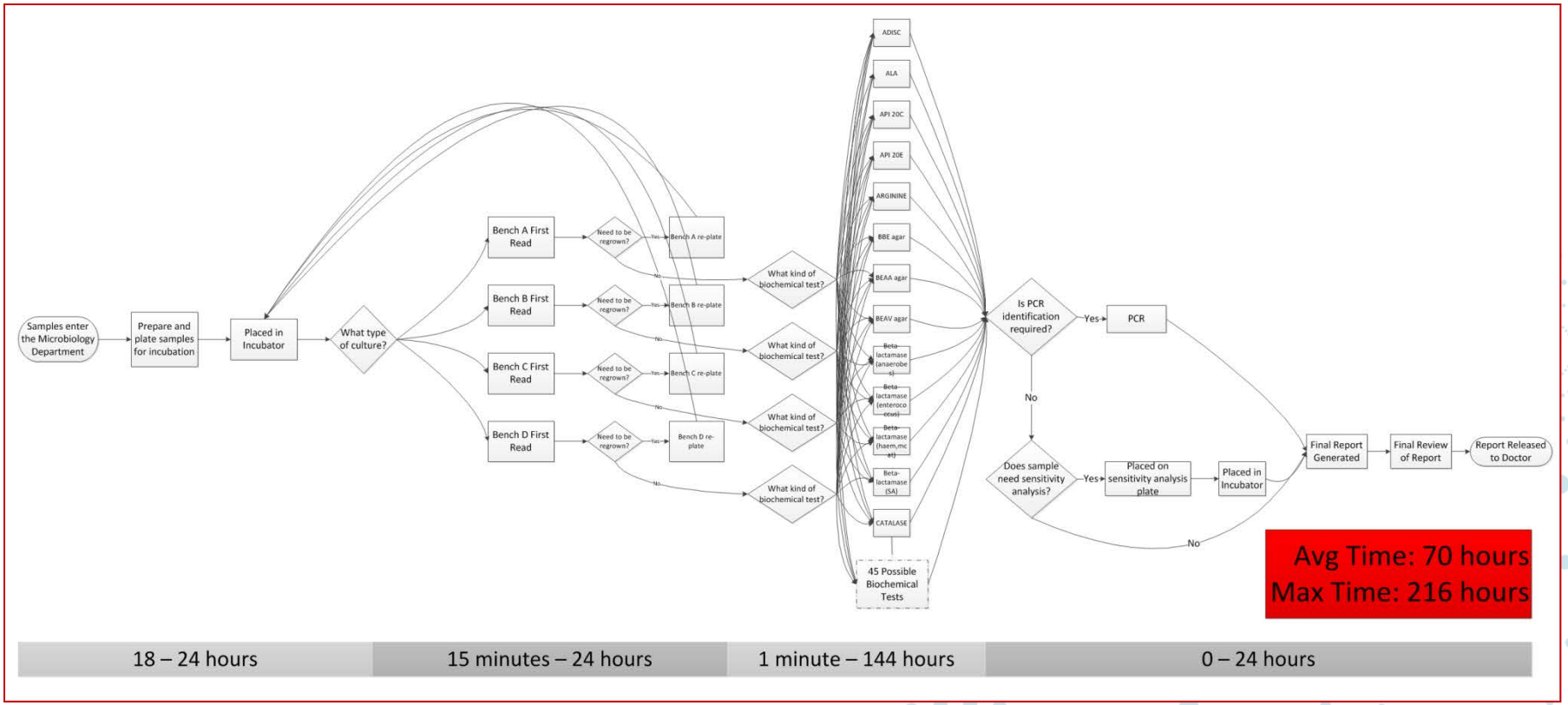


Assessment our existing workflow system

Assess Microbiology System

- Identify scope of project and create a process map
- Identify bottlenecks, unnecessary steps, wait times etc.
- Identify solutions
- Identify metrics to measure your success

Pre-MALDI work flow map based on Jan 1, 2011-Dec 31, 2011



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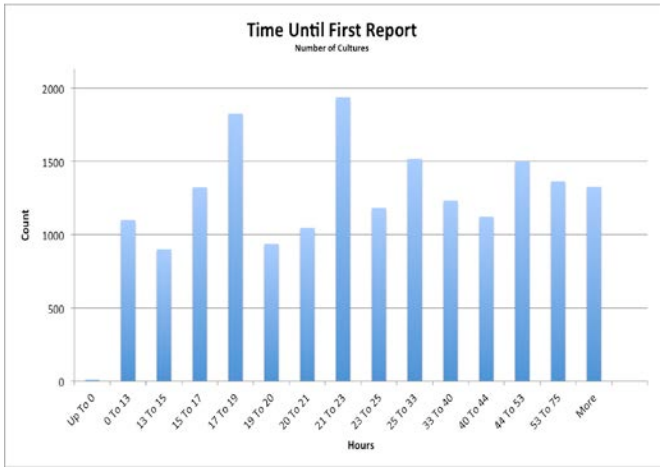
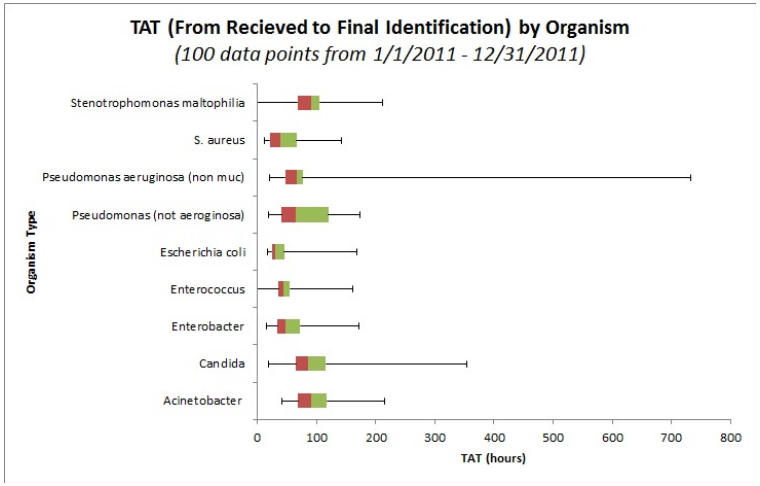
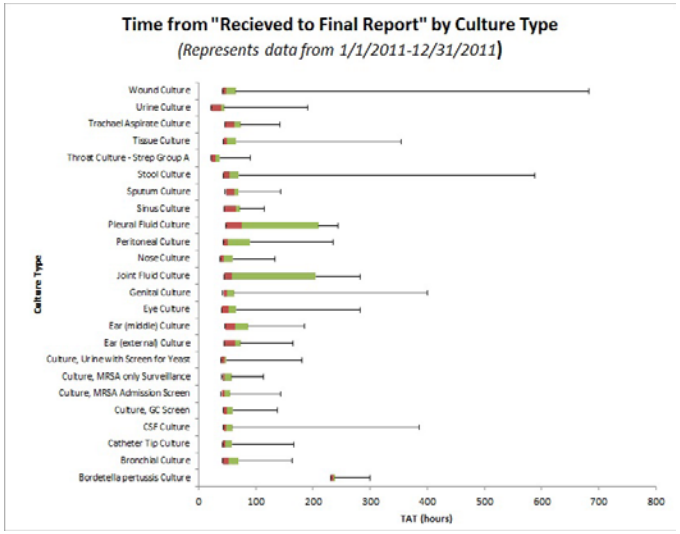
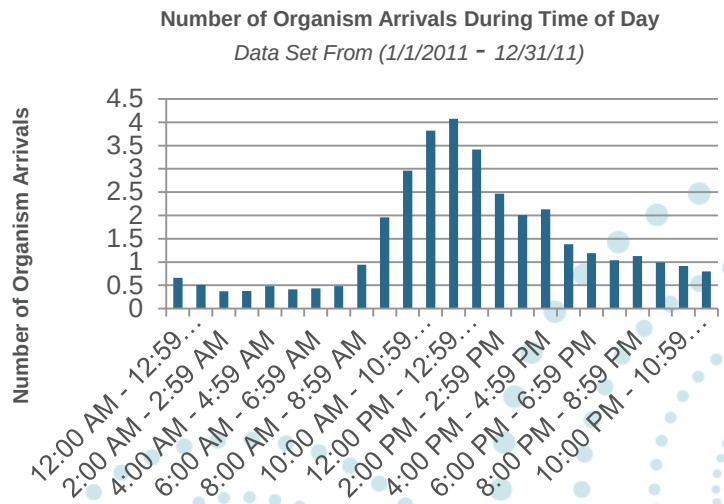
Pre-MALDI system measurements









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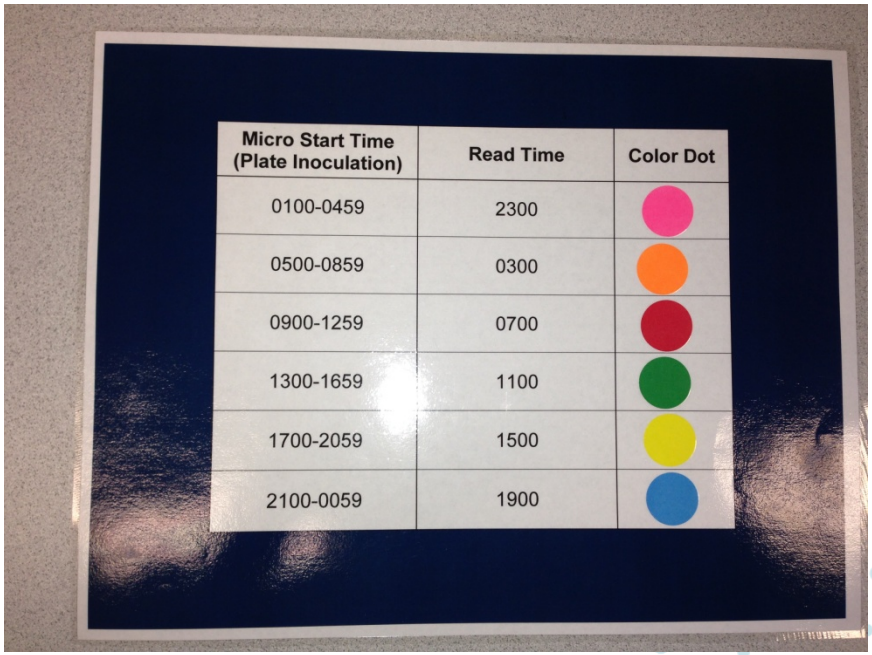
Solutions

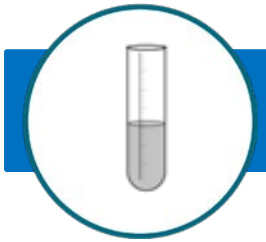
Optimal Read Times

- Reduce variation in culture incubation and reporting cycle times
  - Read cultures when they are ready (16 hours incubation) not when tech is ready
  - Move from one large batch done on day shift to 6 mini batches done 24/7
  - Consistently generate reports 18-24 hours after cultures are received in lab
-

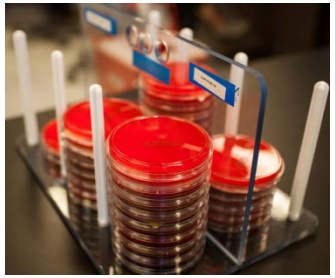


Micro Start Time (Plate Inoculation)	Read Time	Color Dot
0100-0459	2300	
0500-0859	0300	
0900-1259	0700	
1300-1659	1100	
1700-2059	1500	
2100-0059	1900	

Culture Organization

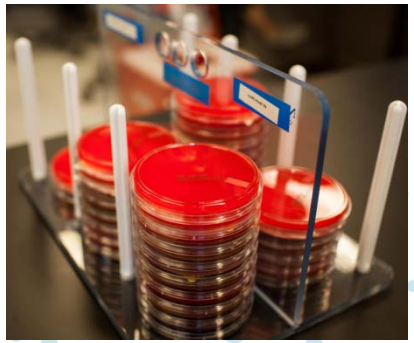


When samples arrive in SCH Microbiology, they will be plated and placed in the appropriate read time rack to ensure the culture status will be reported 18-24 hours later.

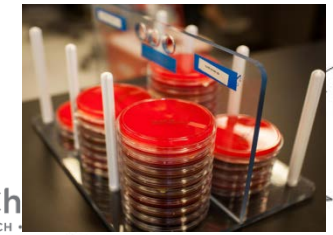


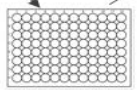
Racks will be placed in the appropriate time slot in one of three incubators.

After 16-22 hours of incubation (at the beginning of each 4 hour cycle) the appropriate read time rack will be selected for testing.



Cultures are read and spotted to 96 well plate, and placed into MALDI-TOF for testing.





Metric Results:

- **TAT Metrics (lab efficiencies/capacities-decrease WIP):**
  - **% improvement** in cultures receiving a preliminary report within 24hrs
    - **Wound 11.2%, Trach 11.0%**
  - **% improvement** in negative cultures receiving a final report within 48hrs
    - **Stool 17.0%, Wound 37.0%, Trach 33.0%**
  - **% improvement** in positive cultures receiving a final report within 48hrs
    - **Stool 11.9%, Wound 3.9%, Trach 22.7%**

- **TAT Metrics (predictability):**
  - **% improvement** in cultures receiving a preliminary report with18- 24hrs
    - **Wound 26.7%, Trach 49.3%**
  - **% improvement** in negative cultures receiving a final report within 42-48hrs
    - **Stool 37%, Wound 42.9%, Trach 35.9%**
  - **% improvement** in positive cultures receiving a final report within 42-48hrs
    - **Stool 16.5%, Wound 21.5%, Trach 12.7%**

- **TAT Metrics (improve quality patient care):**
  - **%blood culture definitive ID.**

blood culture ID TAT

	<4 Hrs	<12 Hrs	<24 Hrs
GN pre-MALDI	0.0%	30.7%	30.7%
GN post-MALDI	80.0%	100.0%	NA
GP pre-MALDI	0.0%	2.9%	68.1%
GP post-MALDI	23.5%	27.5%	91.4%

Cost Savings

Microbiology Lab Future State Cost Savings Results

	Variability	Worst Case	Base Case	Best Case
Culture Plates per year	*5%*	$ 1,772.11	$ 1,816.69	$ 1,860.61
Biochemicals per year	*10%*	$ 41,901.27	$ 46,556.96	$ 51,212.66
Technician Time per year			$ (6,800.00)	
Cost of Running MALDI-TOF	5%	$ (2,496.60)	$ (2,628.00)	$ (2,759.40)
Total Savings		**$ 34,376.77**	**$ 38,945.65**	**$ 43,513.87**
Percentage Savings		**22%**	**25%**	**28%**

Assumptions:
$50/hr (per tech time including over head) and an additional $30/hr for each additional tech
$.30/ run of MALDI-TOF
24 hours x 365 operation days throughout year

* Base Case savings equivalent to 1,557 $25 vaccines

Value of Monitoring your System

- Sustaining the Change: Help promote and maintain a lean culture.
- Allow for quick and easy identification of problems and trends.
- Allow you to identify your next steps in the continuous process improvement.

It takes a lean village…

- Thanks to our senior management team for guidance:
  - Dr. Joe Rutledge MD; Dr. Michael Astion MD, PhD; Joanne Simpson; Dr. Hiem PhD
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