

Improving Turnaround Time for Newborn Screening Testing: A Two Year Experience in Michigan

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Background

- In 1965, Dr. Stanley Read at the Michigan Department of Public Health and Dr. Richard Allen at the University of Michigan introduced newborn screening (NBS) for phenylketonuria (PKU) to Michigan.
- Currently, Michigan's NBS Program screens for 50 disorders.
- Michigan is geographically a large state with 90 hospitals with birthing units located across two peninsulas (Figure 1); the distance from Ironwood, MI to Lansing, MI is 550 miles.
- The time from specimen collection to laboratory receipt is an important quality assurance indicator because it measures how quickly specimens are shipped from birthing centers/midwives to the state NBS laboratory.
- The target time from specimen collection to laboratory receipt is one to three days.
- Treatment initiation recommendations vary from seven days of life for infants with PKU¹ to three months of age for infants with sickle cell disease.²

Goal

- Improve the turnaround time for NBS through a variety of quality improvement measures (Figure 2) in order to decrease the time from birth to treatment initiation for newborns with disorders included in the NBS panel

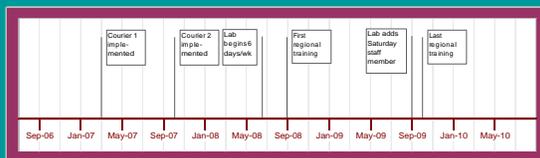


Figure 2. Timeline of Quality Improvement Measures, Michigan NBS Program

Changes Made to Achieve Goal

- NBS Program establishes contract for commercial courier to pick-up specimens from birthing centers and bring them to the state NBS laboratory in Lansing.
- The NBS Program Coordinator contacted hospital staff to encourage them to use courier for specimen delivery rather than US mail (>95% of specimens came by US mail in 2006).



Figure 1. Hospitals with Birthing Units, Michigan 2010



Figure 3. Sites of the NBS Regional Trainings, Michigan 2008-2009

Changes Made to Achieve Goal continued

- The NBS Program Coordinator and Nurse Consultant conducted site visits at individual hospitals to review the entire NBS process.
- The NBS lab hired and trained new scientists, as well as cross-trained existing staff for Saturday testing (4/08).
- The NBS Program began operating six days per week (Monday-Saturday) to provide a partial panel of results (6/08).
- Extensive training & revised schedules for lab staff allowed for the complete panel to be provided for Saturday testing (9/09).
- The NBS Program held eight regional trainings around the state (Figure 3).
 - 80% of hospitals sent at least one representative to a training.

Evaluation of Courier System

- The NBS Program evaluated the courier system by examining transit times (time from collection to laboratory receipt) for infants born 7/07, 7/08, & 7/09.
- The number of hospitals with an average transit time >3 days decreased from 73% in 2007 to 17% in 2009 (Table 1).
- The largest hospitals had the fastest transit times, though the smallest hospitals had the greatest percent improvement in transit time (Table 2).
- The Upper Peninsula region improved the most, reducing the average transit time by more than one day (Table 3, Figure 4).
- Overall, average transit time decreased 18 hours from 7/07 to 7/09.

Table 1. Number of Hospitals with an Average Transit Time >3 Days, Michigan

Time	N (Hospitals)	Percent
July 2007	72	72.7%
July 2008	38	38.4%
July 2009	17	17.2%

Table 2. Average Transit Time, by Size of Hospital, Michigan

Percentile of Births	Average Transit Time (in days)			Percent Change (July 2007-July 2009)
	July 2007	July 2008	July 2009	
<25 th	3.65	2.80	2.55	-30.1%
25 th -49 th	3.77	3.34	2.78	-26.3%
50 th -74 th	3.47	2.91	2.61	-24.8%
>75 th	2.98	2.38	2.34	-21.5%

Table 3. Average Transit Time, by Region, Michigan

Region	Average Transit Time (in days)			Percent Change (July 2007-July 2009)
	July 2007	July 2008	July 2009	
(1) Detroit	3.29	2.76	2.56	-19.7%
(2) Oakland	3.11	2.36	2.23	-28.3%
(3) Ann Arbor	3.18	2.50	2.46	-22.6%
(4) Kalamazoo	3.39	2.78	2.54	-25.1%
(5) Grand Rapids	3.25	2.55	2.36	-27.4%
(6) Lansing	2.55	2.26	2.12	-6.9%
(7) Flint	3.07	2.63	2.53	-17.6%
(8) Saginaw	3.40	2.79	2.51	-28.5%
(9) North Lower Peninsula	3.11	2.90	2.70	-13.2%
(10) Upper Peninsula	3.98	3.00	2.72	-31.7%

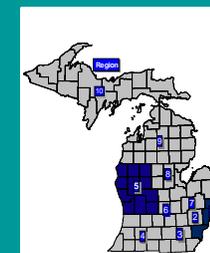


Figure 4. Regions Defined by Michigan Perinatal Health Systems

Lab Reporting and Time to Treatment Initiation

- In 2009, 80 confirmed cases had improved in-lab times due to Saturday testing.
- The average time to treatment initiation decreased for many of the disorders included in the NBS panel. For example:
 - All 4 cases of classic galactosemia in 2008 had treatment initiated within 7 days of birth, compared to 1 of 2 cases in 2007.
 - Each case of profound biotinidase deficiency in 2007 and 2008 began treatment within 7 days; none of the 3 cases in 2006 had treatment initiated before 7 days of life.
 - 4 out of 5 newborns in 2008, 7 out of 8 newborns in 2007, and 0 out of 10 newborns in 2006 diagnosed with medium-chain acyl-coA dehydrogenase deficiency (MCAD) were treated within the first 7 days of life.

Conclusions and Future Directions

- NBS Program improvements have significantly improved specimen transit and in-lab times and thus time to treatment initiation.
- Some anticipated improvements for 2010 include continued educational efforts for hospital personnel, expanded courier coverage and additional changes for in-lab operations.