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What Predicts NBS Specimen Timeliness in a State-Based Cohort of Birthing Hospitals?

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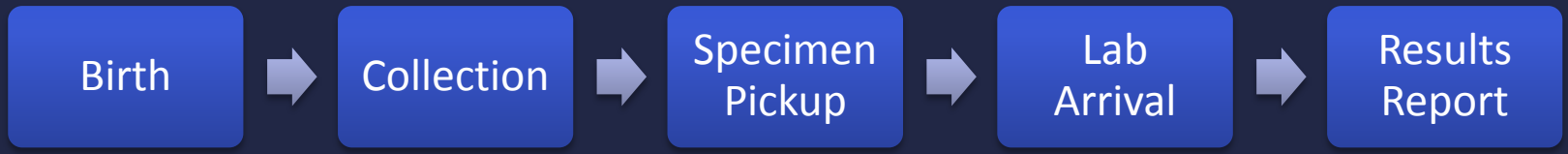
Disclosure

I have no conflicts of interests to disclose

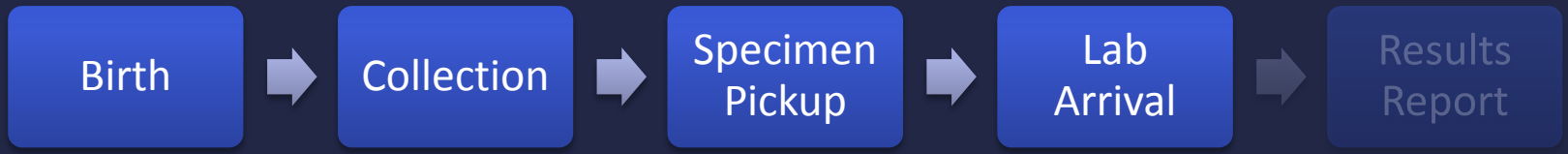
Background

NBS is a system whose effectiveness depends on the timely collection, transport, and evaluation of NBS specimens

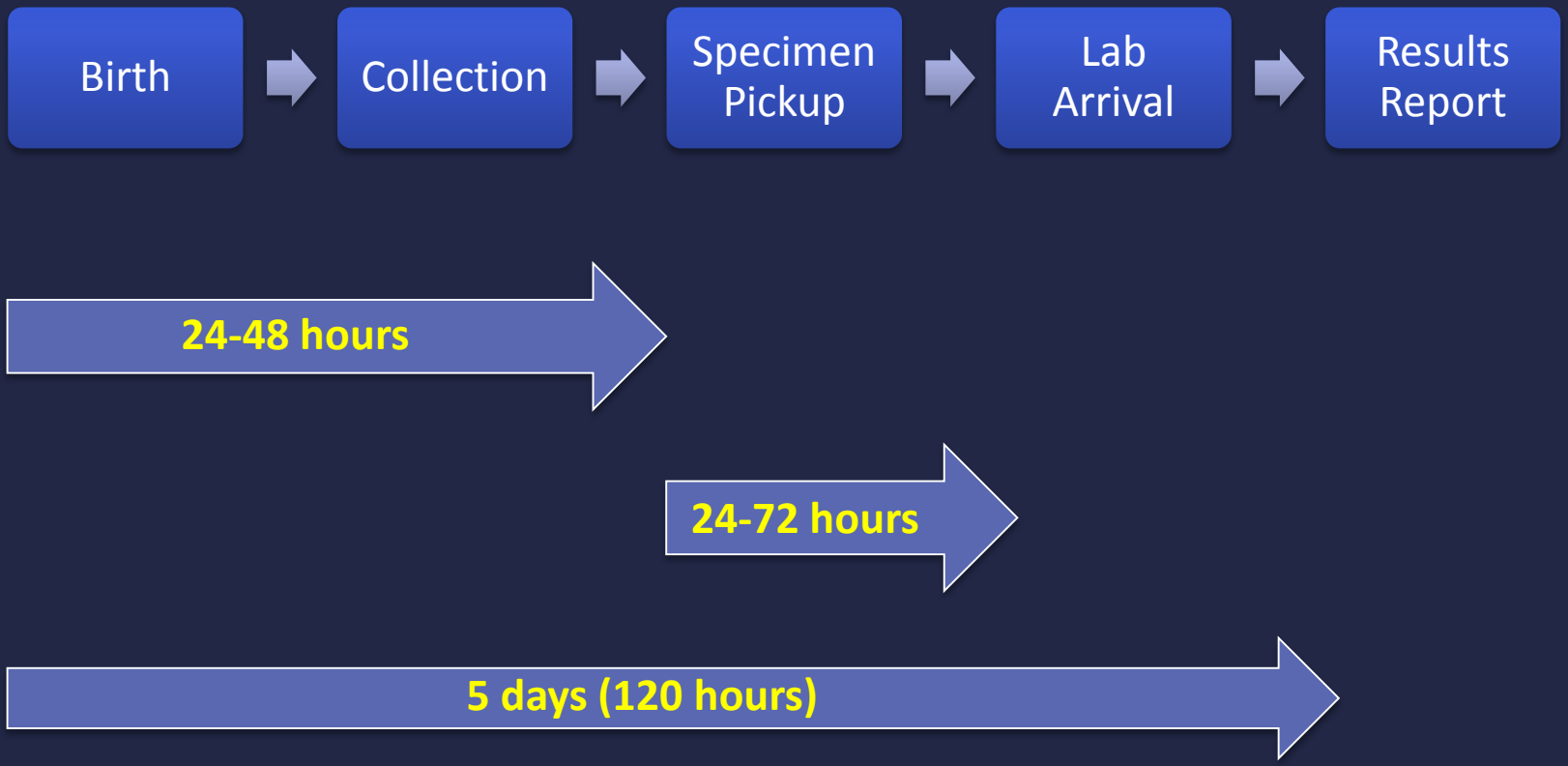
Process Flow



Process Flow



Time Metrics



Appropriate Day Metric

Any specimen collected…

- After previous pickup time

AND

- >5 hours before next designated pickup time

Pickup

Last Collection for Pickup

Pickup

Specimens for Following Day Pickup

Process Flow

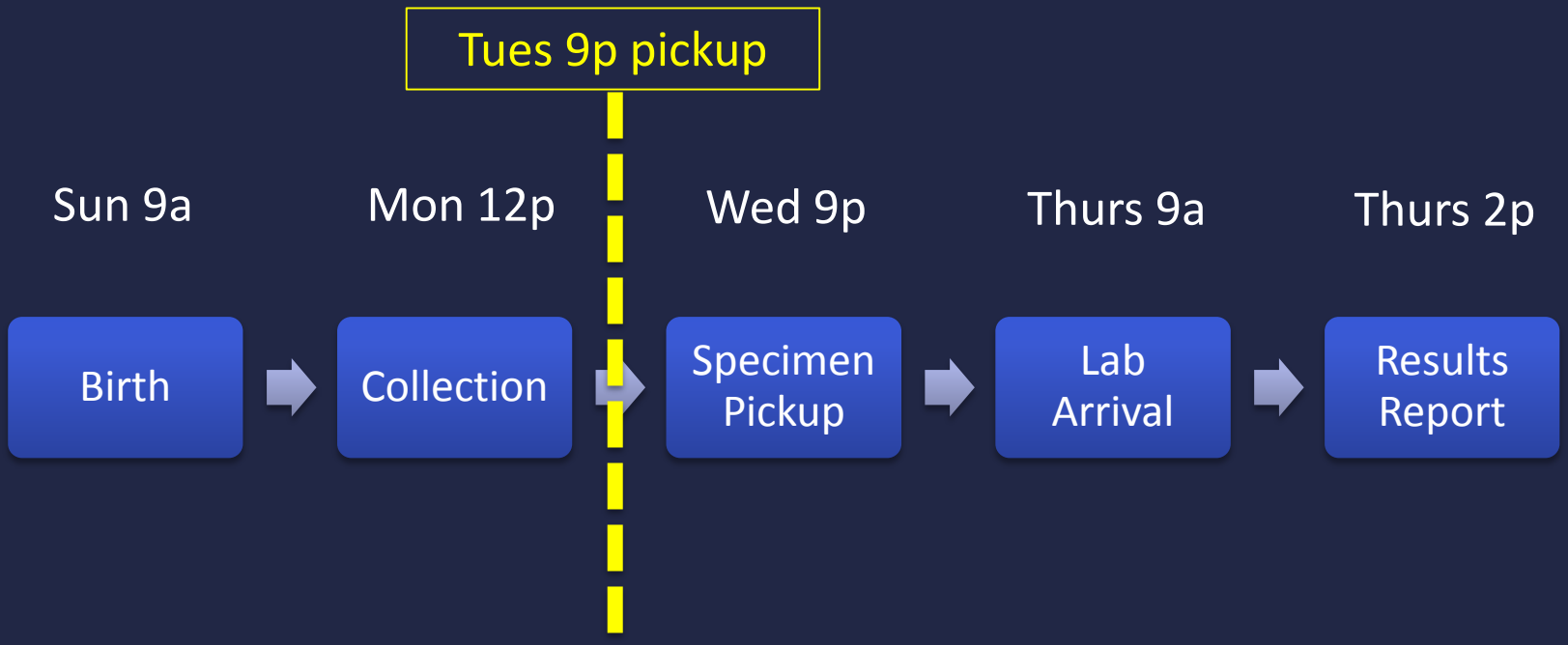
101 hours

Process Flow

101 hours

✓<120 hours

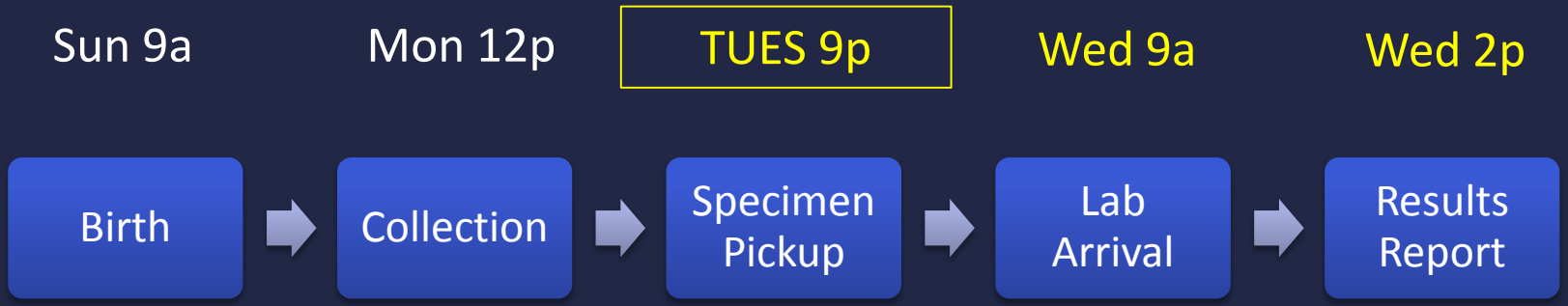
Process Flow



✗ Appropriate Day

✓<120 hours

Process Flow



77 hours!

Objective

- Using appropriate day metric, identify birth level and hospital level characteristics that predict timeliness of the NBS process

Data Source

- Michigan NBS records, April 2014-March 2015
  - Data on hospital characteristics (n=83)
  - Data on initial specimens collected (n=110,851)

- Transport
  - All NBS specimens are transported from the hospital by FedEx® or UPS®

    and
  - Arrive at the state lab the day following pickup
- Lab
  - Open Monday-Saturday


ups


FedEx

Monday
Tuesday
Wednesday
Thursday
Friday
Saturday
Sunday

Monday
Tuesday
Wednesday
Thursday
Friday
Saturday
Sunday

Main Outcome

- Appropriate day

Covariates

- Hospital Characteristics
  - Hospital volume
  - Time from birth to NBS specimen collection
- Birth Characteristics
  - Day of birth
  - Day of collection

Data Analysis

- Generalized linear mixed model
- Excluded following specimens due to small #s:
  - Special Care Nursery (n= 6989)
  - NICU (n=702)

Results

Fixed Effects

Variable	F	df1	df2	P
Corrected Model	45.465	9	94771	<0.001
Hospital Volume	0.18	1	94771	0.0894
Hospital Collection Time	1.188	1	94771	0.276
Collection Time	1.881	1	94771	0.170
Day of Birth	67.637	6	94771	<0.001

- Day of birth is best predictor of timeliness.
- Hospital volume and collection time (hospital and individual) are not significant.

Results

	Exp(Coeff.)/Coeff.	Statistic	P	CI (Lower)	CI (Upper)
Intercept	0.149	-14.845	<0.001	0.116	0.191
Hospital Volume	1	0.133	0.894	1	1
Hospital Transit Time	1.059	1.090	0.276	0.955	1.175
Hospital Collection Time	1.023	0.433	0.665	0.922	1.136
Collection Time	0.989	-1.372	0.170	0.975	1.005
Tuesday Collection	1.006	0.180	0.857	0.942	1.075
Wednesday Collection	1.115	3.244	0.001	1.044	1.191
Thursday Collection	1.106	3.009	0.003	1.036	1.182
Friday Collection	0.593	-14.026	<0.001	0.551	0.638
Saturday Collection	1.091	2.383	0.017	1.016	1.173
Sunday Collection	1.106	2.684	0.007	1.028	1.191
Monday Collection	n/a	n/a	n/a	n/a	n/a
Var(Intercept)	0.638	6.092	<0.001	0.462	0.88
Var(Collection Time)	0.003	4.06	<0.001	0.002	0.004

Birth day

- Relative to Monday, Friday births has the lowest relative chance of being timely (0.593, 95% CI: 1.142–1.211).
- Wednesday, Thursday, Saturday and Sunday births are more significantly likely of lead to timely collection than Monday births.
- Hospital differ significantly in timeliness, despite controlling for volume, collection time, and day of birth.
- Collection time (as a random effect) has effect on timeliness that differs significantly between hospitals.

Conclusion

- When looking to improve NBS timeliness, states should examine the effect that day of birth and hospital have on timeliness.
- States might consider using appropriate day as a means to improve transport timeliness.

Collaborators

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- Mary Kleyn, PhD
- Gabriel Zayas-Caban, PhD
- Sarah Reeves, PhD
- Dalton Simancek, BA

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  Public Health Services and Systems Research

THANK YOU


MICHIGAN
Newborn
Screening


MDHHS
Michigan Department of
Health and Human Services

MONTH:_____

IN-FULL-VIEW

SUN	MON	TUE	WED	THU	FRI	SAT
☐	☐	☐	☐	☐	☐	☐
Lab Closed	Lab Open	Lab Open	Lab Open	Lab Open	Lab Open	Lab Open

SUN	MON	TUE	WED	THU	FRI	SAT
☐	☐	☐	☐	☐	☐	☐
Lab Closed	Lab Open	Lab Open	Lab Open	Lab Open	Lab Open	Lab Open