

# Successfully reducing newborn asphyxia in the labour unit in a large academic medical center

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ORIGINAL RESEARCH

## Successfully reducing newborn asphyxia in the labour unit in a large academic medical centre: a quality improvement project using statistical process control

Rikke von Benzon Hollesen,<sup>1</sup> Rie Laurine Rosenthal Johansen,<sup>1</sup> Christina Rørbye,<sup>2</sup> Louise Munk,<sup>2</sup> Pierre Barker,<sup>3</sup> Anette Kjaerbye-Thygesen<sup>2</sup>

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<sup>1</sup>Danish Society for Patient Safety, Frederiksberg, Denmark

### ABSTRACT

**Background** A safe delivery is part of a good start in life, and a continuous focus on preventing harm during delivery is crucial, even in settings with a good safety record. In January 2013, the labour unit at Copenhagen University Hospital, Hvidovre, undertook a quality improvement (QI) project to prevent asphyxia and reduced the percentage of newborns

newborns, around 600–700 of them experience deprivation of oxygen during birth and are diagnosed with signs of asphyxia (International Classification of Diseases, 10th Revision: P21).<sup>3</sup> Asphyxia may result in a severely impaired child with mental

# Agenda

- Objective
- Background and context
- Change theory
- Measurements and results
- Lessons and messages

# Objective

Reduce the number of newborns with asphyxia by the end of 2014 using improvement science

Asphyxia definition:

Number of deliveries between newborn with

- Apgar score  $< 7$  after 5 minutes.  
and/or
- pH  $< 7$  from the arterial umbilical cord.



# Background and context

Quality improvement work from January 2013 to end of 2014:

- Labour unit at Copenhagen University Hospital, Hvidovre.
- 7000 newborns per year.
- Staff: 120 midwives, 25 obstetricians and gynaecologists, 20 physicians in training and 6 nursing assistants.
- Midwives are responsible for all normal deliveries.
- Always a midwife in charge.

# Change theory - How to close the know-do gap?

## Change theory

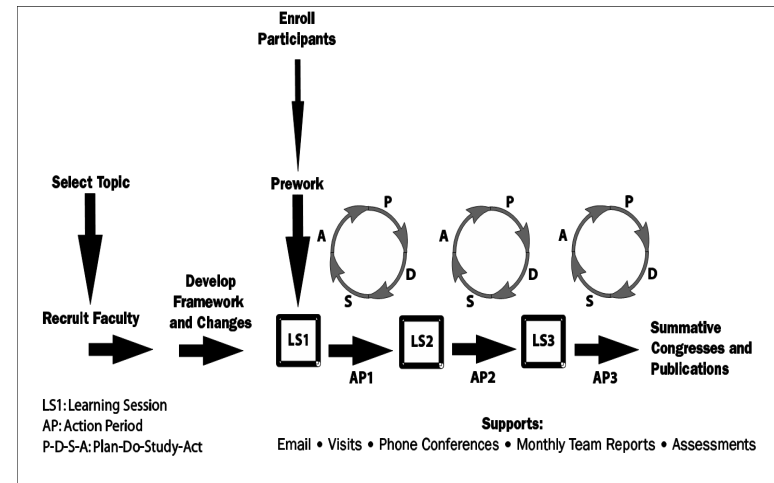
### The clinical content:

- Three care bundles based on national guidelines
  - Delivery Bundle (Check in and Time out)
  - Vacuum extraction bundle
  - Oxytocin Bundle

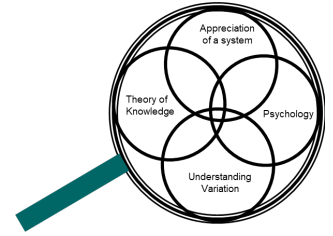
### Implementation theory:

- Training in interpretation of CTG
- Training in QI methodology
- Part of the national perinatal QI collaborative

## Perinatal Quality and Improvement Collaborative



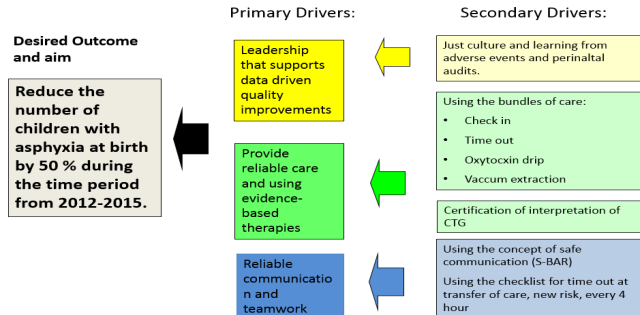
# Improvement Science



## Model for Improvement



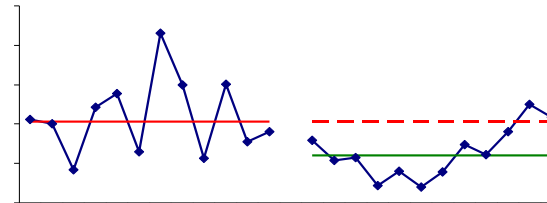
## Driver Diagram



## Work flow analysis



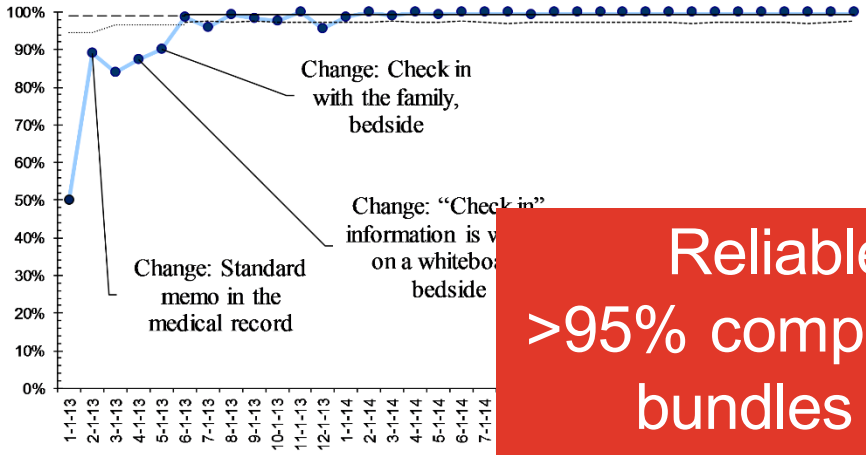
## Statistical Process Control



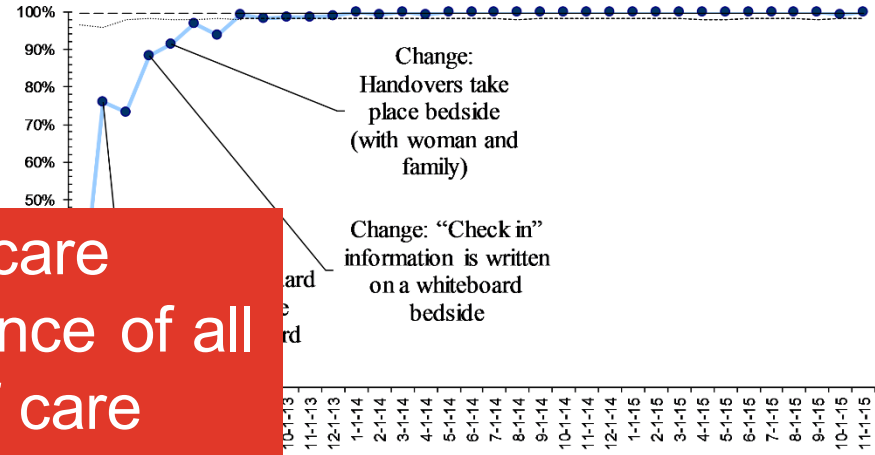
# Changes in workflow

Bundle of perinatal care	Workflow before	Workflow after
Delivery: "Check-in" at admission	<b>Unstructured</b> documentation of labour and risk factors	<ul style="list-style-type: none"><li>• Structured documentation in standard memo</li><li>• Whiteboards bedside</li></ul>
Delivery: "Time-out" at handovers	Handovers took place <b>twice</b> : <ul style="list-style-type: none"><li>• Office</li><li>• Bedside</li></ul>	<ul style="list-style-type: none"><li>• Handovers take only place bedside with the mother and relatives.</li></ul>
Oxytocin	The midwife took the decision <b>alone</b> under normal fetal conditions in a silo	<ul style="list-style-type: none"><li>• Shared decision with a peer</li><li>• Checklist to support the decision</li></ul>
Vacuum extractions	Obstetricians worked <b>alone</b> in a silo	<ul style="list-style-type: none"><li>• Multidisciplinary teamwork</li><li>• Checklist to support the teamwork under pressure</li></ul>

**% Compliance with check in at admission  
P-chart**

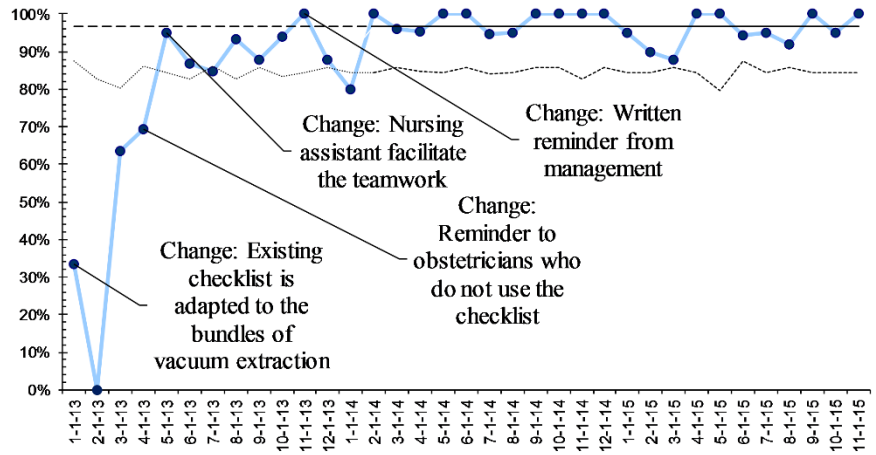


**% Compliance with time out at handovers, and new risk factors  
P Chart**

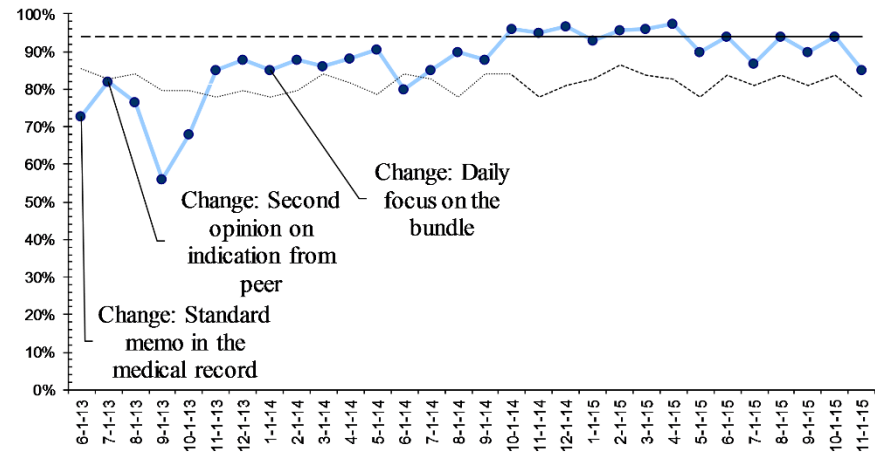


**Reliable care  
>95% compliance of all  
bundles of care  
– all or none**

**% Compliance with the vacuum  
P Chart**

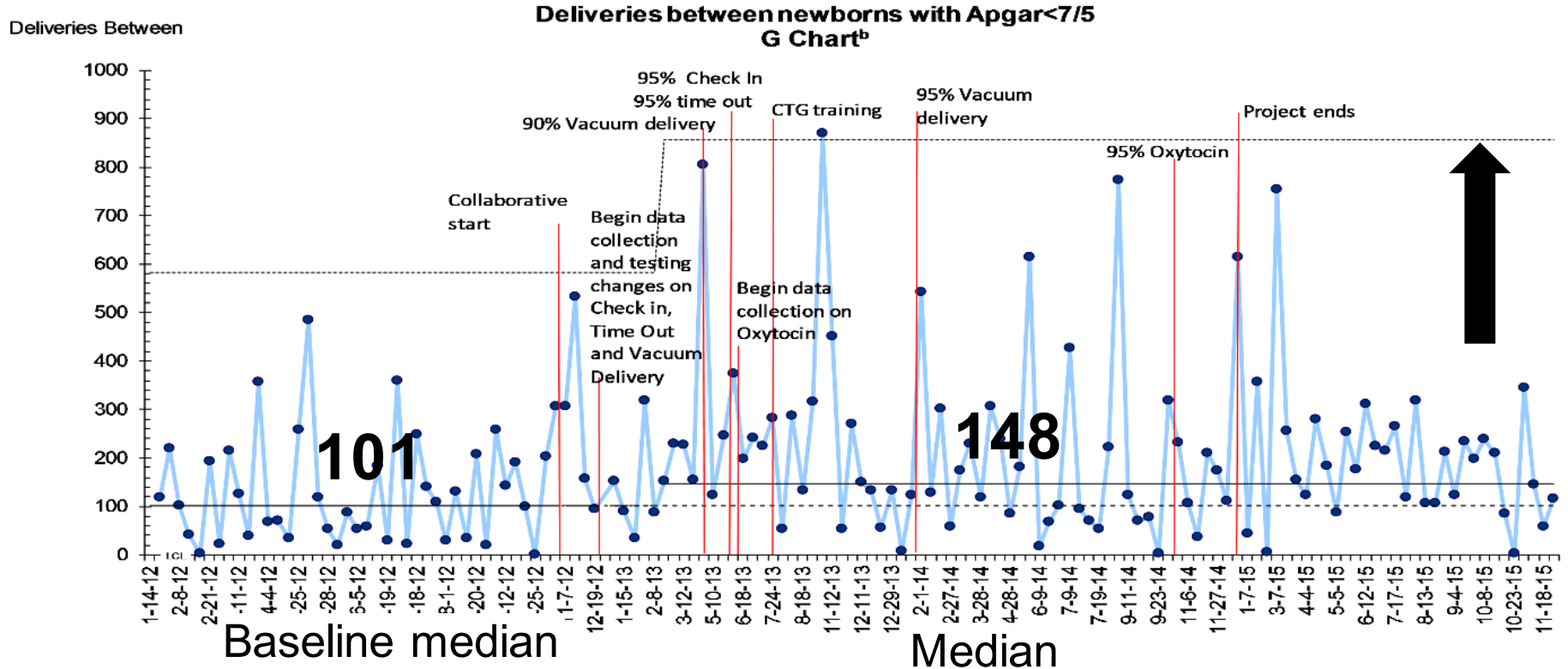


**% Compliance with the oxytocin drip bundle  
P Chart**



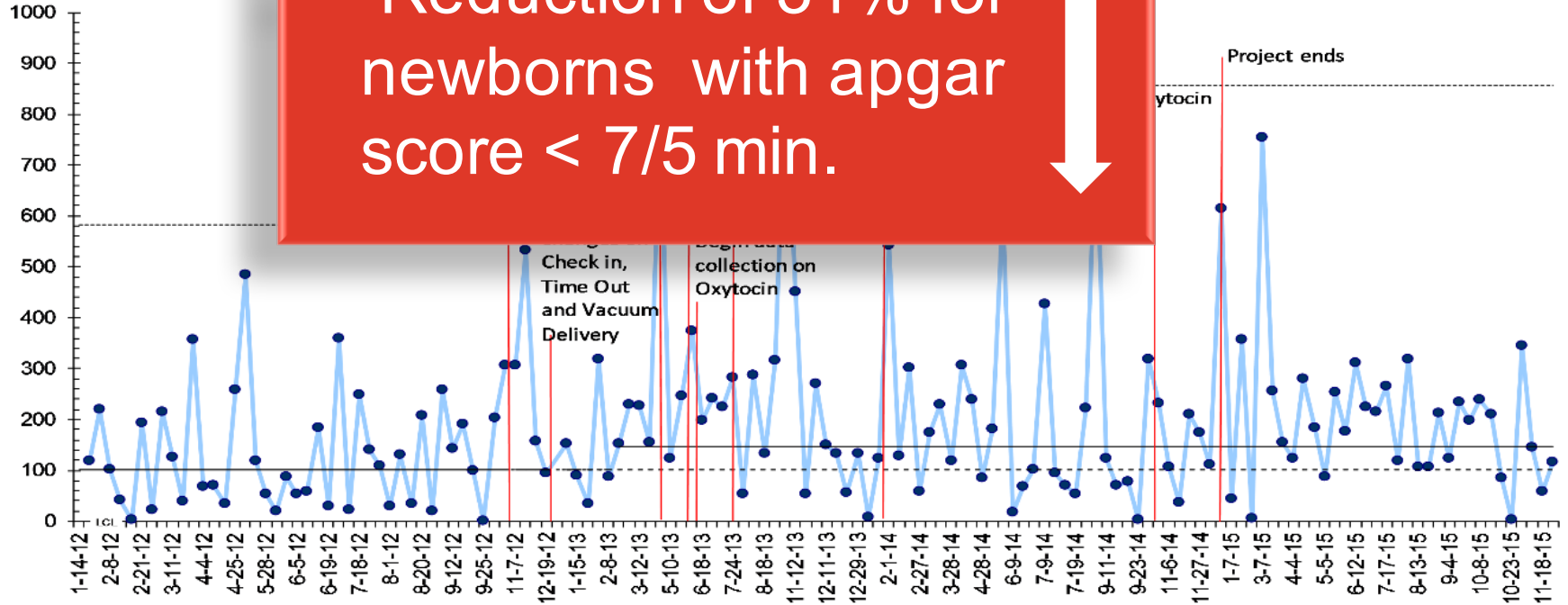


# Deliveries between newborns with Apgar score < 7 after 5 minutes

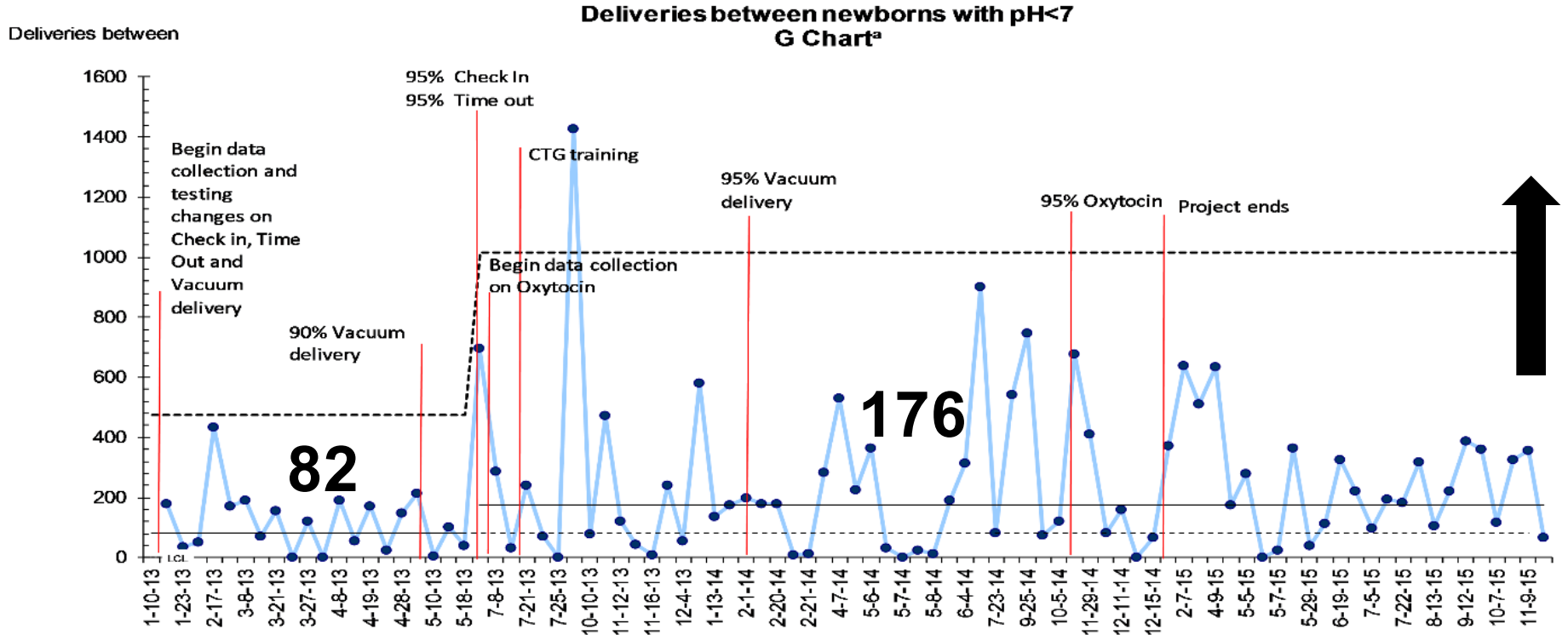


# Deliveries between newborns with Apgar score < 7 after 5 minutes

Deliveries Between



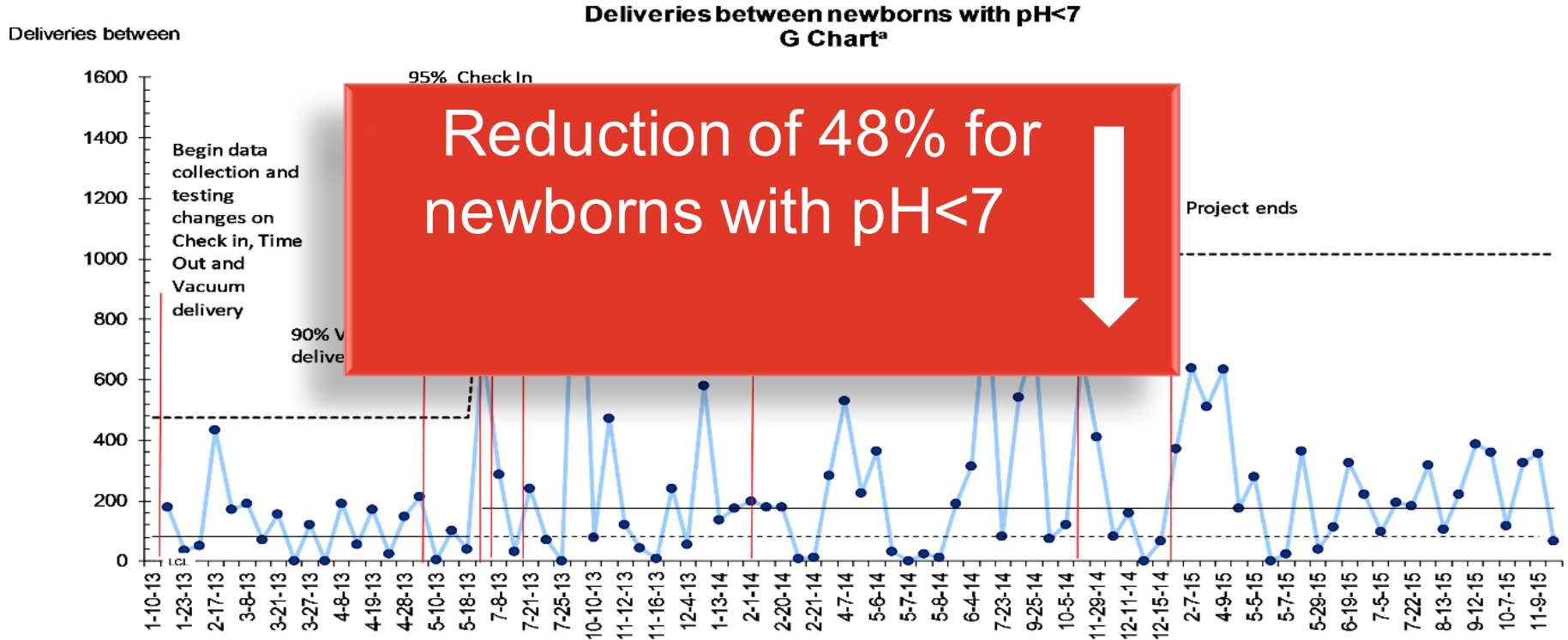
# Deliveries between newborns with pH < 7



Baseline median

Median

# Deliveries between newborns with pH < 7



# Lessons and messages

Drivers of improvement of successful collaboratives:

- Strong leadership support (1,3,4,7)
- Multidisciplinary quality improvement team (3,4,8)
- Capability for improvement (3,8)
- Clear theory of change and aims (4)
- Multiple methods to a close learning network (4)
- Learning from data over time (1,3,4)

# Key message

*By using quality improvement methods and statistical process control, the QI-team in the labour unit at Copenhagen University Hospital, Hvidovre, Denmark was able to close the know do gap, and reduce the percentage of asphyxia with 48% - even in a setting with a good safety record.*

# Contact informations

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# For further inspiration

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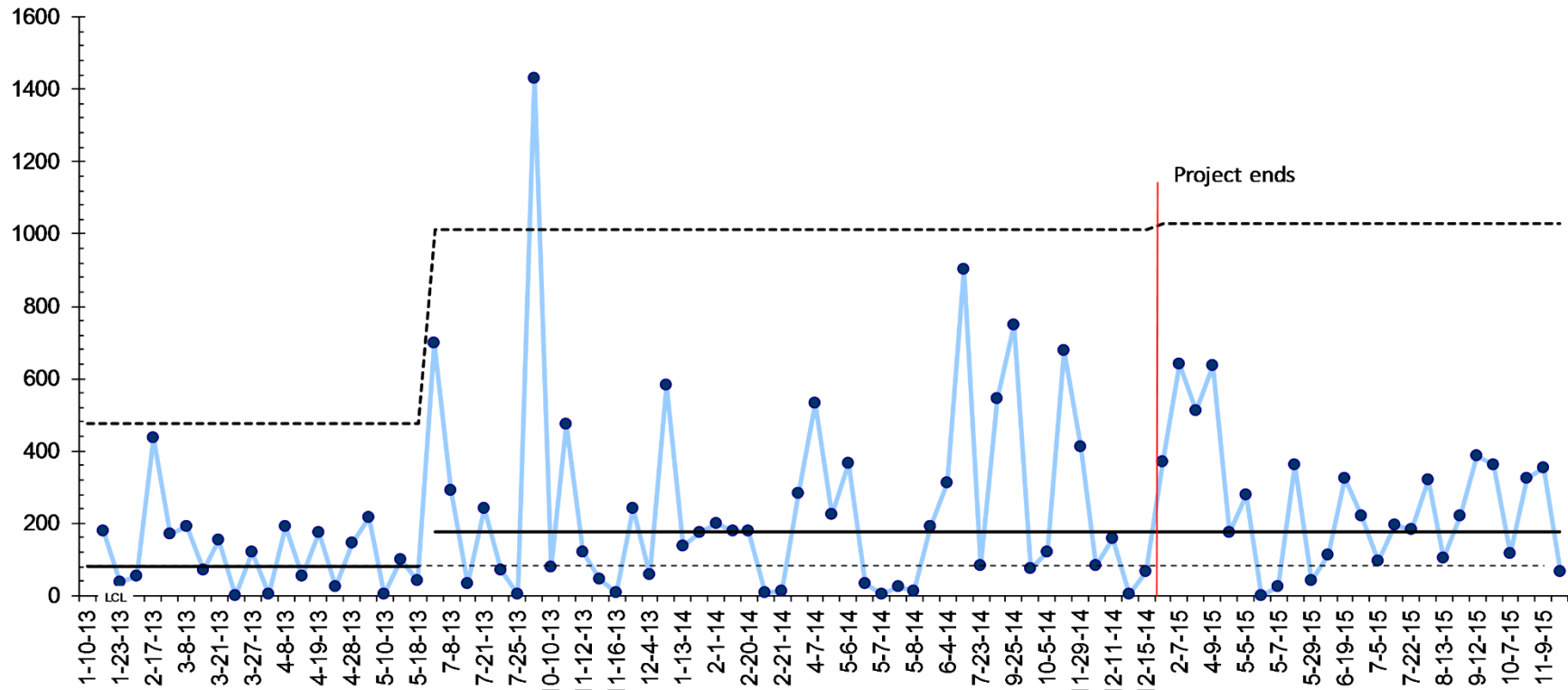
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# Sustainability

Deliveries between newborns with pH<7 before and after project ends  
G Chart<sup>a</sup>

Deliveries between



# Sustainability

Deliveries between newborns with Apgar<7/5 before and after project ends  
G Chart<sup>b</sup>

Deliveries between

