

# Pediatric DART: Establishing a Multidisciplinary Difficult Airway Response Team at a Free-standing Children's Hospital

Christina R Rufener MD<sup>1,2</sup>, Matthew Brigger MD, MPH<sup>1,2</sup>, Lena Derkrikorian MSN, RN<sup>1</sup>, Helen Harvey MD, MS<sup>1,2</sup>, Matthew Murray MD<sup>1,2</sup>, Harjot Bassi MD<sup>1,2</sup>, Wen Jiang MD<sup>1,2</sup>, Romeo Ignacio MD<sup>1,2</sup>, Benjamin Keller MD<sup>1,2</sup>, Alyssa Brzenski MD<sup>1,2</sup>, Amy Kimball MD<sup>1,2</sup>, Nina Haskell RT<sup>1</sup>, Elena Saenz RT<sup>1</sup>, Eman Alrabadi<sup>1</sup>, Laurel Moyer MD, MPH<sup>1,2</sup>, Branden Engorn, MD<sup>1,2</sup>

<sup>1</sup>Rady Children's Hospital San Diego, San Diego, CA <sup>2</sup>University of California - San Diego, San Diego, CA

## INTRODUCTION

Management of pediatric difficult airways (DA) outside of the operating room (OR) are hospital wide events associated with complications (1,2). A multidisciplinary difficult airway response team (DART) was created at a free-standing children's hospital to facilitate out of OR intubations.

## METHODS

This project was approved by the RCHSD/UCSD IRB. A multidisciplinary team developed a protocol to identify DA patients in the electronic medical record (EMR), collaborated on policy writing, performed in situ simulations, and attended monthly meetings to review activations for quality improvement (QI) (Figure 1). The EMR displays a color-coded airway banner that provides immediate access to airway history categorized as difficult, resolved difficult, not difficult, and no history (Figure 2). The DART policy for DA patients includes signage at the bedside, an ENT rounding list, DART cart standardization, and a DART activation algorithm to standardize intubations based on the airway banner (Figure 3). A database of DART activations was created through apparent cause analysis methodology. The primary outcome was to describe patient characteristics with future design of QI interventions.

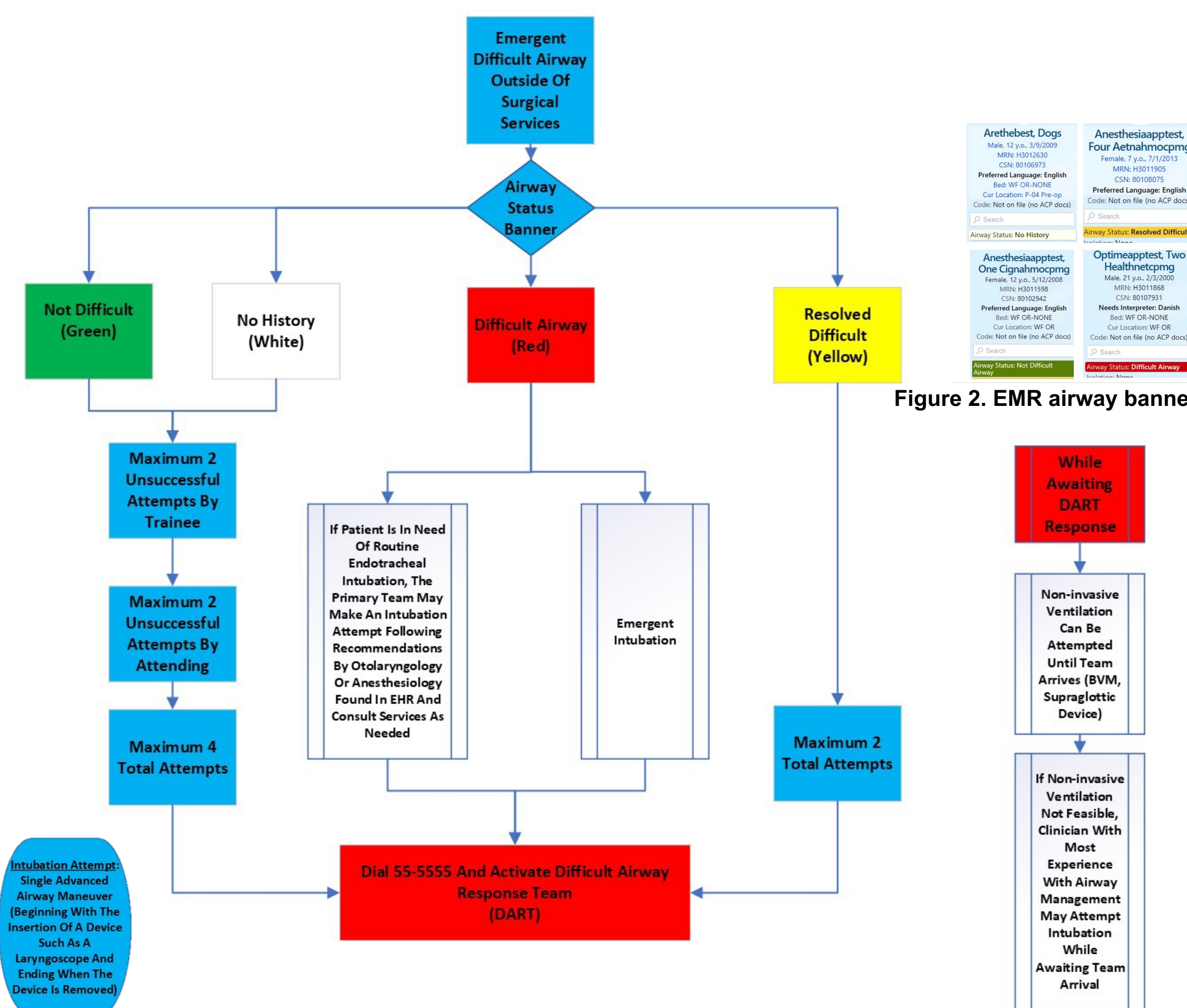


Figure 2. EMR airway banner

Figure 3. Activation algorithm

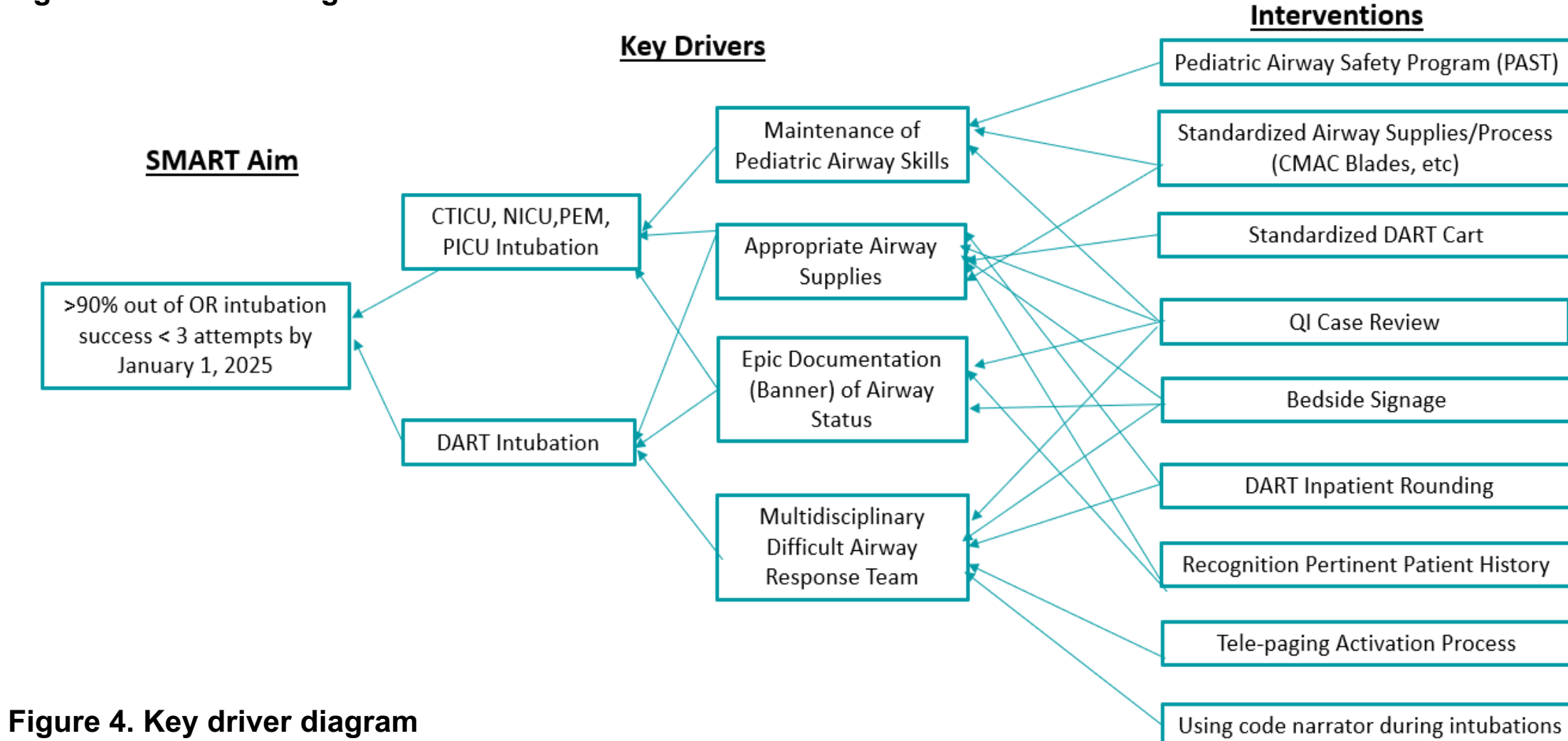


Figure 4. Key driver diagram

## RESULTS

There were 50 activations between 8/2/21-2/28/24 (Tables 1-3). Activations most often occurred in the Emergency Department (50%) for known difficult airways (40%). Airways were most successfully secured with video laryngoscopy (66%) by an Anesthesiologist (30%). Most activations occurred between 0700-1900 (58%) without complications (80%).

Table 1. Patient demographics

Age of Patient n (%)	
Neonate	9 (18%)
Infant	19 (38%)
Child	9 (18%)
Adolescent	13 (26%)
Congenital Heart Disease n (%)	
Yes	17 (34%)
No	33 (66%)
Genetic Syndrome n (%)	
Yes	24 (48%)
No	26 (52%)

Table 3. DART activation characteristics

Location of Events n (%)	
Emergency Department	25 (50%)
PICU	7 (14%)
CTICU	10 (20%)
NICU	7 (14%)
Heme Onc	1 (2%)
Reason for DART activation n (%)	
Concern for difficult airway- anatomic	12 (24%)
Concern for difficult airway - physiologic	4 (8%)
Known difficult airway	20 (40%)
Tube exchange	1 (2%)
Unclear if airway was secured	1 (2%)
Multiple attempts	12 (24%)
Timing of Events n (%)	
0700-1900	29 (58%)
1900-0700	21 (42%)
Banner Color at DART Activation n (%)	
Green	10 (20%)
Red	19 (38%)
White	20 (40%)
Yellow	1 (2%)

Table 2. Outcomes after activation

Airway Supplies Used Successful n (%)	
Direct Laryngoscopy	4 (8%)
Flexible bronchoscopy	5 (10%)
Flexible tracheoscopy	2 (4%)
Rigid Bronchoscopy	2 (4%)
Videolaryngoscopy	29 (58%)
Videolaryngoscopy - CMAC D Blade	3 (6%)
Videolaryngoscopy - Glidescope	1 (2%)
Total Number of Attempts n (%)	
0 Attempt	5 (10%)
1 Attempts	27 (54%)
2 Attempts	3 (6%)
3 Attempts	8 (16%)
4 Attempts	3 (6%)
5 Attempts	2 (4%)
6 Attempts	2 (4%)
Total Number of Attempts After DART activation n (%)	
0 Attempt	8 (16%)
1 Attempts	30 (60%)
2 Attempts	6 (12%)
3 Attempts	1 (2%)
Airway Fiberoptic Evaluation	5 (10%)
Provider Specialty Successful Intubation/Evaluation n (%)	
Anesthesiologist	15 (30%)
EM Resident	3 (6%)
ENT Attending	5 (10%)
ENT Fellow	5 (10%)
ENT Resident	1 (2%)
NICU Attending	3 (6%)
PEM Attending	2 (4%)
PEM Fellow	2 (4%)
PICU Attending	5 (10%)
PICU Fellow	5 (10%)
No Intubation Needed	4 (8%)
Complications n (%)	
Airway edema	1 (2%)
Hemodynamic instability	3 (6%)
Cardiac arrest	3 (6%)
Deceased	1 (2%)
ETT cuff ruptured	1 (2%)
Pneumothorax	1 (2%)
None	40 (80%)

## CONCLUSION/FUTURE AIM

A multidisciplinary DART policy with EMR integration can be successfully implemented in a free-standing children's hospital. Future aims include > 90% out of OR intubations to be successful in less than 3 attempts (Figure 4).

## REFERENCES

1. Dalesio, et al. *Hospital Pediatrics*, 2019; 9(6):468-475
2. Fiadjo, et al. *The Lancet. Respiratory medicine*, 2016; 4(1):37-48

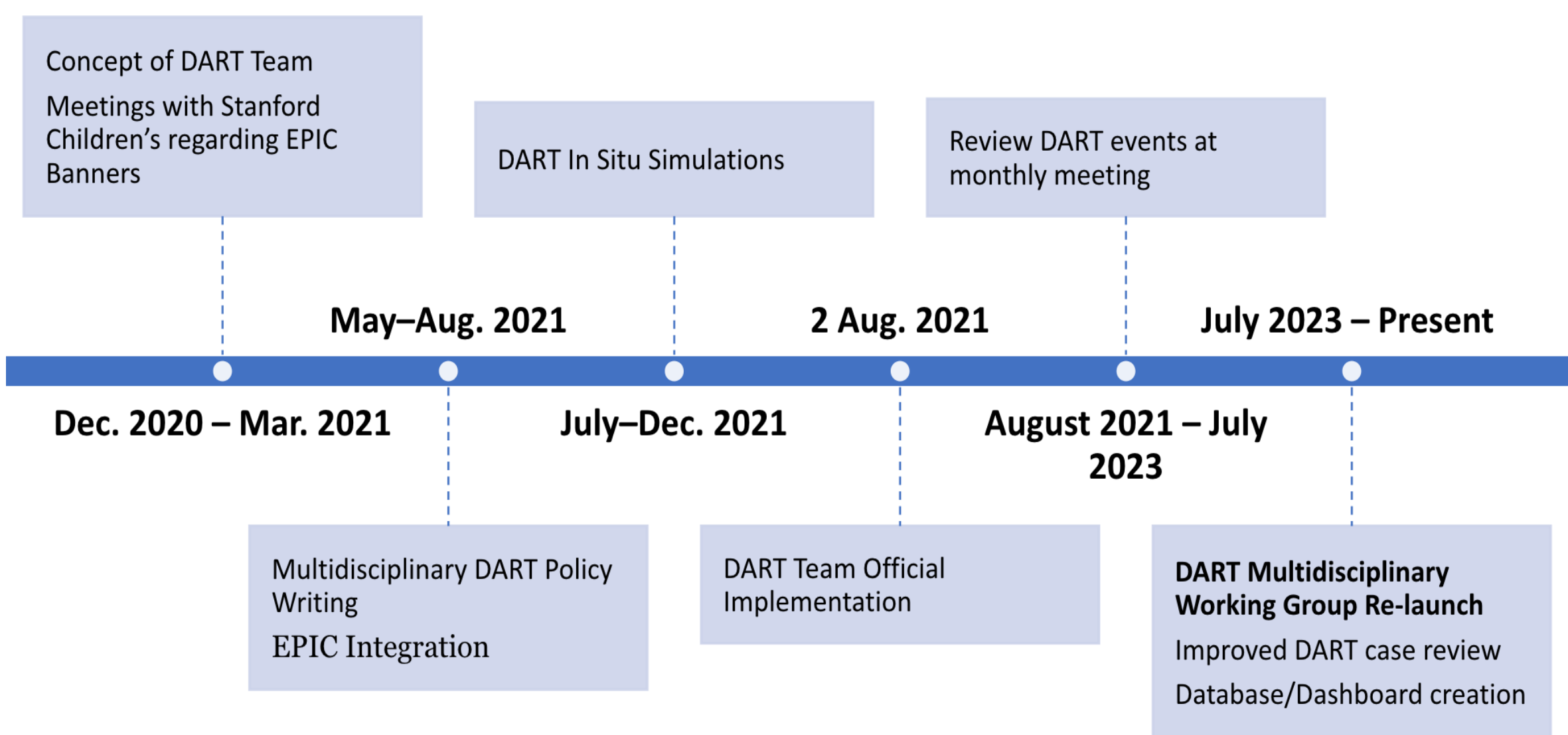


Figure 1. DART timeline