Development of a novel training course for EMS providers in Newborn Resuscitation and Transport-The ABCs of NRT-Easy as 1, 2, 3

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Abstract

Out-of-hospital births (OOHB) are increasing across the United States. This is even more pronounced in Nevada where there are 1.8% OOHB. In Clark County, where there are more than 450 OOHB every year, Emergency Medical Service providers transport more than 250 OOHB to hospitals and 40-70% are admitted to Neonatal Intensive Care Units. OOHB have a higher mortality rate than babies born in the hospital. Thus, OOHB are a low frequency high risk clinical scenario.

Globally EMS providers have low confidence and high anxiety regarding OOHB and in the US, paramedics are not required to maintain current up to date Neonatal Resuscitation Program training.

Training in Newborn Resuscitation and Transport (NRT) can address EMS providers confidence and ability to provide high quality care to OOHB.

Methods

Over the past two years, a multidisciplinary combined experiential and didactic course focused on the resuscitation and transport of the OOHB was developed- the ABCs of NRT-easy as 1, 2, 3 at the Mountain View Paramedic Institute as a one day in person hands on learning course that includes a brief lecture discussing the basic principles of NRT followed by skill stations and simulated cases with structured debriefing. EMS providers are trained in newborn resuscitation, including how to administer PPV, place an advanced airway, give chest compressions, achieve IV or I/O access, dose epinephrine, treat hypoglycemia, and prevent hypothermia.

A reference card-"Badge buddy" has been developed to help implement the principles of course.

The course has been presented to 116 Advanced-Emergency Medical Technicians (A-EMTs) from eight local EMS agencies. A pre course and post course survey was administered to the most recent cohorts that included 81 students and focused on the confidence that the EMS providers have in providing care to OOHB. Students responded to their ability to provide care in the following areas.

- Performing initial steps of resuscitation
- Providing PPV with corrective steps
- Endotracheal intubation
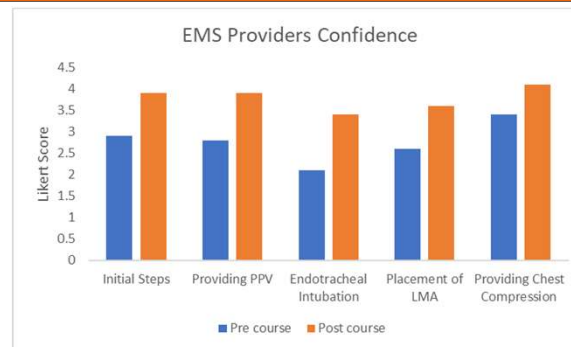- Placement of laryngeal mask
- Providing chest compressions.

Methods

The survey used the following published Neonatal Resuscitation Program Likert scale.

1= Little or no experience.

2= Need to review.

3= I am pretty comfortable.

4= I am very good at this.

5= I am an expert.

The results were analyzed using traditional comparative statistics- paired t test.

Results

Eighty one of the 116 students filled out the survey. Paired t tests of the responses showed improved confidence in all areas that were statistically significant.

	Pre-	Post-	
Performing initial steps of resuscitation	3.0	3.9	p <.001
Providing PPV with corrective steps	2.8	3.9	p<.001
Endotracheal intubation	2.1	3.4	p<.001
Placement of laryngeal mask	2.6	3.6	p<.001
Providing chest compressions.	3.4	4.1	p<.001

All of these results indicate that the EMS providers felt more confidence in providing these critical skills after the course.

Results

Conclusions

Conclusion: The ABCs of NRT – Easy as 1, 2, 3, a novel training course for EMS providers is proven to increase the confidence of EMS providers in newborn resuscitation and transport. When empowering EMS providers with the specific knowledge of NRT with opportunity to practice clinical skills, they are more confident in their ability to provide appropriate care to OOHB during transport to the hospital. This course focused on the importance of providing PPV, placement of advanced airways, appropriate chest compressions and medication administration that are unique to the newborn.

References

1. Watterberg K; Committee on Fetus and Newborn. Providing care for infants born at home. Pediatrics. 2020;145(5):e20200626. doi:10.1542/peds.2020-0626. Epub 2020 Apr 20
2. Gregory et al; Changes in Home Births by Race and Hispanic Origin and State of Residence of Mother: United States, 2019-2021. Natl Vital Stat Rep.2022 Nov;71(8):1-10
3. Way et al; Out-of-hospital births and infant mortality in the United States: Effect measure modification by rural maternal residence. Paediatr Perinat Epidemiol. 2022 May;36(3):399-411. Doi: 10.1111/ppe.12862. Epub 2022 Feb 2
4. Hill et al; Paramedic training, experience, and confidence with out-of-hospital childbirth (OOHB) in Australia. Australas Emerg Care. 2023 Jun;26(2):119-125. Doi: 10.1016/j.auec.2022.08.008. Epub 2022 Sep 10

ABCs of NRT-Easy as 1, 2, 3

Background

Out-of-hospital births (OOHB) also know as "field deliveries" are increasing across the United States. This is even more pronounced in Nevada where there are 1.8% OOHB.

In Clark County, Nevada where there are more than 450 OOHB every year, Emergency Medical Service providers transport more than 250 OOHB to hospitals and 40-70% are admitted to Neonatal Intensive Care Units.

OOHB have a higher mortality rate than babies born in the hospital.

Thus OOHB are a low frequency high risk situation.

Globally EMS providers have low confidence and high anxiety regarding OOHB. Many do not feel confident in their skills and training for emergency newborn transport. This can lead to infants suffering from preventable complications due to providers having inadequate experience in newborn resuscitation.

In the US paramedics are not required to maintain current up to date Neonatal Resuscitation Program training.

Training in Newborn Resuscitation and Transport (NRT) can address EMS providers confidence and ability to provide high quality care to OOHB.

Methods

Over the past two years, a multidisciplinary course focused on the resuscitation, stabilization and transport of the field delivered baby was developed- the ABCs of NRT-easy as 1, 2, 3- as a one day course that includes a brief lecture discussing the ABCs of NRT followed by skill stations and simulated cases with structured debriefing. The course has been presented to 116 Advanced-Emergency Medical Technicians (A-EMTs) from eight local EMS agencies.
They were trained in newborn resuscitation, including how to administer PPV, place an advanced airway, give chest compressions, achieve IV or I/O access, and dose epinephrine, treat hypoglycemia, and prevent hypothermia

Methods

For the last 81 students, a pre course and post course survey was administered that focused on the confidence that the EMS providers felt using a Likert scale ranging from 1 little or no experience to 5 level of expert in the following areas;
Performing initial steps of resuscitation
Providing PPV with corrective steps
Endotracheal intubation
Placement of laryngeal mask
Providing chest compressions.
The results were analyzed using traditional comparative statistics- paired t test.

Results- Badge Buddy – Front

		1 Intervention Required	2 May Require Intervention	3 Standard care
Term / 3 kg	**Anticipate**	**Estimate Size and PLAN** -Airway adjuncts -Medication doses -Warming methods		
	Airway 1+2 =3	ETT **2.5** @ 7	ETT **3.0** @ 8 i-gel 1	ETT **3.5** @ 9 i-gel 1
Pre-term / 2 kg	**Breathing** "Breath, 2, 3"- 40-60 MR. SOPA	-RR > 80 -SpO2 <80%	-RR >60 -SpO2 80-85%	-RR 40-60 -SpO2 >85
	Circulation "1, 2, 3, Breath" 120	--HR <60 -CPR -Lines	-HR <100 -PPV	-HR >100
1 kg / Extreme Pre-term	**Drugs** Drill I/O	**1 kg**	**2 kg**	**3 kg**
	Environment	<96.8 F	< 97.7 F	>97.7 F
		-Dry and warm infant-Wrap in dry blankets, hat -Place emergency blanket-Heating mattress -AC off		
	Foot Length	<27 weeks < 5cm <1kg	27-33 Weeks 5-7 cm 1-2 kg	> 34 weeks > 7 cm > 2 kg
	Glucose	< 25 g/dL	25-45 g/dL	> 45 g/dL
		ABCs of Newborn Resuscitation & Transport- easy as 123		

Scale markings: 7 cm, 5 cm, 0 cm

ABCs of Newborn Resuscitation & Transport- easy as 123

Meds	1 kg Extreme Pre-Term	2 kg Pre-Term	3 kg Term
Epi 1:10,000 ETT	1 mL	2 mL	3 mL
Epi 1:10,000 IV	0.2 mL	0.4 mL	0.6 mL
NS Bolus	10 mL	20 mL	30 mL
D10W	2 mL	4 mL	6 mL
Dextrose (oral gel)	0.5 mL	1 mL	1.5 mL

APGAR	0	1	2
Appearance	Cyanotic	Peripheral cyanosis	Pink
Pulse	0	<100	>100
Grimace (reflex/ irritability)	No response to stim.	Weak cry with stim.	Cry with stim.
Activity (tone)	Floppy	Some flexion	Well flexed and resists extension
Respirations	Apnea	Slow irregular breathing	Strong cry

Left scale (bar):
- Term — 3 kg (green)
- 7 cm
- Pre-term — 2 kg (yellow)
- 5 cm
- 1 kg (red)
- Extreme Pre-term
- 0 cm

Keep Warm

Patch Information
- Approximate Gestational Age
- Sex
- Time of delivery
- Delivery complications
- APGAR scores
- VS
- Glucose
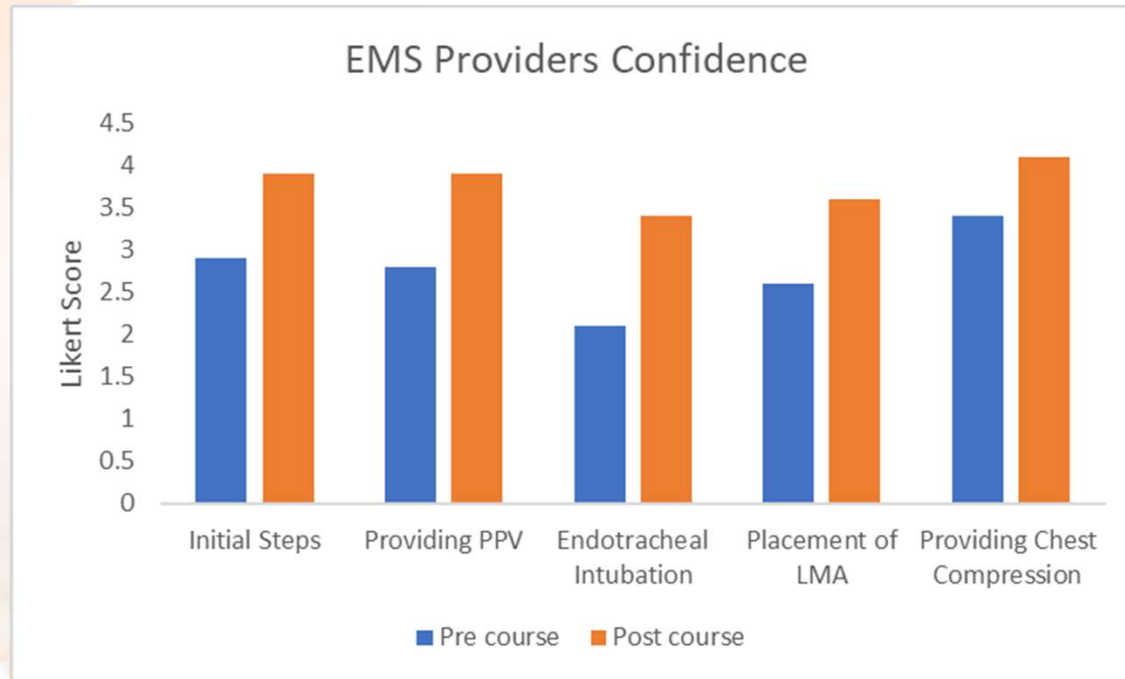- Interventions

Clinical Pearls
- Most infants respond well to PPV
- PPV (40-60/min.)
- Consider early LMA/i-gel
- CPR 3:1 (120 event/min.)
- Consider I/O
- Clamp 6 in and 4 in, cut between clamps with clean instrument

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Conclusion

Conclusion: The ABCs of NRT – Easy as 1, 2, 3 is proven to increase the confidence of EMS providers in newborn resuscitation and transport. When empowering EMS providers with the specific knowledge of NRT with opportunity to practice clinical skills, they are more likely to provide appropriate care to field-delivered infants during transport to the hospital. This course focused on the importance of providing PPV, placement of advanced airways, appropriate chest compressions and medication administration that are unique to the newborn.

Next Steps

Discussion
  1- Feedback
  2- Where does EMS-C see ABCs of NRT fitting into EMS training

Proposal
  1- Pilot study
        Two EMS agencies- one rural and one suburban
        Train the Educators for each agency in how to conduct ABCs NRT training
        Two options
              a- One day in person
              b- Virtual
                    View lecture at home
                    Pass off skills stations and case scenario with Educator
  2- Continuing Education –CAPSE Approved
  3- Equipment

Transport of stable newborn baby with mom

Many OOHB babies who were STABLE at
birth arrive at the hospital with unrecongized
  hypothermic
 hypoglycemic
  hypoxic
  shock
The ABCs of NRT is set to address this
But how can we PREVENT this

Aegis: One way to prevent the STABLE baby from decompensating in transport is with skin to skin care.
The Aegis system has undergone testing and is approved in three states as a manner for safe transport of the STBLE newborn to the hospital

Aegis Neonatal Restraint System
"The Seatbelt of Maternity"

Calspan
HYGE SLED
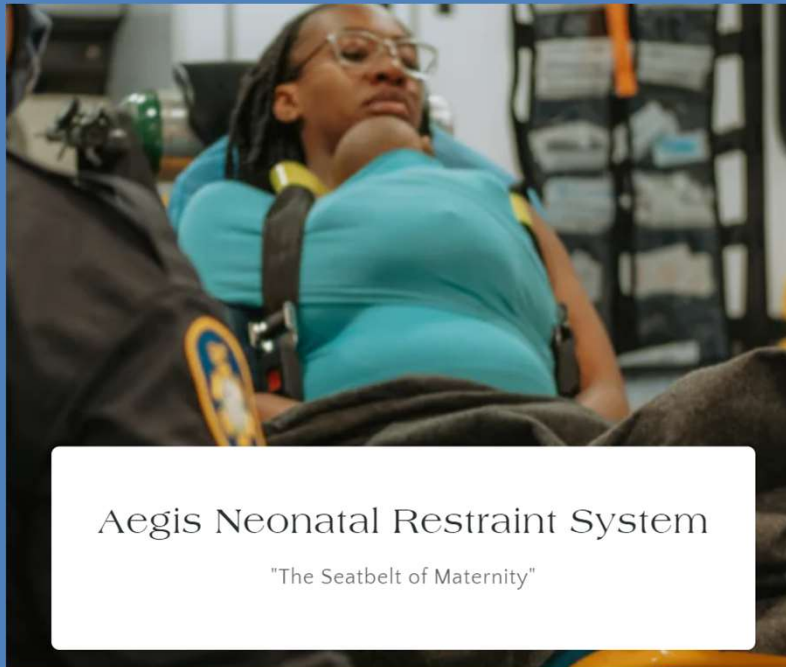
Next Steps for AEGIS

Discussion
  1- Feedback
  2- Where does EMS-C see AEGIS fitting into EMS training

Proposal
  1- Pilot study
          Two EMS agencies- one rural and one suburban
          Train the Educators on use of AEGIS
  2- Present to appropriate committee to get approval
  3- Purchas equipment