Patient Care Services / Nursing

The Inconsistency of Providing Ventilation with a T-piece Style Resuscitator: A Bench Model Study

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Background:

- Providing consistent and safe ventilation is critical in optimizing gas exchange and guaranteeing patient safety
- Consistent and safe ventilation is most crucial in the neonatal patient population
- When a practitioner is unfamiliar with the neonatal patient population the above goals may become difficult to achieve

T-Piece Resuscitator:

- Practitioner manually controls the delivered breath rate
- Practitioner has the ability to set a:
  - Peak Inspiratory Pressure (PIP)
  - Positive End Expiratory Pressure (PEEP)
  - FiO_2 when hooked up to a blender

Study Design:

- To test the ability to provide a consistent and adequate ventilatory rate during a simulated neonatal resuscitation
- Goal:
  - Assess what percentage of practitioners would provide the recommended ventilatory rate of forty breaths per minute (two hundred breaths over 5 minutes) with a T-piece resuscitator
  - Evaluate the number of breaths delivered by each therapist over a five minute period
- Minutes 1, 2, & 5 were counted separately while minutes 3 & 4 were group together secondary to distractions to mimic chaos in a labor and delivery suite emergency.

Methods:

- Seventy-one practitioners participated in the study
- The practitioners' years of experience and if they currently worked in an emergency department or labor and delivery patient population area was documented
- Practitioners received a simple review on how to properly utilize the T-Piece resuscitator that was provided
- A baby manikin head was used as the "patient" and was placed on a standard neonatal warmer
- Simulations were performed in two separate rooms with two separate counters who recorded the number of breaths delivered
- All set-ups were identical

Table 1. Title

	Labor & Delivery	Emergency Room	Not Specified
Participants	35	41	25
Percent Total	49.3%	57.7%	35.2%

Table 2. Title

Years of Experience	0-4	5-9	10-14	14+
Participants	4	8	9	50
Percent Total	5.6%	11.3%	12.7%	70.4%

Results:

- Only 31 of the 71 (43.66%) practitioners met the desired breath rate of 40 breaths/minute (200 breaths over five the minute time frame)

Table 3. Title

	# Participants 38-42 BPM Range	% of Total Participants
1 Minute	10	14.0845
2 Minutes	14	19.7183
3 & 4 Minutes	18 (76-84 PPM range)	25.3521
5 Minutes	17	23.9437
	# Participants 180-220 BPM Range	
Total for 5 Minutes	31	43.6620

Table 4. Title

	100-149	150-199	200-249	250-299	300-349	350-399	400-449	450-499	500-549	550-600
Breaths	4	24	18	9	6	4	1	4	0	1

Conclusion:

- Adequate ventilation is paramount in proving optimal gas exchange
- Inconsistent ventilation brings about the potential hazards of air trapping, hemodynamic insult, ventilation induced trauma, and inadequate gas exchange
- These adverse events may have long-term consequences in the neonatal patient population
- The study demonstrated that during a five minute simulated code practitioner delivered breaths tended to be inconsistent and vary from practitioner to practitioner
- Findings of this study warrants further research and exploration in the development of an automated rate delivery device

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