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THE COMFORT SCALE AND ASSESSING BEHAVIORAL STRESS OF THE VENTILATED PREMATURE BORN BABIES

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Introduction

COMFORT Scale

Psychometric properties

Stress measured during ventilation

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200.000 Newborns

20.000 NICU

5.000 Intensive Care

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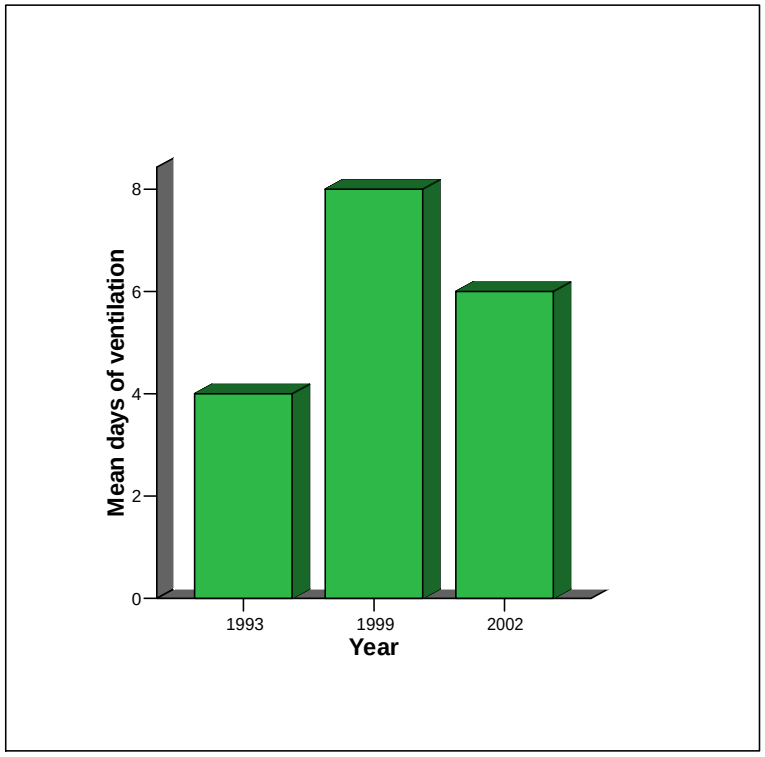
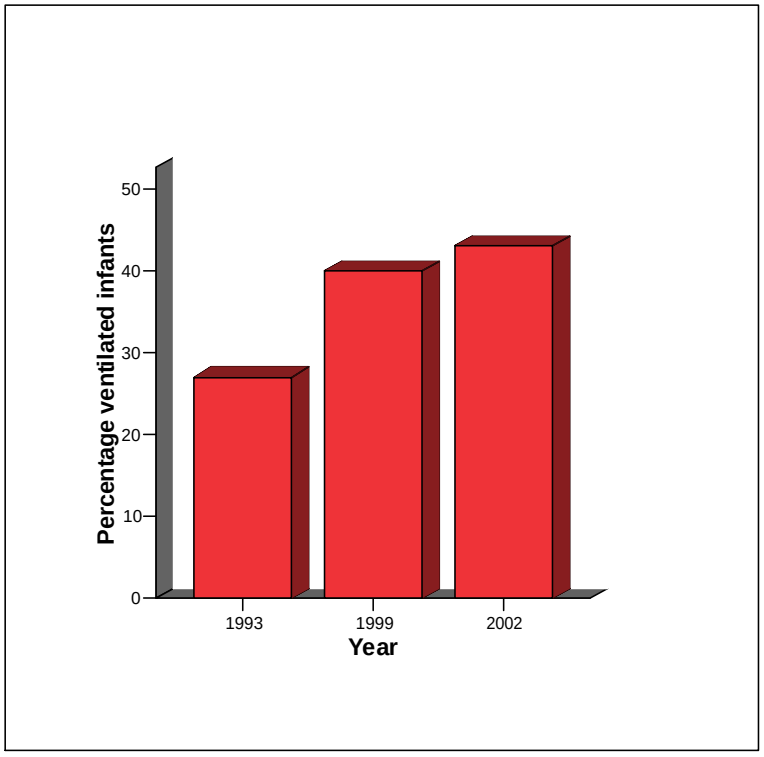
Incidence (EKZ/AMC)

Mechanical Ventilation





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HFV

600x per minute

24 hours per day

864000 vibrations

Ambuel, 1992

	comfort scale	Score
	ALERTNESS	
	Deeply Asleep	1
	Lightly Asleep	2
	Drowsy	3
	Fully Awake and Alert	4
	Hyper-Alert	5
	CALMNESS/AGITATION	
	Calm	1
	Slightly Anxious	2
	Anxious	3
	Very Anxious	4
	Panickey	5
	RESPIRATORY RESPONSE	
	No Coughing and No Spontaneous Respiration	1
	Spontaneous Respiration with Little or No Response to Ventilation	2
	Occasional Cough or Resistance to Ventilator	3
	Actively Breathes Against Ventilator or Coughs Regularly	4
	Fights Ventilator; Coughing or Choking	5
	PHYSICAL MOVEMENT	
	No Movement	1
	Occasional, Slight Movement	2
	Frequent, Slight Movement	3
	Vigorous Movement Limited to Extremities	4
	Vigorous Movements Including Torso and Head	5
...../.....	**BLOOD PRESSURE (MAP) BASELINE**	
	Blood Pressure Below Baseline	1
	Blood Pressure Consistently at Baseline	2
	Infrequent Elevations of 15% or More (1-3)	3
	Frequent Elevations of 15% or More (more than 3)	4
	Sustained Elevation ≥15%	5
...../.....	**HEART RATE BASELINE**	
	Heart Rate Below Baseline	1
	Heart Rate Consistently at Baseline	2
	Infrequent Elevations of 15% or More Above Baseline (1-3) During Observation Period	3
	Frequent Elevations of 15% or More Above Baseline (more than 3)	4
	Sustained Elevation of ≥15%	5
	MUSCLE TONE	
	Muscles Totally Relaxed; No Muscle Tone	1
	Reduced Muscle Tone	2
	Normal Muscle Tone	3
	Increased Muscle Tone and Flexion of Fingers and Toes	4
	Extreme Muscle Rigidity and Flexion of Fingers and Toes	5
	FACIAL TENSION	
	Facial Muscles Totally Relaxed	1
	Facial Muscle Tone Normal; No Facial Muscle Tension Evident	2
	Tension Evident in Some Facial Muscles	3
	Tension Evident Throughout Facial Muscles	4
	Facial Muscles Contorted and Grimacing	5
	TOTAL COMFORT SCORE	

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Study Phase 1

COMFORT scale; psychometric properties

Face validity

Training nurses

Testing

consecutive sample

infants gestational age of < 37 weeks;

5 days of age at the most;

indication for ventilation IRDS, infection, exhaustion.

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Study Phase 1

COMFORT scale; psychometric properties

Criterion related validity →

Pearson's correlation coefficient 0.84

Inter-observer reliability

variable level →

Weighted Kappa 0.64 –1.00

total COMFORT score →

ICC 0.94

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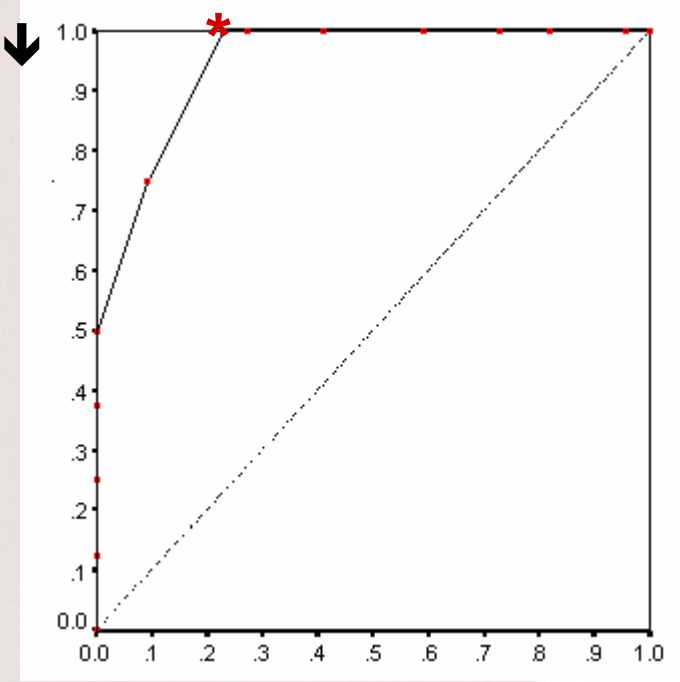
Study Phase 1

COMFORT scale; psychometric properties

Diagnostic properties
(ROC)

sensitivity ➔



1- specificity ➔

Cutoff point 20

Sensitivity	100%*
Specificity	77%
AUC	0.95

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Study phase 2

stress and ventilation

Prospective cohort study with a consecutive sample

Ventilation dependent
Infants born <37 weeks gestational age
First 3 ventilation days

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stress and ventilation

Ventilation mode according to protocol

- CV or HFV

Sedation with morphine according to protocol

- Loading dose 0.1 mg/kg iv
- Continuous iv infusion 0.25 mg/kg/day

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Study phase 2

Research model

A	*Clinical characteristics*			
	m/v	BW	GA	Apgar Score

+

B	*Illness related characteristics*	
	complications	medication
	(intra)ventricular haemorrhage convulsions air leak syndrome infection	sedation anticonvulsiva muscle relaxans

+

C	*Treatment related characteristics*
	NTISS

+

D	*Ventilation mode*	
	conventional	high frequency

STRESS
COMFORT Scale

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Study phase 2
Results

Patient related characteristics

	HFV (N=35)	CV (N=15)	*p*
Gender (m)	20	12	0.123
Mean birth weight (SD)	1171 (337)	1585 (598)	0.017
Mean GA (SD)	28.7 (1.4)	31.3 (2.9)	0.003
Median Apgar (5 min)	8 (0-10)	8 (2-10)	0.218

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Study phase 2
Results

Illness related characteristics

	HFV (N=35)	CV (N=15)	*p*
Complication present	42.9%	40.0%	0.529
≥ grade 1 cerebral hemorrhage	31.4%	33.3%	
Air-leak syndrome	8.6%	0.0%	
Sepsis (positive blood culture)	2.9%	6.7%	
Medication (analgesic/sedative)	100%	93.4%	0.458
Standard	60.0%	66.7%	
Extra medication	40.0%	26.7%	

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Study phase 2
Results

Treatment related characteristics

	HFV (N=35)	CV (N=15)	*p*
Mean NTISS (range)	27.6 (22-36)	22.4 (18-27)	0.000
Ventilation day 1	29.5 (22 - 43)	24.4 (18 - 35)	0.002
Ventilation day 2	26.7 (20 - 37)	22.2 (19 - 26)	0.001
Ventilation day 3	26.8 (20 - 36)	19.4 (16 - 23)	0.001

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Study phase 2
Results

		HFV		CV	
		N	Comfort Scale	N	Comfort Scale
	Start of ventilation	35	16.6 (10-29, 3.6)	15	17.4 (10-24, 3.9)
Day 1	After 12 hours of ventilation	33	17.5 (10-25, 3.6)	12	17.3 (10-29, 4.7)
Day 1	After 24 hours of ventilation	32	20.7 (15-29, 4.0)	11	20.1 (17-24, 2.5)
Day 2	After 36 hours of ventilation	31	19.3 (13-30, 3.8)	10	20.3 (18-26, 2.8)
Day 2	After 48 hours of ventilation	29	18.3 (10-32, 4.2)	6	17.4 (17-21, 1.6)
Day 3	After 60 hours of ventilation	27	18.6 (11-28, 3.9)	4	21.3 (19-26, 4.0)
Day 3	After 72 hours of ventilation	26	18.0 (11-23, 2.9)	3	18.7 (17-20, 1.5)
Total ventilation period			**18.5 (15-25, 2.1)**		**18.7 (15-23, 2.1)**

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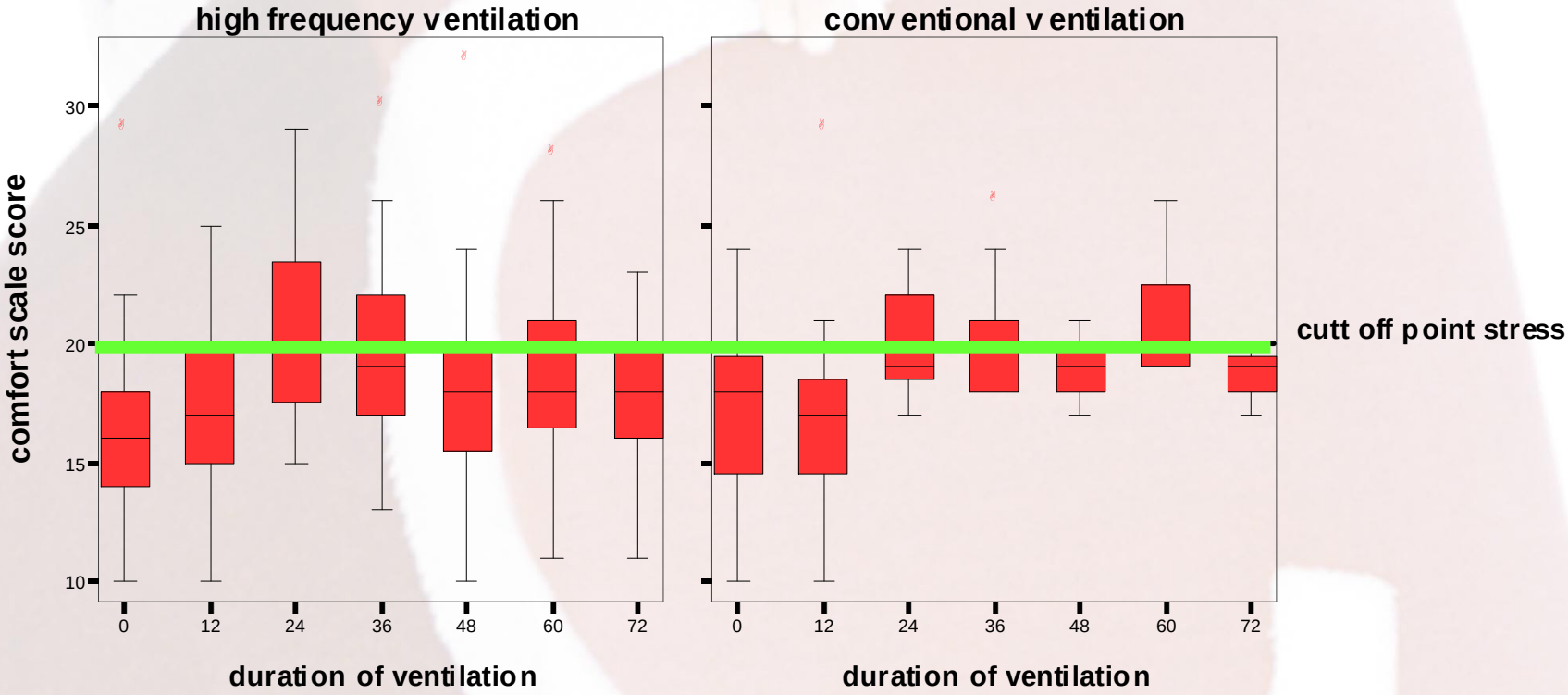
Study phase 2
Results



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Study phase 2
Results

multivariate analysis for significant baseline and clinical differences between both groups;

- birth weight, gestational age, and NTISS
- ventilation mode

HFV group compared to the CV group
mean difference -0.40 points (95% CI:-1.52 to 0.71 points, p= .475)

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Study phase 2
Limitations

- no randomization
- unit policy
- large range of gestational age
- interference of medication

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Study phase 2
Conclusions

overall period of ventilation, with present sedation policy, is characterised, by multiple moments of stress, especially when ventilated for around 24 hours

no differences between both ventilation modes

the COMFORT Scale is an easy to learn instrument and could be of great value in the care of newborns

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Study phase 2
Recommendations

- Adjust present protocol on sedation during ventilation to a more individually based protocol

- explore more preventive orientated nursing interventions

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COMFORT SCORE