Curriculum vitae

PEDIATRIC CLINICAL UPDATES IN DAILY PRACTICES

Pudjiastuti, dr., Sp. A(K)

Pendidikan :

- S 1 : FK UNS Surakarta, lulus tahun 1986
- Spesialis : FK Undip Surakarta, lulus tahun 1997 Spesialis Anak
- Konsulen : FK UI – RSCM, lulus tahun 2004

Optimalisasi oksigenasi dan ventilasi pada anak dengan gagal napas dengan ventilasi noninvasif

Pudjiastuti, Sri Martuti

Pendahuluan

Ventilasi Mekanis invasive

Anak gagal napas

Cardiac arrest

Ventilasi mekanis noninvasif

Menghindarkan komplikasi intubasi endotrakeal :

- trauma saluran napas atas pembengkakan laring
- disfungsi plika vokalis pasca ekstubasi
- infeksi nosokomial.

Tujuan

- Memahami mekanisme dan penyebab gagal napas
- Mampu mentatalaksana untuk optimalisasi ventilasi dan oksigenasi dengan NIV pada anak gagal napas

Definisi

- Gagal napas : sindrom ketidakmampuan sistem pernapasan melakukan pertukaran gas untuk memenuhi kebutuhan metabolik tubuh
- Kegagalan *uptake* oksigen, atau kegagalan eliminasi karbon dioksida; atau keduanya.

Klasifikasi

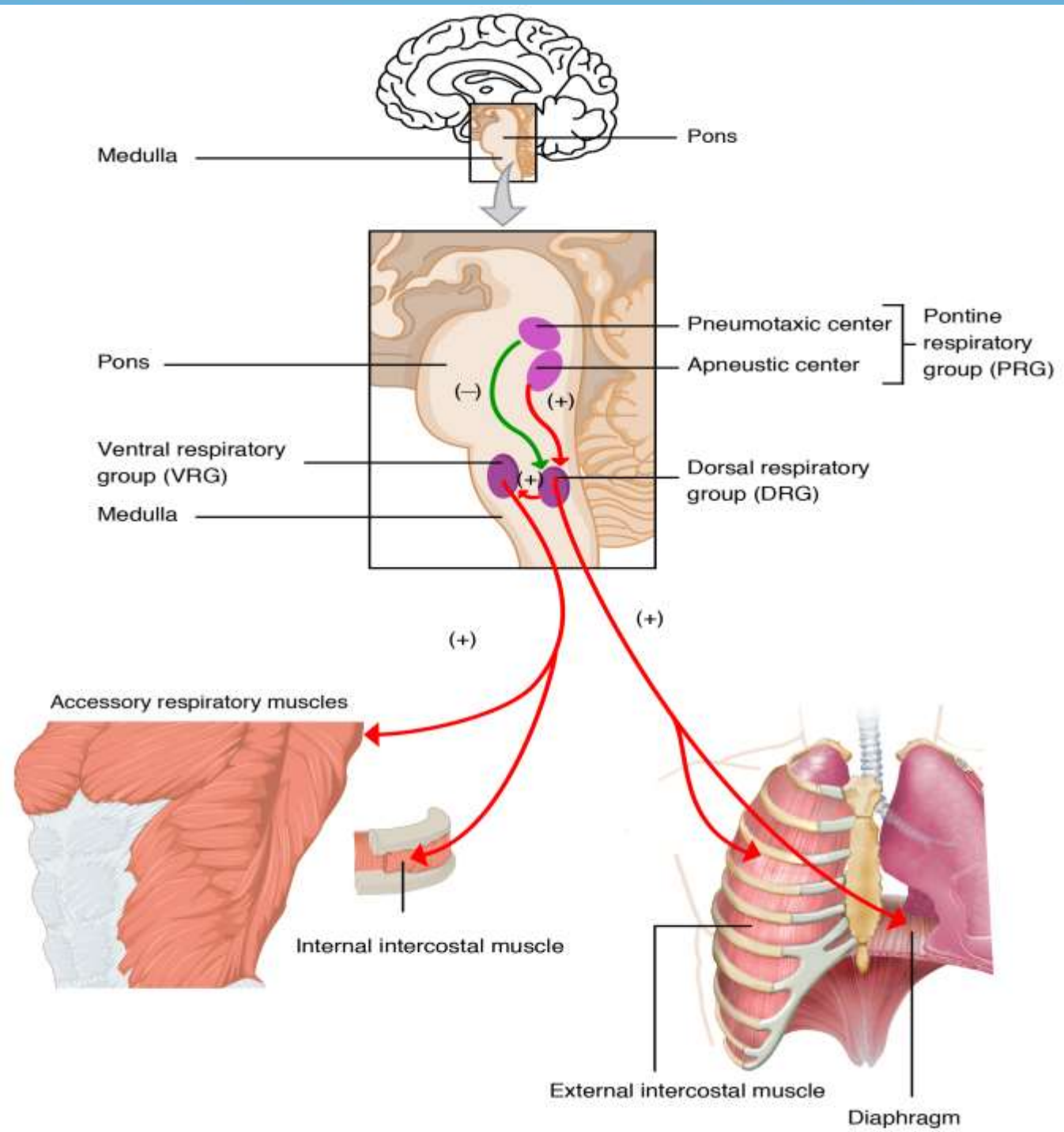
- Tipe **hipoksemik**

  (kegagalan oksigenasi dengan PaO2 < 60 mmHg)
- Tipe **hiperkapnik**

  (kegagalan ventilasi dengan PaCO2 > 50 mmHg)
- Tipe **campuran**
  - **PaO2 < 60 mmHg**
  - **PCO2 > 50 mmHg**

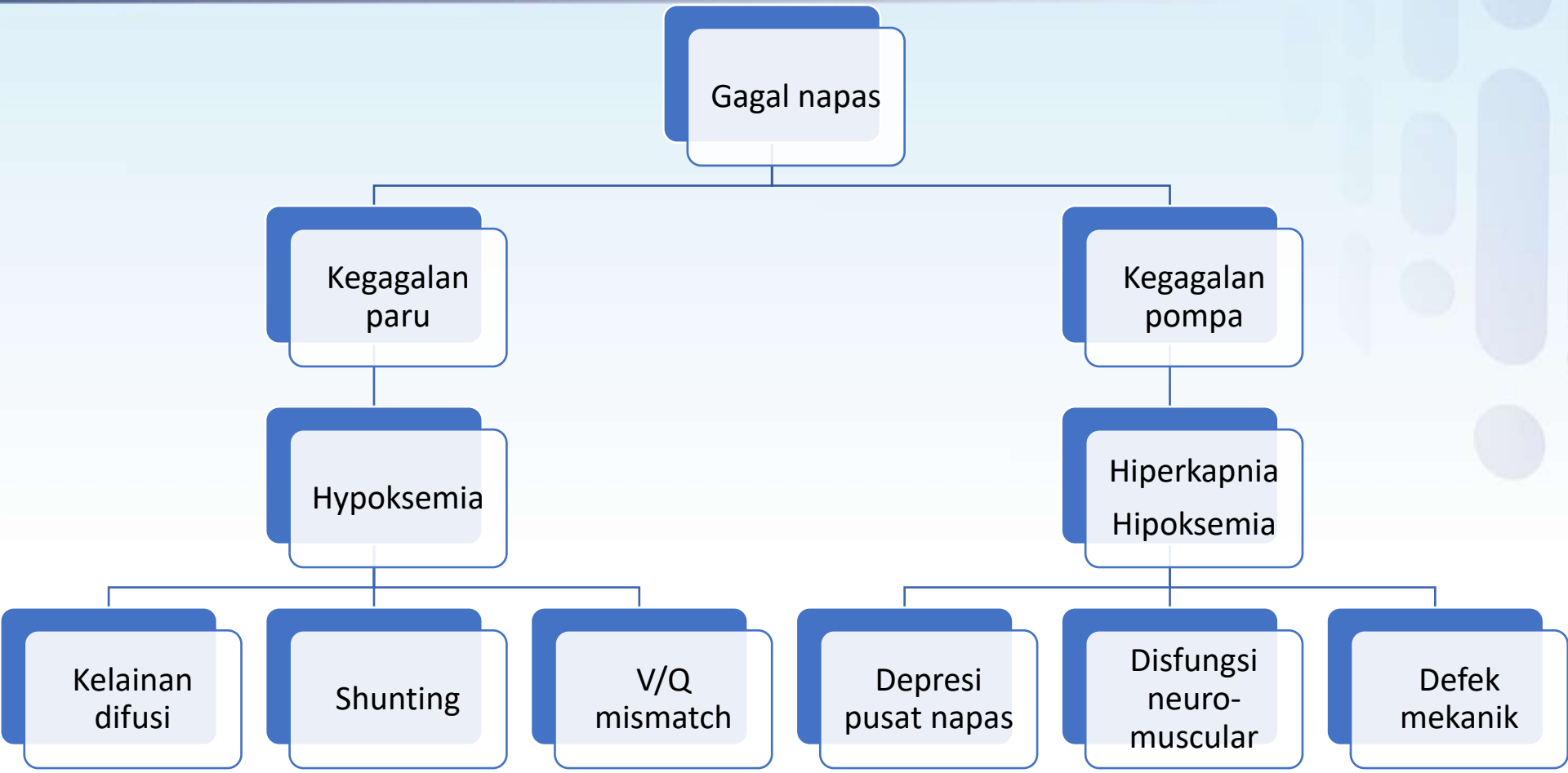
Etiologi

Letak patologi	Penyebab
sistem pernapasan saluran napas bagian atas	malformasi jalan napas, benda asing, infeksi (croup, epiglottitis)
intratorak/paru	pneumonia, bronkiolitis, kistik fibrosis, edema paru, ARDS
pusat pernapasan	trauma otak, infeksi SSP, malformasi kongenital, efek samping obat atau keracunan
kebutuhan oksigen berlebihan	sepsis, ketoasidosis diabetikum



Patofisiologi

Patofisiologi



Gejala dan tanda gagal napas

- Frekuensi pernapasan :
  - Takipneu seringkali merupakan tanda awal gagal napas
  - Bradipneu merupakan tanda yang sudah terlambat
- Peningkatan *work of breathing* :
  - Napas cuping hidung,
  - Retraksi interkostal, suprasternal dan substernal
  - Pernapasan abdominal
  - Grunting
- Peningkatan laju denyut nadi
- Penurunan kesadaran

Tatalaksana gagal napas

- Tujuan utama :
  - mengatasi gejala dan tanda akibat hipoksemia atau hiperkarbia
  - mengembalikan kondisi asidosis respiratorik
  - menyediakan kecukupan oksigen untuk organ-organ ekstrapulmonal
- Sebagian besar pasien gagal napas membutuhkan suplementasi oksigen

Optimalisasi ventilasi dan oksigenasi dengan NIV

Noninvasive ventilation adalah pemberian tunjangan ventilasi menggunakan masker atau device serupa tanpa menggunakan *artificial airway* (*endotracheal tube* atau kanul trakeostomi)

I	• Indication
C	• Contraindication
E	• Equipment
M	• Mode
A	• Analysis success and failure
N	• Next step

Indikasi

Gagal napas hiperkapnia	Gagal napas hipoksemia	Indikasi lain
Asma	Pneumonia	*Weaning invasive MV/post extubation respiratory failure*
Kelainan neuromuskular	ARDS	Pasien tidak membutuhkan intubasi
Hipoventilasi sentral	Pasca operasi	Trauma toraks tanpa pneumotoraks
Obstructive sleep apneu	Edema paru akut	

Pediatrics

SESSION TITLE: Pediatric Pulmonary

SESSION TYPE: Original Investigation Slide

PRESENTED ON: Tuesday, October 25, 2016 at 02:45 PM - 04:15 PM

Noninvasive Ventilation in Pediatric Status Asthmaticus

Todd Karsies MD, and Mellissa Moore-Clinenpeel, MA

PURPOSE: Noninvasive ventilation (NIV) is increasingly used for critically ill adults and children with respiratory insufficiency or failure. Use of NIV for pediatric status asthmaticus is not well supported, and there are concerns that NIV only delays intubation and is associated with complication rates similar to invasive ventilation. NIV is frequently used in our pediatric intensive care unit (PICU) for status asthmaticus. The purpose of this study was to report our experience with NIV in pediatric status asthmaticus.

METHODS: We evaluated all patients admitted over a 1 year period to our PICU for status asthmaticus who were > 2 years old

RE

groups]; however, patients on NIV were more likely to receive ketamine [21% vs 2%, p<0.0001], aminophylline [8% vs 1%, p=0.0056], and Heliox [7% vs 1%, p=0.0086]. A total of 8 patients were intubated (2.7%), but only 3 were intubated after first being treated with NIV (1.8% of those on NIV). Only two patients had barotrauma: 1 (0.6%) NIV patient and 1 (0.8%) non-NIV patient. NIV patients did have a longer ICU LOS than non-NIV patients even when adjusting for initial asthma score and other potential confounders (adjusted mean ICU LOS 2.68 vs 1.74 days; p<0.0001). The strongest association with longer LOS was seen with invasive mechanical ventilation [risk ratio 2.63 (1.87, 3.71); p<0.0001].

CONCLUSIONS: In our cohort of children with status asthmaticus, NIV use was not associated with adverse outcomes such as barotrauma and was associated with a low rate of invasive mechanical ventilation. While increased treatment intensity and LOS likely reflect higher disease severity, prospective, controlled studies are needed to better determine the impact of NIV on pediatric status asthmaticus outcomes.

Result :

170 NIV patient → 8 (2,7% intubated); 1 (0,8%) pasien barotrauma

Conclusion :

NIV → not associated with adverse outcome such as barotrauma and was associated with a low rate of invasive mechanical ventilation

Thille *et al. Critical Care* 2013, **17**:R269
http://ccforum.com/content/17/6/R269

CRITICAL CARE

RESEARCH Open Access

Non-invasive ventilation for acute hypoxemic respiratory failure: intubation rate and risk factors

Result :
Intubation rate NIV in ARDS : mild ARDS 31%; moderate 62%; severe 84%
Among moderate ARDS, NIV failure was lower among those having PaO2/FiO2 > 159 mmHg (45% vs 74%, p=0.04)

to the intensive care unit (ICU) for non-hypercapnic acute hypoxemic respiratory failure (AHRF).

Methods: This is an observational cohort study using data prospectively collected over a three-year period in a medical ICU of a university hospital.

Results: Among 113 patients receiving NIV for AHRF, 82 had acute respiratory distress syndrome (ARDS) and 31 had non-ARDS. Intubation rates significantly differed between ARDS and non-ARDS patients (61% versus 35%, $P = 0.015$) and according to clinical severity of ARDS: 31% in mild, 62% in moderate, and 84% in severe ARDS ($P = 0.0016$). In-ICU mortality rates were 13% in non-ARDS, and, respectively, 19%, 32% and 32% in mild, moderate and severe ARDS ($P = 0.22$). Among patients with moderate ARDS, NIV failure was lower among those having a PaO_2/FiO_2 >150 mmHg (45% vs. 74%, p = 0.04). NIV failure was associated with active cancer, shock, moderate/severe ARDS, lower Glasgow coma score and lower positive end-expiratory pressure level at NIV initiation. Among intubated patients, ICU mortality rate was 46% overall and did not differ according to the time to intubation.

Mayordomo-Colunga *et al. BMC Pediatrics* 2010, **10**:29
http://www.biomedcentral.com/1471-2431/10/29

BMC Pediatrics

RESEARCH ARTICLE Open Access

Non invasive ventilation after extubation in paediatric patients: a preliminary study

Juan Mayordomo-Colunga*, Alberto Medina, Corsino Rey, Andrés Concha, Sergio Menéndez, Marta Los Arcos and Irene García

Abstract

Background: Non-invasive ventilation (NIV) may be useful after extubation in children. Our objective was to determine postextubation NIV characteristics and to identify risk factors of postextubation NIV failure.

Methods: A prospective observational study was conducted in an 8-bed pediatric intensive care unit (PICU). Following

underlying conditions. NIV was deemed successful when reintubation was avoided. Logistic regression analysis was performed in order to identify predictors of NIV failure.

Results: There were 41 episodes (rNIV in 20 episodes). Success rate was 50% in rNIV and 81% in eNIV ($p = 0.037$). We found significant differences in univariate analysis between success and failure groups in respiratory rate (RR) decrease at 6 hours, FiO_2 at 1 hour and PO_2/FiO_2 ratio at 6 hours. Neurologic condition was found to be associated with NIV failure. Multiple logistic regression analysis identified no variable as independent NIV outcome predictor.

Conclusions: Our data suggest that postextubation NIV seems to be useful in avoiding reintubation in high-risk children when applied immediately after extubation. NIV was more likely to fail when ARF has already developed (rNIV), when RR at 6 hours did not decrease and if oxygen requirements increased. Neurologic patients seem to be at higher risk of reintubation despite NIV use.

41 episode (rNIV in 20 episodes) : succes rate was 50% rNIV and 81% in eNIV (p=0,037)

Kontraindikasi

- Total obstruksi jalan napas atas
- Muntah
- Gangguan pada reflek batuk dan menelan
- Trauma atau deformitas wajah
- GCS 10 atau kurang
- Hemodinamik tidak stabil
- Pneumotorak tanpa WSD

Equipment

Interface

Modus

Konvensional *invasive ventilator*:

- *Control mechaninal ventilation* (CMV)
- *Assist/control ventilation* (AMV)
- *Assisted spontaneous breathing (pressure support)*

Non invasive ventilator:

- *Continous positive airway pressure* (CPAP)
- *Bi-level pressure support*

Parameter pengaturan awal ventilasi mekanis konvensional

- *Peak Pressure* atau *Pressure Support*
- Volume Tidal
- PEEP
- Waktu inspirasi
- *Respiratory Rate*
- Fraksi O_2
- *Ramp slope, flow speed*
- *Inspiratory sensitifity*
- *Expiratory sensitivity*

Parameter pengaturan awal *bi-level pressure ventilation*

- IPAP
- EPAP
- Waktu inspirasi
- *Respiratory Rate*
- Fraksi O_2
- *Ramp slope, flow speed*

Analisis keberhasilan dan kegagalan NIV

	Total sample (n=151)	NIV success group (n=117)	NIV failure group (N=34)	P value
Age				
<1 month	79	61	18	0.5
<2 months	109	84	25	ns
Age (mean±sd)	7.2±20.3	7.9±22.6	4.9±9	ns
Sex (F:M)	74 : 77	55 : 62	19 : 15	ns
Weight (mean±sd)	5.1±4.9	5.3±5.4	4.4±3	ns
PIM*		3.4±7.0 (n=80)	6.9±9.0 (n=23)	0.049
Diagnosis (%)				
Bronquiolitis	102 (67.5)	95	7	0.00
Pneumonia	44 (29.1)	18	26	0.00
Apnea	20 (13.2%)	9	11	0.001
Bacterial co-infection	43 (28.5%)	26	17	0.001
Septic shock	3	2	1	n.s.
Acute respiratory distress syndrome	3	0	3	0.011

	Odds ratio	95% confidence interval for odds ratio	P value
Apnea	15.8	3.42-71.4	0.000
Bacterial co-infection	2.68	0.94-7.70	0.067
Pneumonia	31.25	8.33-111.11	0.000

*PIM only determined in children > 1 month and < 16 years.NIV, non-invasive ventilation; PIM, pediatric index of mortality score; ns, not significant.

Analisis keberhasilan dan kegagalan NIV

PEDIATRIC CLINICAL UPDATES IN DAILY PRACTICES

Predictive factors for the outcome of noninvasive ventilation in pediatric acute respiratory failure*

Juan Ignacio Muñoz-Bonet, MD; Eva M. Flor-Macián, MD; Juan Brines, PhD; Patricia M. Roselló-Millet, MD; M. Cruz Llopis, MD; José L. López-Prats, MD; Silvia Castillo, MD

Predict failure :

- MAP > 11 mmHg
- FiO2 > 60%

Objectives: noninvasive v invasive venti atric acute should not be

Design: Pr

Setting: P

Patients: ate-to-severe ventilation during for tracheal intubation.

Interventions: None.

Measurements and Main Results: Nine (19.1%) of 47 patients needed tracheal intubation between the third and 87th hour after the start of treatment (33.6 ± 29.6 hrs). Failure was associated with the younger age group (4 ± 3.3 yrs vs. 7.7 ± 5 yrs, $p < .04$), acute respiratory distress syndrome (failure/acute respiratory distress syndrome: 5 of 10 vs. failure/non acute respiratory distress syndrome: 4 of 37, $p = .013$), and worsening radiographic

$< .001$, observed invasive 001) and 8 ± 1.91 a higher e multi- and FIO_2 n a cutoff

Conclusions: Modifications in a patient's respiratory assistance were made depending on the clinical, blood gas, and radiologic evolution of the patient. Mean airway pressure and FIO_2 values of >11.5 and 0.6, respectively, predict failure and possibly set the limit above the patient's risk of delayed intubation increases. (Pediatr Crit Care Med 2010; 11:675–680)

KEY WORDS: noninvasive ventilation; children; acute respiratory failure; acute respiratory distress syndrome; predictive factors; mean airway pressure

Komplikasi

- Tidak nyaman penggunaan masker, atau asinkroni ringan (*leak)*
- Kerusakan kulit wajah, distensi lambung, regurgitasi dan aspirasi
- Ketidakstabilan hemodinamik akibat pemberian tekanan positif intratoraks.
- Pemberian NIV yang terlalu lama (pada kasus gagal NIV) dapat mengakibatkan kematian akibat keterlambatan melakukan intubasi.

Terima Kasih