

# Yeni NIMV Modları

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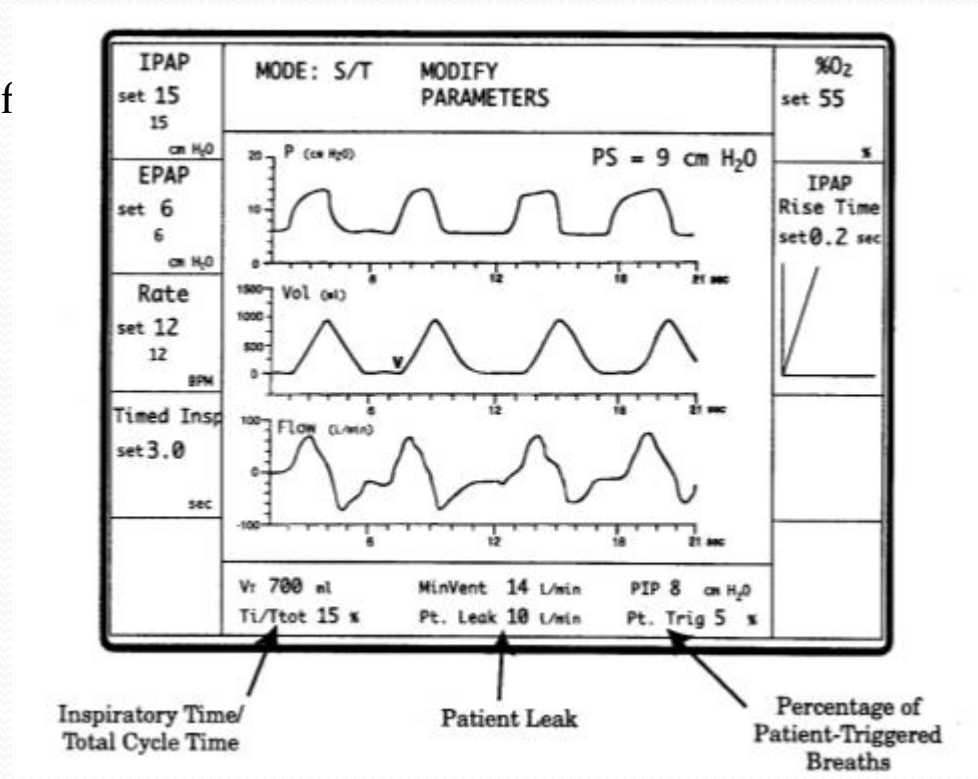
Ankara Üniversitesi Tıp Fakültesi Göğüs Hastalıkları ABD

# Modlar

- BİPAP (S ve S/T)
- PS
- CPAP

# Ventilatör Ayarları

- İPAP (inspiratuvar pozitif hava yolu basıncı)
- EPAP (CPAP/PEEP) (ekspiratuvar pozitif hava yolu basıncı)
- S/T modunda solunum frekansı
- FiO<sub>2</sub>
- İnspiryum süresi
- Rise time
- Rampa
- Alarm ayarları



# Neden Yeni Modlar?

- **Hasta-ventilatör uyumsuzluğu**

\*Hastanın istediđi solunum desteđi ile ventilatörün uyguladıđı arasında süre, başlangıç veya destek miktarı açısından tam uyum olmaması

\*Nedenleri;  
solunum sistemi mekaniđi, ventilatör ayarları, kullanılan maske ve maske kaçakları olabilir.

- **Hastanın ihtiyacına göre ventilasyon desteđi (deđişken PS)**

# Yeni Modlar

- PAV (Proportional Assist Ventilation)
- AVAPS
- AVAPS-AE
- iVAPS
- NAVA

# PAV (Orantılı Destek Ventilasyon)

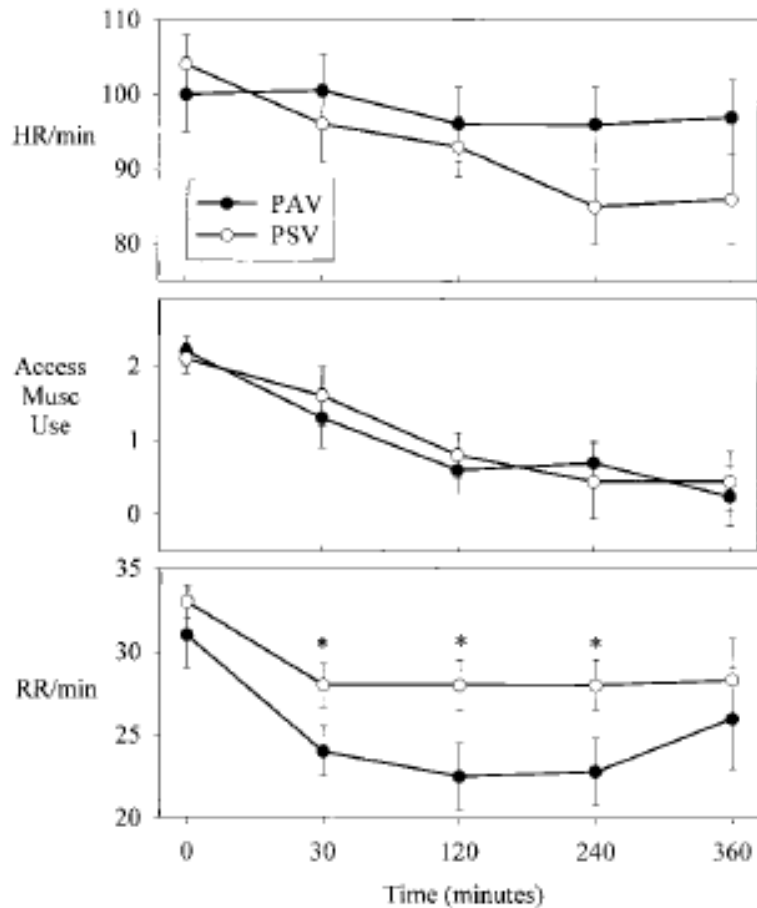
- Hastanın solunum eforuna ventilatör yanıtını artırmak için geliştirilmiş
- Önceden ayarlanmış sabit basınç yerine hastanın spontan solunum eforuna oranla inspiratuvar akım ve basınç sağlanır
- İncspiryumdan ekspiryuma geçiş, önceden belirlenen inspiratuvar akım hızındaki azalmaya bağlı olmayıp, inspiratuvar efor sonlandığında inspiratuvar destek sonlandırılır
- Hasta-ventilatör senkronizasyonu-konforu

## Noninvasive proportional assist ventilation for acute respiratory insufficiency. Comparison with pressure support ventilation.

Gay PC<sup>1</sup>, Hess DR, Hill NS.

**TABLE 1. BASELINE DEMOGRAPHIC, PHYSIOLOGIC AND GAS EXCHANGE VARIABLES**

Variable	PAV	PSV	p Value
n	21	23	
Age, yrs	71 ± 3	67 ± 3	0.27
Female, %	57	52	
Body mass index	26 ± 1	28 ± 2	
APACHE II score	19 ± 2	17 ± 1	0.34
Heart rate/min	101 ± 5	103 ± 5	0.77
Respiratory rate/min	31 ± 1	33 ± 2	0.34
Accessory muscle use	2.2 ± 0.2	2.1 ± 0.2	0.84
Dyspnea score	7 ± 1	6 ± 1	0.20
pH	7.30 ± 0.02	7.35 ± 0.01	0.02*
Pa <sub>CO2</sub> , mm Hg	59 ± 4	54 ± 3	0.35
Pa <sub>O2</sub> /F <sub>iO2</sub>	138 ± 18	176 ± 17	0.17
Hypoxemic <sup>†</sup> , %	30	50	0.20
Hypercapnic, %	20	10	0.49
Both, %	40	25	0.33
Normal ABCs, %	10	15	0.39



**TABLE 4. DURATION OF VENTILATOR USE, COMPLICATIONS, TREATMENT REFUSALS, AND LENGTHS OF STAY**

	PAV	PSV	p
Duration of use, h	13.0 ± 2.1	11.9 ± 4.4	0.82
Complications			
Nasal bridge ulcers	0	6	
Claustrophobia	0	1	0.03
Treatment refusals	1	8	0.01
Length of stay, d			
ICU	6.3 ± 1.4	5.2 ± 1.1	0.57
Hospital	12.0 ± 2.0	14.0 ± 3.6	0.89

Data are mean ± SD.

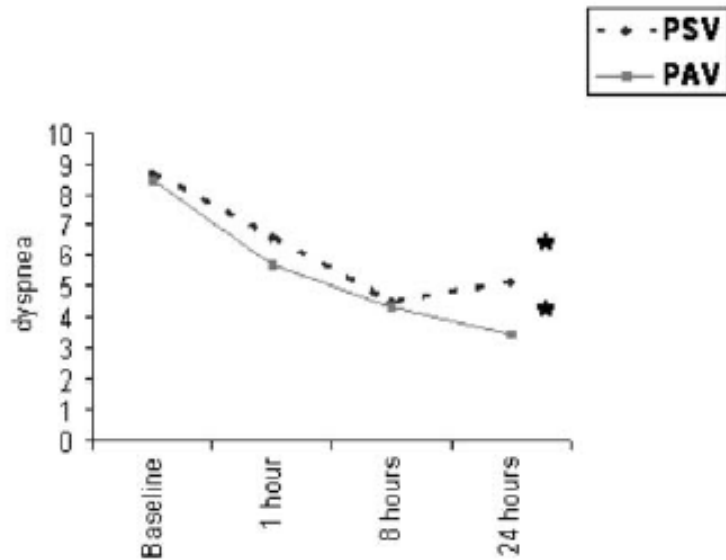
Mortalite ve entübasyon oranları benzer



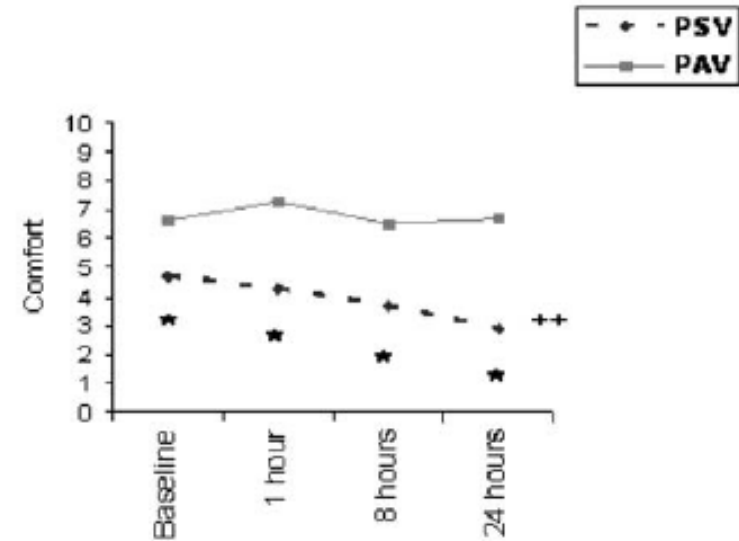
## Noninvasive pressure support versus proportional assist ventilation in acute respiratory failure.

Fernández-Vivas M<sup>1</sup>, Caturla-Such J, González de la Rosa J, Acosta-Escribano J, Alvarez-Sánchez B, Cánovas-Robles J.

Variable	PSV (n = 59)	PAV (n = 58)	P value
Age, years	65±13	62±14	NS
Apache II score, at 24 h	20±4	19±4	NS
Respiratory rate, breaths/min	35±6	37±6	0.05
Oxygenation index (PaO <sub>2</sub> /FiO <sub>2</sub> )	139±53	138±57	NS
PaO <sub>2</sub> , mmHg	84±10	85±9	NS
pH	7.28±0.10	7.30±0.11	NS
PaCO <sub>2</sub> , mmHg	60±20	54±21	NS
Heart rate, beats/min	111±15	107±14	NS
Systolic blood pressure, mmHg	139±25	139±27	NS
Diagnoses			
Exacerbations of chronic respiratory failure			
COPD	25 (42)	22 (38)	NS
Neuromuscular disorder	3 (5)	4 (7)	NS
Cardiogenic pulmonary edema	7 (12)	9 (15)	NS
Hypoxaemic acute respiratory failure			
Pneumonia	13 (22)	16 (27)	NS
Acute respiratory distress syndrome	4 (7)	3 (5)	NS
Extubation failure	7 (12)	4 (7)	NS



**Fig. 2** Dyspnoea improvement on the 0–10 visual analogue scale (VAS). Comparison of PSV and PAV modes at start of non-invasive ventilation (baseline) and at 1 h, 8 h, and 24 h (Student's *t* test, NS). Start of noninvasive ventilation vs 24 h for within group comparisons (PSV and PAV) (ANOVA, \**P* <0.001)



**Fig. 3** Comfort on the 0-10 visual analogue scale (VAS). Comparison of PSV and PAV modes at start of non-invasive ventilation (baseline) and at 1 h, 8 h, and 24 h (Student's *t* test, \**P* <0.001). Start of non-invasive ventilation vs 24 h for within group comparisons in the PSV mode (ANOVA, ++*P* <0.001) and PAV mode (ANOVA, NS)

Mortalite, entübasyon oranları ve hastane yatış süreleri benzer

[J Intensive Care Med.](#) 2018 Jan 1:885066618769021. doi: 10.1177/0885066618769021. [Epub ahead of print]

## **Evidence Supporting Clinical Use of Proportional Assist Ventilation: A Systematic Review and Meta-Analysis of Clinical Trials.**

[Tirupakuzhi Vijayaraghavan BK<sup>1,2</sup>](#), [Hamed S<sup>1</sup>](#), [Jain A<sup>1</sup>](#), [Chimunda T<sup>1</sup>](#), [Telias I<sup>1,3</sup>](#), [Friedrich JO<sup>1,3</sup>](#), [Burns KEA<sup>1,3,4</sup>](#).

- 14 RKÇ, 931 hasta (NİMV/İMV)
- NİMV grubunda; Entübasyon ve mortalite bakımından PS ile fark yok

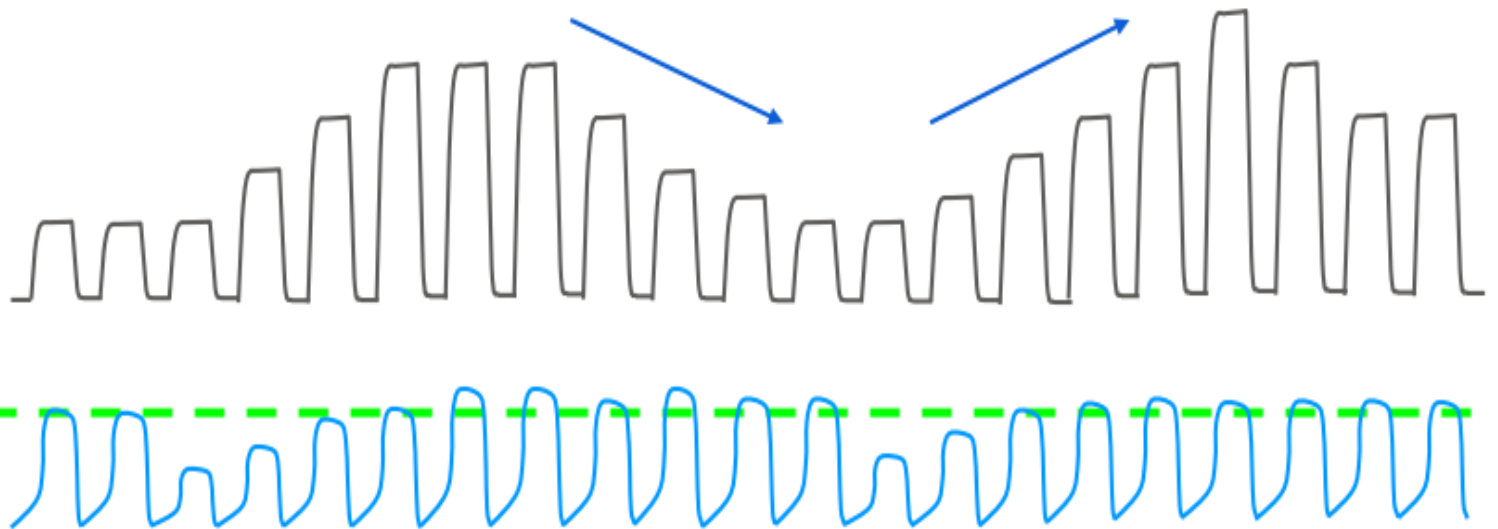
# AVAPS

Average Volume Assured Pressure Support  
(*adjunct to Pressure modes*)

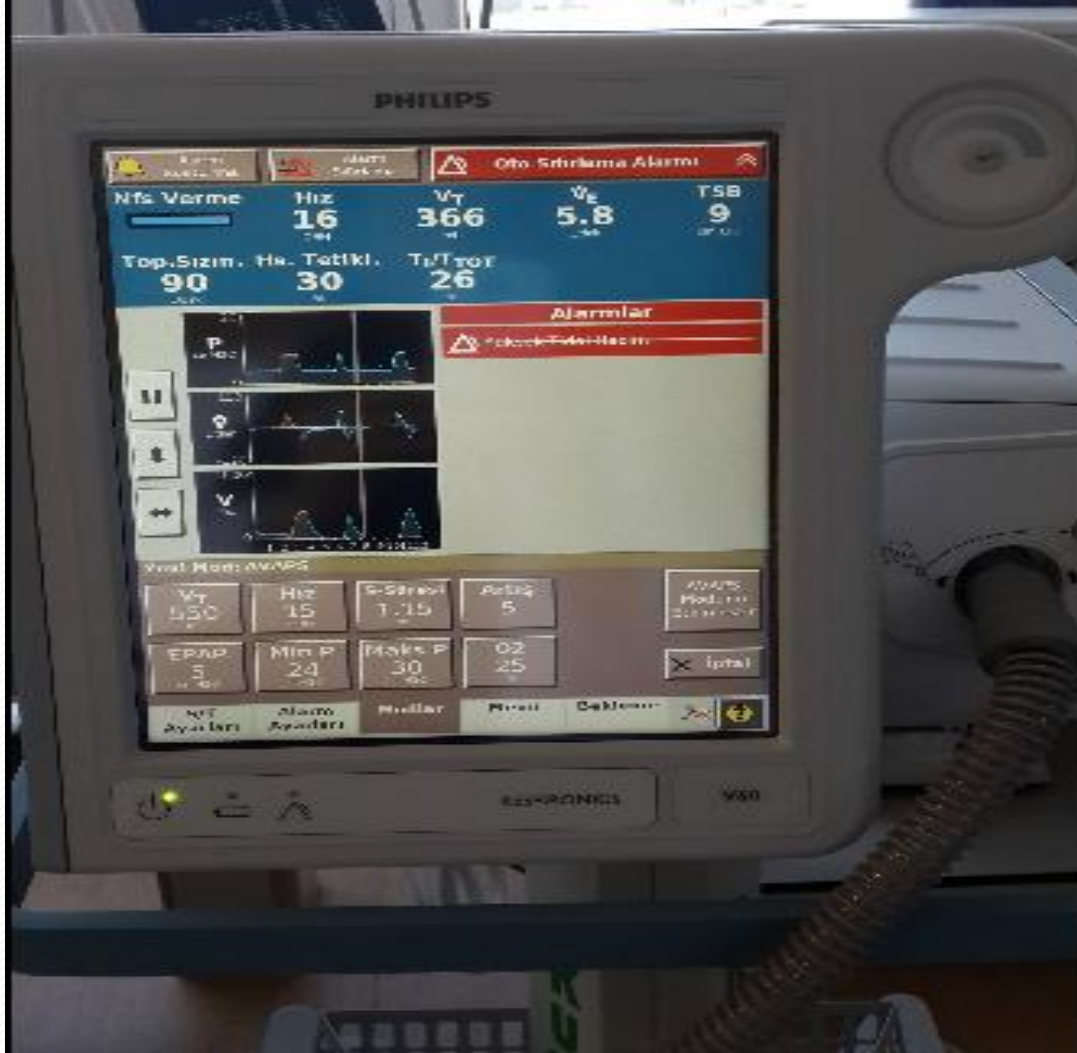
IPAP max

IPAP min

Target Vt



# AVAPS (Ortalama Volüm Garantili Basınç Desteđi)



# AVAPS

- CPAP tedavisine yanıtızsız OHS'li hastalar
- S/T vs AVAPS
- AVAPS grubunda nokturnal PtcCO<sub>2</sub>'de anlamlı azalma

*Storre JH, et al. Chest 2006;130:815-21*

# AVAPS

- KOAH atak ve hiperkapnik ensefalopatili 22 hasta
- S/T vs AVAPS

*Briones Claudett KH, et al. BMC Pulm Med. 2013;13:12. doi: 10.1186/1471-2466-13-12*

**Table 1 Initial patient assessment results**

NIV study groups (All 22 patients)		Mean	SD	P
BMI	BiPAP S/T	26.22	2.87	.99
	BiPAP S/T + AVAPS	24.23	2.62	
Age (years)	BiPAP S/T	77.55	6.49	.10
	BiPAP S/T + AVAPS	79.82	13.53	
APACHE II	BiPAP S/T	18.45	2.50	.86
	BiPAP S/T + AVAPS	18.55	2.73	
Initial GSC	BiPAP S/T	8.36	1.43	1.00
	BiPAP S/T + AVAPS	8.36	1.63	
Initial pH	BiPAP S/T	7.28	0.02	.45
	BiPAP S/T + AVAPS	7.29	0.03	

\*Statistically significant ( $P$  value  $<.05$ ).

A total 22 patients. 11 patients of group BiPAP S/T and 11 patients of group BiPAP S/T + AVAPS.

**Table 2 Evolution of blood gases, vital signs, and ventilatory parameters (mean  $\pm$  SD)**

Variables	Groups	Initial	1 hour	3 hours	12 hours	P
GSC	BiPAP S/T	8.3 $\pm$ 1.4	9.7 $\pm$ 2	12 $\pm$ 1.5	13 $\pm$ 1	.00001*
	BiPAP S/T + AVAPS	8.3 $\pm$ 1.6	11 $\pm$ 1	14.1 $\pm$ 0.8	15 $\pm$ 0	
pH	BiPAP S/T	7.28 $\pm$ 0.02	7.30 $\pm$ 0.05	7.31 $\pm$ 0.11	7.32 $\pm$ 0.12	.31
	BiPAP S/T + AVAPS	7.29 $\pm$ 0.03	7.34 $\pm$ 0.04	7.37 $\pm$ 0.11	7.37 $\pm$ 0.08	
pCO <sub>2</sub>	BiPAP S/T	64.8 $\pm$ 9.1	58.3 $\pm$ 8.7	53.2 $\pm$ 9	50.1 $\pm$ 6.5	.03*
	BiPAP S/T + AVAPS	63 $\pm$ 16.3	50.7 $\pm$ 11.2	45.4 $\pm$ 7.9	43.6 $\pm$ 6.5	
PO <sub>2</sub>	BiPAP S/T	66.6 $\pm$ 12.7	83.1 $\pm$ 17.8	75.3 $\pm$ 26.7	79.7 $\pm$ 16.2	.31
	BiPAP S/T + AVAPS	71.5 $\pm$ 16.8	78 $\pm$ 19.1	87.5 $\pm$ 11.5	87.4 $\pm$ 18	
Respiratory rate	BiPAP S/T	27.9 $\pm$ 5.6	23.2 $\pm$ 3.5	21 $\pm$ 2.6	20 $\pm$ 1.61	.01*
	BiPAP S/T + AVAPS	29 $\pm$ 6.9	17.4 $\pm$ 3.2	18.5 $\pm$ 3.6	19.9 $\pm$ 5.1	
Maximum delivered IPAP received	BiPAP S/T	12.3 $\pm$ 0.9	12.6 $\pm$ 0.9	14.3 $\pm$ 0.8	14.7 $\pm$ 1	.005*
	BiPAP S/T + AVAPS	19.8 $\pm$ 2.2	18.3 $\pm$ 2.3	18 $\pm$ 2.6	17 $\pm$ 2.3	
Exhaled tidal volume	BiPAP S/T	304 $\pm$ 60.6	400.5 $\pm$ 73.9	519 $\pm$ 61.4	531.1 $\pm$ 63.6	.01*
	BiPAP S/T + AVAPS	298.6 $\pm$ 54.3	606.3 $\pm$ 75.4	626.3 $\pm$ 77.6	617.6 $\pm$ 77.4	



## Evaluation of the feasibility of average volume-assured pressure support ventilation in the treatment of acute hypercapnic respiratory failure associated with chronic obstructive pulmonary disease: A pilot study.

Çiftci F<sup>1</sup>, Çiledağ A<sup>2</sup>, Erol S<sup>3</sup>, Öz M<sup>4</sup>, Acar D<sup>5</sup>, Kaya A<sup>6</sup>.

General characteristics of the patients with COPD and AHRF who were treated with AVAPS

Characteristics	
Subjects, n	106
Age, y	71.8 ± 10.9
Female	52 (49.05)
BMI, kg/m <sup>2</sup>	27.3 ± 7.9
Smoking status, former/current	91/15
Cumulative smoking, pack-years	40.2 ± 25.1
Comorbidities	
Hypertension	82 (77.4)
Diabetes mellitus	36 (34)
Coronary artery disease	35 (33)
OSA	11 (10.4)
Hyperlipidemia	9 (8.5)
Chronic renal failure	15 (14.2)
Osteoporosis	2 (1.9)
FEV1, %predicted	38.7 ± 14.5
FVC, %predicted	51.4 ± 16.8
FEV1/FVC	43.5 ± 11.6
pH	7.28 ± 0.05
Paco <sub>2</sub> , mm Hg	69.8 ± 11.0
Base excess	3.8 ± 1.9
HCO <sub>3</sub>	22.5 ± 5.8
PaO <sub>2</sub> /Fio <sub>2</sub>	202.4 ± 29.7
Hematocrit, mg/dL	40.3 ± 8.7
C-reactive protein, mg/L	50.5 ± 60.7
Procalcitonin, ng/mL	0.6 ± 0.8
GCS	14.6 ± 0.6
APACHE II	18.6 ± 4.1
CCI	1.8 ± 1.1

- AVAPS başarısı: %76.4
- Başarı ile ilişkili faktörler: Bazal CRP, GKS, ilk 2 saatteki AKG yanıtı

# AVAPS-AE (Automatic EPAP)

- Hedef tidal volüm ve deęişken PS'a ek olarak
- Havayolu direncini ölçerek, üst havayolu açıklığını sağlayacak şekilde EPAP ayarı
- KOAH ve OHS'li hastalarda eşlik eden OSA
- Obstrüktif apnelerin engellenmesi?

## Noninvasive auto-titrating ventilation (AVAPS-AE) versus average volume-assured pressure support (AVAPS) ventilation in hypercapnic respiratory failure patients.

Gursel G<sup>1</sup>, Zerman A<sup>1</sup>, Basarik B<sup>1</sup>, Gonderen K<sup>1</sup>, Aydogdu M<sup>2</sup>, Memmedova S<sup>1</sup>.

**Table 1** Demographics and baseline characteristics of the patients

	Group 1 (AVAPS-AE) (n=28) mean ± SD	Group 2 (AVAPS) (n=22) mean ± SD	P
Age (years)	68 ± 9	64 ± 12	0.188
Gender, female, n (%)	18 (64)	10 (46)	0.183
BMI (kg/m <sup>2</sup> )	32 ± 9	35 ± 11	0.379
BMI ≥ 30 kg/m <sup>2</sup> , n (%)	18(64)	14(64)	0.962
APACHE II	15 ± 4	17 ± 4	0.182
FEV <sub>1</sub> /FVC (%)	63 ± 18	64 ± 16	0.878
EF (%)	58 ± 9	60 ± 8	0.327
PAP (mmHg)	45 ± 1	50 ± 1	0.216
Admission ABG pH	7.33 ± 0.06	7.32 ± 0.04	0.508
PaO <sub>2</sub> (mmHg)	75 ± 12	75 ± 15	0.929
PaCO <sub>2</sub> (mmHg)	69 ± 9	67 ± 8	0.517
HCO <sub>3</sub> (meq)	32 ± 5	35 ± 4	0.052
SatO <sub>2</sub> %	92 ± 3	94 ± 3	0.126
Diagnosis, n (%)			
OHS	10 (36)	6 (30)	0.679
COPD	17 (61)	15 (68)	0.585
CHF	14 (50)	9 (41)	0.522
Infection	6 (21)	2 (9)	0.238
LTOT, n (%)	21 (75)	13 (62)	0.325
Home MV, n (%)	14 (50)	10 (46)	0.749

	Group 1 ( <i>n</i> = 28)	Group 2 ( <i>n</i> = 22)	<i>P</i>
Patients with 10% reduction in the PaCO <sub>2</sub> levels (%)	96%	91%	0.546
Mean day of 10% reduction	1.4 ± 0.8	2.7 ± 2.4	0.007
Patients with 10 mm Hg reduction in the PaCO <sub>2</sub> levels (%)	89%	77%	0.223
Mean day of 10 mmHg reduction	1.8 ± 1.2	3 ± 3	0.044
Patients whose PaCO <sub>2</sub> drops at first 6 h (%)	93%	60%	0.004
Mean amount of PaCO <sub>2</sub> reduction at first 6 h (mmHg)	7 ± 7	2 ± 5	0.025

**Table 4** Comparison of the course of ventilation parameters between the groups

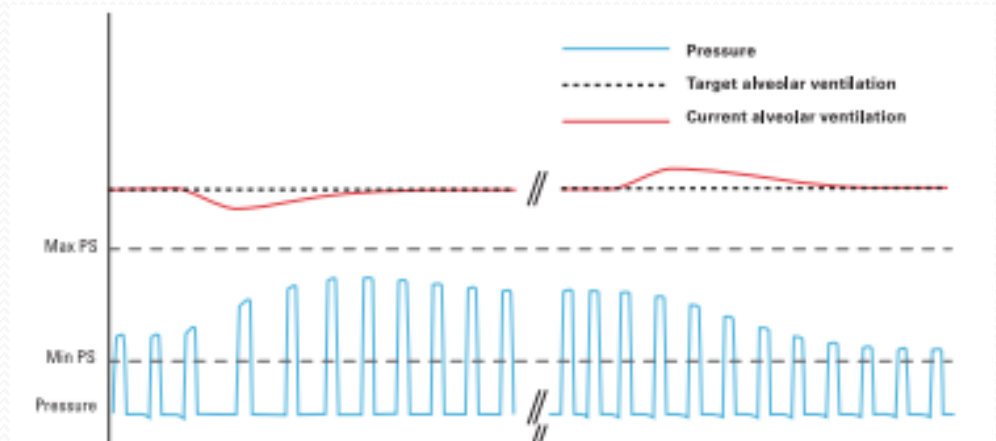
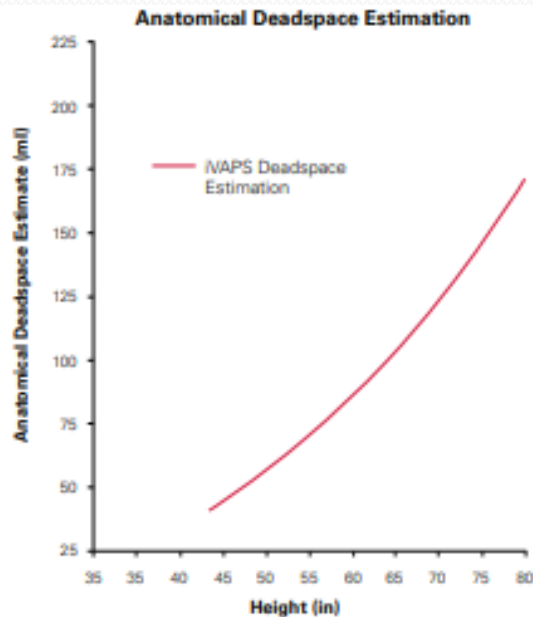
Group 1 (n= 28)	First 6 h mean $\pm$ SD	1st day mean $\pm$ SD	2nd day mean $\pm$ SD	3rd day mean $\pm$ SD	4th day mean $\pm$ SD
Group 2 (n= 22)					
<b>Max IP (cmH<sub>2</sub>O)</b>					
Group 1	28 $\pm$ 6 <sup>a</sup>	30 $\pm$ 6	29 $\pm$ 7	28 $\pm$ 5	28 $\pm$ 6
Group 2	24 $\pm$ 6	28 $\pm$ 5	28 $\pm$ 4	27 $\pm$ 6	26 $\pm$ 6
<b>Mean IP (cmH<sub>2</sub>O)</b>					
Group 1	21 $\pm$ 5	22 $\pm$ 7	21 $\pm$ 7	19 $\pm$ 6	20 $\pm$ 6
Group 2	18 $\pm$ 5	20 $\pm$ 6	20 $\pm$ 5	20 $\pm$ 6	18 $\pm$ 4
<b>Max EP (cmH<sub>2</sub>O)</b>					
Group 1	12 $\pm$ 3 <sup>c</sup>	13 $\pm$ 2 <sup>c</sup>	13 $\pm$ 2 <sup>c</sup>	13 $\pm$ 3 <sup>c</sup>	13 $\pm$ 3 <sup>c</sup>
Group 2	8 $\pm$ 4	8 $\pm$ 3	8 $\pm$ 3	8 $\pm$ 3	8 $\pm$ 3
<b>Min EP (cmH<sub>2</sub>O)</b>					
Group 1	5 $\pm$ 0.6 <sup>c</sup>	5 $\pm$ 0.5 <sup>c</sup>	5 $\pm$ 0.7 <sup>c</sup>	5 $\pm$ 0.4 <sup>b</sup>	5 $\pm$ 2 <sup>c</sup>
Group 2	6 $\pm$ 1.2	7 $\pm$ 3	7 $\pm$ 2	7 $\pm$ 3	7 $\pm$ 3
<b>Respiratory rate</b>					
Group 1	19 $\pm$ 2	19 $\pm$ 2	20 $\pm$ 2	19 $\pm$ 3 <sup>b</sup>	20 $\pm$ 4
Group 2	21 $\pm$ 6	22 $\pm$ 6	21 $\pm$ 6	23 $\pm$ 5	22 $\pm$ 4
<b>Tidal volume (mL)</b>					
Group 1	509 $\pm$ 64 <sup>b</sup>	525 $\pm$ 60 <sup>b</sup>	624 $\pm$ 63 <sup>b</sup>	539 $\pm$ 48 <sup>c</sup>	541 $\pm$ 41 <sup>b</sup>
Group 2	435 $\pm$ 107	461 $\pm$ 68	445 $\pm$ 110	470 $\pm$ 62	487 $\pm$ 51
<b>Minute ventilation (L/min)</b>					
Group 1	9.7 $\pm$ 2 <sup>a</sup>	10.1 $\pm$ 1.7	10.4 $\pm$ 2	11 $\pm$ 1.7	11.2 $\pm$ 2.3 <sup>a</sup>
Group 2	8.2 $\pm$ 2.5	9.1 $\pm$ 2.5	10 $\pm$ 3	10 $\pm$ 2.7	10 $\pm$ 2.1
<b>Leak (L/min)</b>					
Group 1	32 $\pm$ 10 <sup>a</sup>	35 $\pm$ 10	36 $\pm$ 11 <sup>c</sup>	36 $\pm$ 12 <sup>b</sup>	35 $\pm$ 11 <sup>c</sup>
Group 2	27 $\pm$ 6	30 $\pm$ 16	27 $\pm$ 4	27 $\pm$ 4	26 $\pm$ 4
<b>Mean daily usage time (h)</b>					
Group 1	5 $\pm$ 3	10 $\pm$ 1.7	10 $\pm$ 2	11 $\pm$ 2	11 $\pm$ 2 <sup>a</sup>
Group 2	4 $\pm$ 1	9 $\pm$ 2.5	10 $\pm$ 3	10 $\pm$ 3	10 $\pm$ 2

# Intelligent volume-assured pressure support (iVAPS)

Hedef alveoler ventilasyon

$V_a: f \times (V_T - V_d)$

Anatomik ölü boşluk:  $120 \times (\text{height}/175)$



## Randomized trial of 'intelligent' autotitrating ventilation versus standard pressure support non-invasive ventilation: impact on adherence and physiological outcomes.

Kelly JL<sup>1</sup>, Jaye J, Pickersquill RE, Chatwin M, Morrell MJ, Simonds AK.

- 18 kronik obstrüktif veya restriktif akciğer hasta
- iVAPS vs PSV gruplarına randomize
- Bazal ve 1. ayda PSG ve transkutan CO<sub>2</sub>
- İki grup arasında spirometri, solunum kas gücü, uyku kalitesi, arousal ve SaO<sub>2</sub> bakımından fark yok

	iVAPS	Standard PS	Median difference between treatments (95% CI)	<i>P</i>
<b>Ventilator settings (<i>n</i> = 18)</b>				
PS minimum and maximum boundaries (iVAPS) (cmH <sub>2</sub> O)	5.0 (5.0–5.0)–17.5 (15.0–18.0)	n/a	n/a	n/a
PS (standard PS) (cmH <sub>2</sub> O)	n/a	10.0 (9.0–11.4)	n/a	n/a
EPAP (cmH <sub>2</sub> O)	7.8 (6.0–9.0)	7.3 (6.0–9.0)	0 (0 to 1)	0.77
RR (bpm)	16.5 (14.0–21.0)	12.0 (12.0–13.0)	4.7 (2.3 to 7.3)	0.001 <sup>†</sup>
Target Va (l/min)	4.9 (4.1–6.1)	n/a	n/a	n/a
<b>Ventilator output (<i>n</i> = 16)</b>				
<b>PS delivered median (cmH<sub>2</sub>O)<sup>†</sup></b>	<b>8.3 (5.6–10.4)</b>	<b>10.0 (9.0–11.4)</b>	<b>–2.2 (–4.5 to 0.3)</b>	<b>0.001<sup>†</sup></b>
Median leak (l/min)—vent	6.5 (3.5–26)	3.6 (0.2–9.6)	3.5 (–2.5 to 9.6)	0.23
Median tidal volume (mL)	421 (321–521)	400 (300–575)	–10 (–54 to 23)	0.47
Median minute ventilation (l/min)	6.8 (5.3–8.3)	6.2 (5.4–9.4)	–0.2 (–1.2 to 0.5)	0.50
Median RR (bpm)	16.7 (13.2–18.4)	15.5 (13.5–17.0)	0.3 (–0.7 to 2.2)	0.41
<b>Adherence (<i>n</i> = 17)</b>				
<b>Mean NIV usage time (hh:mm/day)</b>	<b>5:40 (4:42–6:49)</b>	<b>4:20 (2:27–6:17)</b>	<b>01:04 (00:27 to 1:44)</b>	<b>0.004<sup>†</sup></b>
% days used in study	91 (64–98)	92 (70–99)	–1 (–15 to 7)	0.53
% days used ≥4/24	74 (49–92)	60 (27–85)	8 (–2 to 17)	0.1



## Non-invasive ventilation with intelligent volume-assured pressure support versus pressure-controlled ventilation: effects on the respiratory event rate and sleep quality in COPD with chronic hypercapnia.

Nilius G<sup>1,2</sup>, Katamadze N<sup>1,2</sup>, Domanski U<sup>1</sup>, Schroeder M<sup>1</sup>, Franke KJ<sup>1,2</sup>.

**Table 3** Ventilation parameters from device

	IVAPS	ST	P-value
IPAP, cmH <sub>2</sub> O	20.5±3.9	17.9±4.1	0.011
EPAP, cmH <sub>2</sub> O	5.3±1.3	5.4±1.4	0.317
Leakage, L/min	6.9±10.3	7.1±9.3	0.399
TV, mL	569.3±105.4	549.2±243.5	0.209
RMV, L	9.7±1.8	9.8±3.2	0.463
RR, n/min	16.9±1.7	18.0±3.4	0.065
Inspiratory time, sec	1.2±0.3	1.1±0.3	0.100
Spontaneously cycled breaths, %	38.1±25.3	58.9±28.2	0.007
Alveolar ventilation, L/min	7.7±1.6		

**Table 1** Respiratory events

	IVAPS	ST	P-value
UL, n/h	0.3±0.8	0.0±0.0	0.109
Ventilator asynchrony (PVA), n/h	0.2±0.6	0.6±1.5	0.173
PVA + UL, n/h	0.6±1.2	0.6±1.5	0.779
Ventilatory drive, n/h	2.7±3.4	1.8±4.3	0.158
Obstructive hypopneas, n/h	5.1±8.1	3.0±4.6	0.087
Central apneas + hypopneas, n/h	2.7±3.4	1.8±4.5	0.158
Overall events, n/h	8.3±10.2	5.4±6.7	0.064

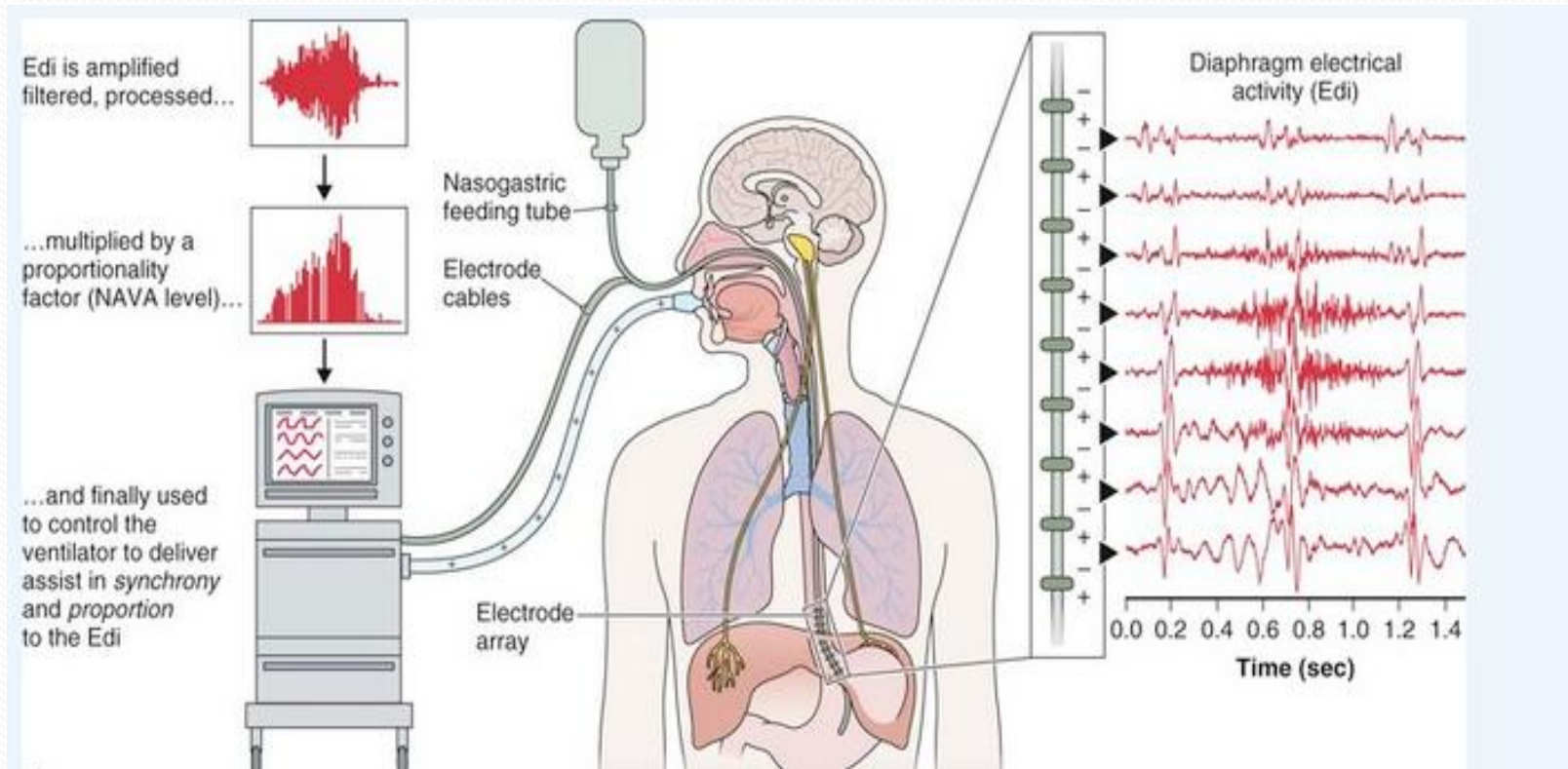
**Table 2** Other respiratory parameters

	<b>IVAPS</b>	<b>ST</b>	<b>P-value</b>
SaO <sub>2</sub> during NREM, %	92.7±3.5	91.0±3.8	<b>0.036</b>
SaO <sub>2</sub> during REM, %	92.2±4.4	90.6±4.8	0.169
Total SaO <sub>2</sub> , %	92.6±3.5	90.9±3.9	<b>0.034</b>
Respiratory rate during W, breaths/min	17.4±4.0	18.9±3.1	<b>0.026</b>
Respiratory rate during REM, breaths/min	16.0±1.9	17.2±3.2	0.064
Respiratory rate during NREM, breaths/min	15.9±1.8	17.6±3.4	0.016
PtcCO <sub>2</sub> during W, mmHg	46.0±6.1	49.6±6.6	0.307
PtcCO <sub>2</sub> during REM, mmHg	51.4±6.3	55.0±6.4	0.139
PtcCO <sub>2</sub> during NREM, mmHg	50.0±6.6	54.1±5.4	0.078
Total PtcCO <sub>2</sub> , mmHg	49.1±6.4	52.9±6.2	0.196

**Table 4** Sleep parameters

	<b>IVAPS</b>	<b>ST</b>	<b>P-value</b>
Total sleep time, min	262.9±61.1	268.9±60.6	0.778
Sleep period time, min	344.5±54.4	326.3±59.9	0.140
Time in bed, min	358.8±51.4	332.1±57.3	0.056
NREM sleep, %	84.2±7.8	85.4±7.4	0.379
REM sleep, %	15.8±7.8	14.6±7.4	0.379
N3 sleep, %	29.2±16.3	28.7±12.6	0.727
Sleep efficiency, %	73.9±16.1	80.9±10.7	0.272
WASO, min	83.1±65.8	50.1±38.0	0.233
WASO/sleep period time, %	23.3±16.9	15.2±11.4	0.433
Arousal index, n/h	25.4±9.9	24.4±7.5	0.683
Respiratory arousal index, n/h	4.2±3.1	3.1±3.3	0.510

# NAVA



## Neurally adjusted ventilatory assist vs pressure support ventilation for noninvasive ventilation during acute respiratory failure: a crossover physiologic study.

Bertrand PM<sup>1</sup>, Futier E<sup>2</sup>, Coisel Y<sup>3</sup>, Matecki S<sup>4</sup>, Jaber S<sup>5</sup>, Constantin JM<sup>1</sup>.

- 13 ASY'li hasta
- Sıra ile 30'ar dakika PSV sonra NAVA

Table 3—Respiratory Parameters and Patient-Ventilator Asynchrony During PSV and NAVA

Parameters and Asynchrony	NIV Trial		P Value
	PSV (n = 13)	NAVA (n = 13)	
Respiratory parameters			
Pmax, cm H <sub>2</sub> O	12.1 (11.0-13.2)	12.6 (11.3-13.6)	.21
Pmin, cm H <sub>2</sub> O	4.4 (4.1-6.5)	4.9 (4.4-5.8)	.18
VTE			
mL	515 (410-593)	498 (421-663)	.06
mL/kg	8 (6-8)	8 (7-8)	.08
PEEP, cm H <sub>2</sub> O	6 (5-7)	6 (5-7)	.35
EAdi max, $\mu$ V	10.6 (8.1-18.8)	11.9 (10.0-15.1)	.017
Tm, ms	880 (770-1,140)	870 (770-1,055)	.63
Td	90 (30-130)	0 (0-30)	<.001
Tiexe, ms	125 (20-312)	10 (0-28)	<.001
Asynchrony, n/min			
Ineffective efforts	0.4 (0.2-0.6)	0.0 (0.0-0.0)	.008
Autotriggering	0.2 (0.0-0.6)	0.0 (0.0-0.2)	.08
Double triggering	0.2 (0.0-0.2)	0.06 (0.0-0.4)	.10
Delayed cycling	0.8 (0.2-1.6)	0.2 (0.0-0.4)	.028
Premature cycling	0.6 (0.3-1.0)	0.6 (0.15-1.2)	.73

## **Asynchrony index in pressure support ventilation (PSV) versus neurally adjusted ventilator assist (NAVA) during non-invasive ventilation (NIV) for respiratory failure: systematic review and meta-analysis.**

Sehgal IS<sup>1</sup>, Dhooria S<sup>2</sup>, Aggarwal AN<sup>2</sup>, Behera D<sup>2</sup>, Aggarwal R<sup>2</sup>.

- Toplam 9 çalışma, 96 hasta
- 6'sı erişkin, 3'ü pediatrik popülasyon
- 5 RKC, 4 gözlemsel çalışma
- Asenkroni indeksi PSV'de anlamlı olarak daha fazla

# Yeni Modlar-Sonuç

- Etkinliđi?
- Komplikasyon?
- Hangi hasta?
- Ne zaman?

Teşekkür ederim