

De toekomst van de thuisbeademing



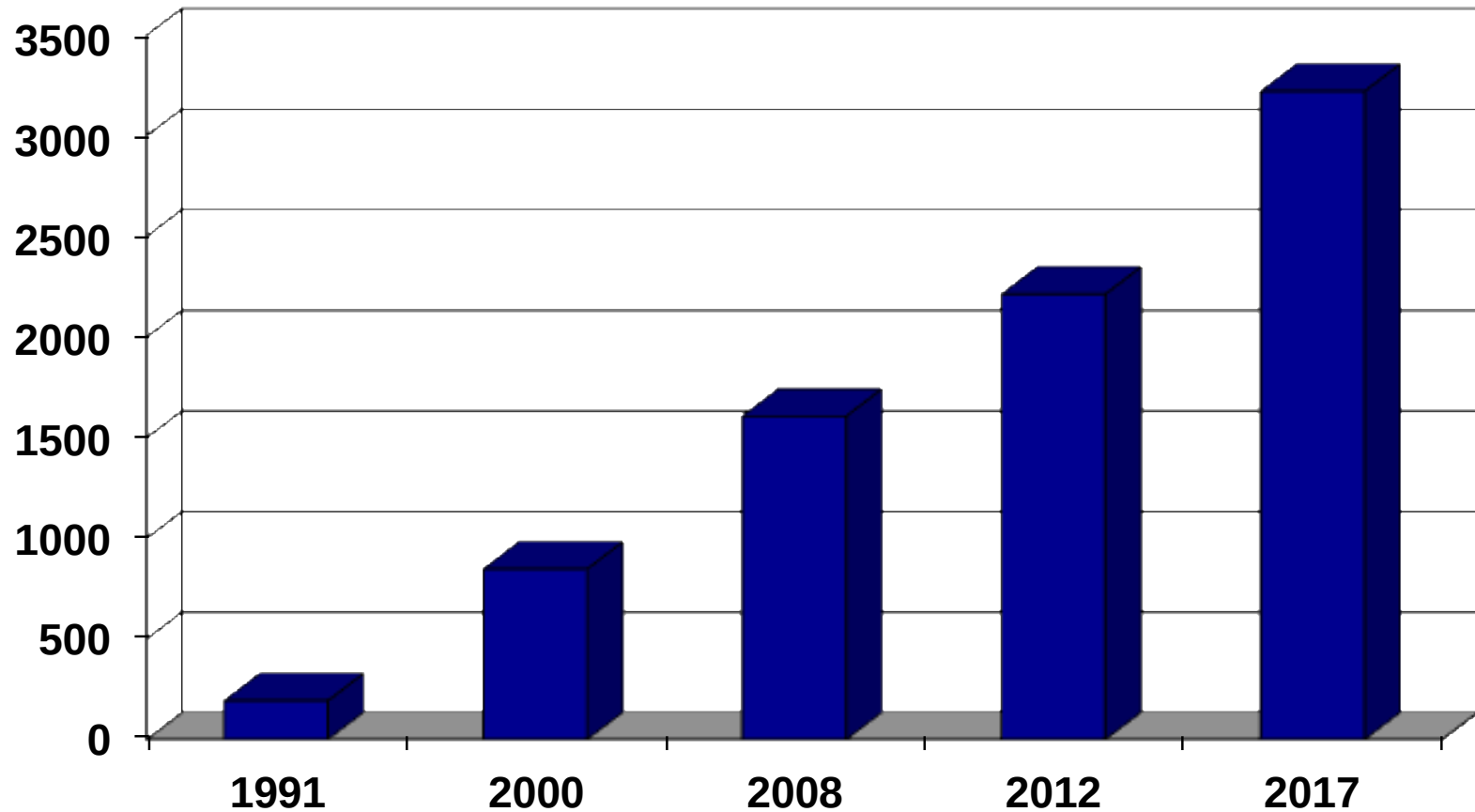
Wat zijn de uitdagingen?

Wat zijn de uitdagingen ?

- Patientenzorg
- Onderwijs / scholing
- Wetenschap

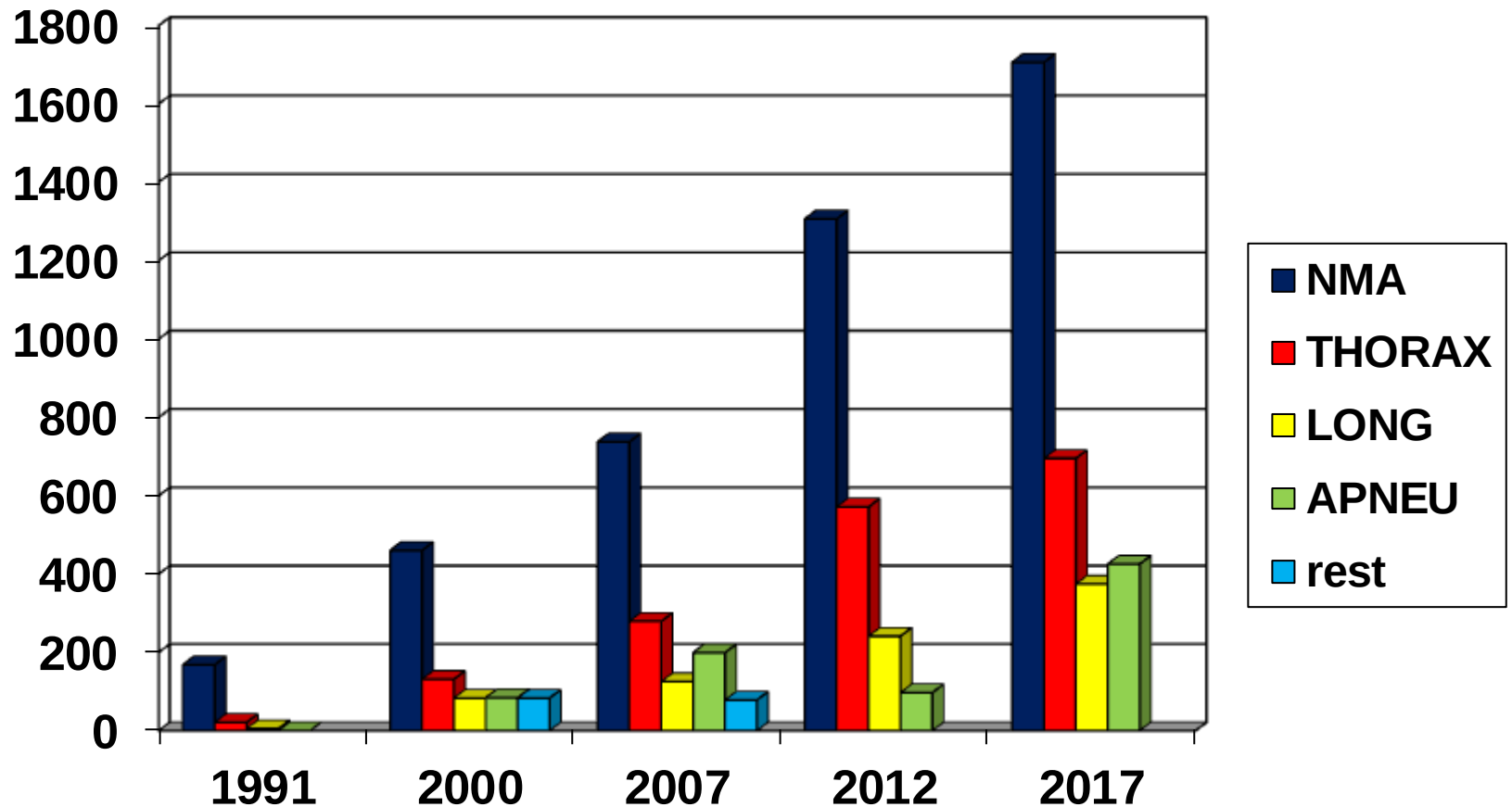


Totale aantal patiënten

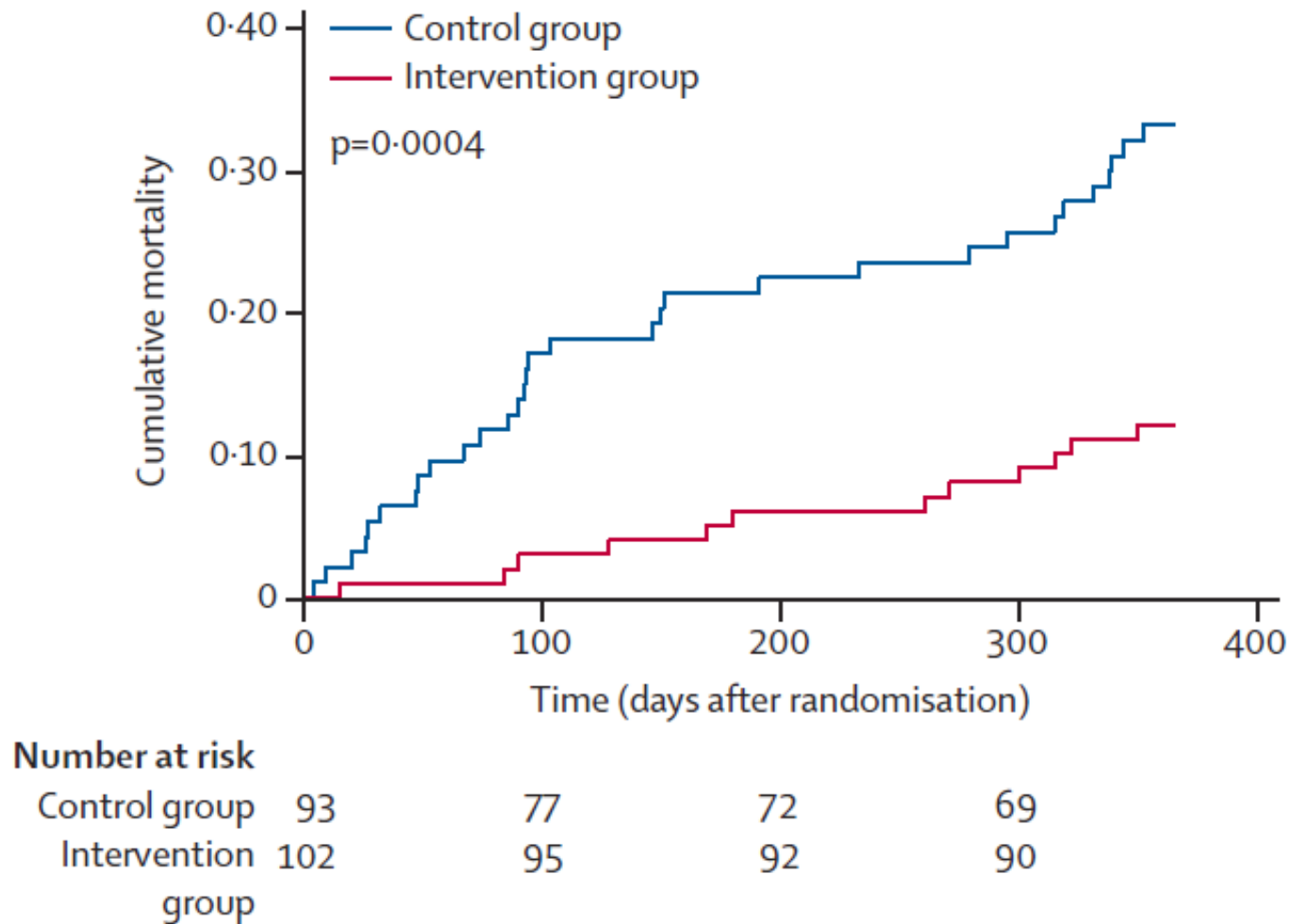




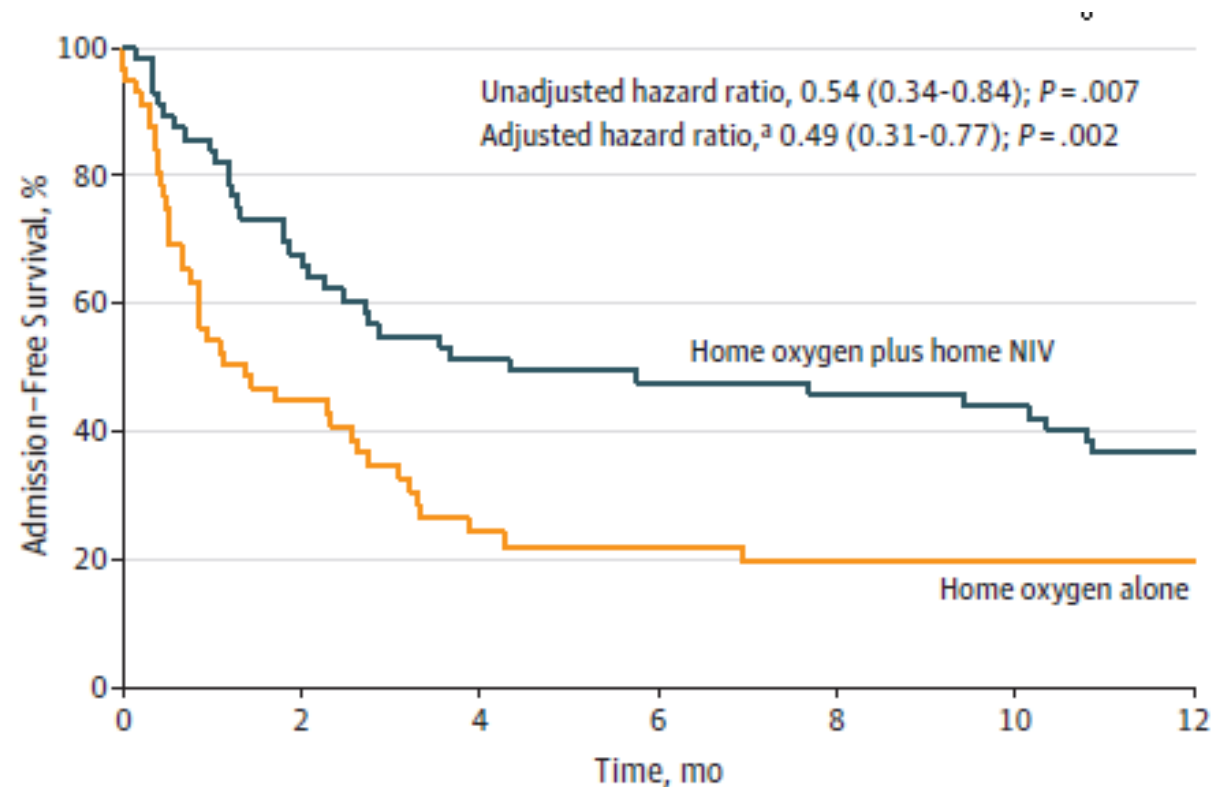
Totaal per diagnose



Thuisbeademing bij stabiel COPD



Thuisbeademing na acuut respiratoir falen



No. at risk							
Home oxygen plus home NIV	57	37	28	26	25	24	16
Home oxygen alone	59	23	11	10	8	8	6

Patiëntenzorg

- Knelpunten
 - Kwaliteitsstandaard
- Groei
 - Welke patiënten groepen ?
 - Satelliet vorming \ Netwerken ?
- Financiering



Wat zijn de uitdagingen ?

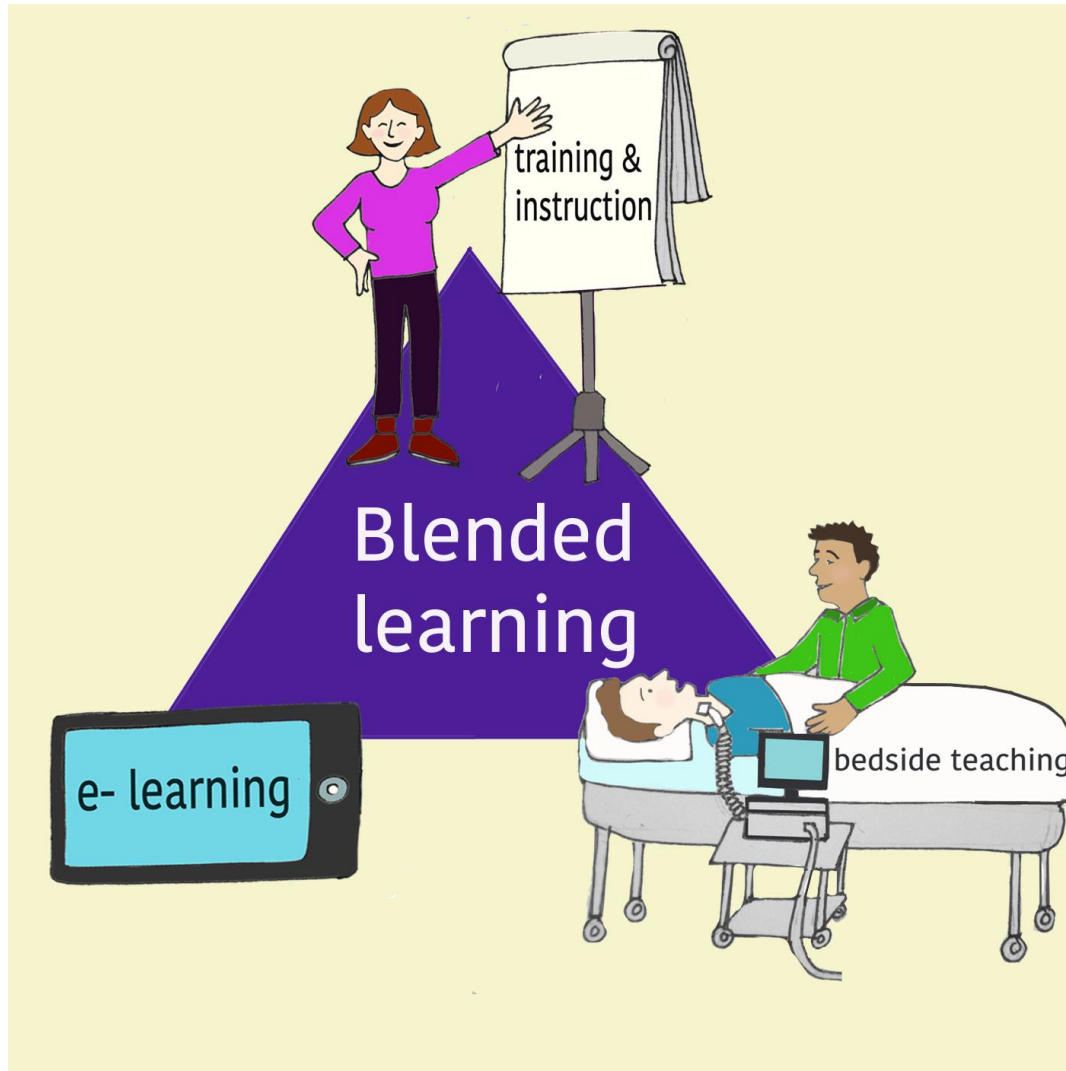
- Patientenzorg
- *Onderwijs / scholing*
- Wetenschap



Onderwijs/ scholing

- Opleiding
 - Verpleegkundigen
 - dokters
- Visitatie
- Scholing

Nationale uniforme scholing



Wat zijn de uitdagingen ?

- Patientenzorg
- Onderwijs / scholing
- *Wetenschap*



HOMERUN

- Wie : NMA / thoraxkooi patiënten
- Hoe: Start NIV thuis versus ziekenhuis
Telemonitoring
- Doel: Thuis NIV starten
- Door wie: alle CTB's
- Subsidie : ZONMW / RESMED / VIVISOL



REMeDY

- Wie : Steinert
- Hoe: Nationaal cohort onderzoek
- Doel: bij wie en wanneer starten met NIV
- Door wie: Faber/Vosse v/h MUMC en CTB's
- Subsidie : Prinses Beatrix Spierfonds

ALS STUDIE

- Wie : ALS
- Hoe: Nationaal cohort onderzoek
- Doel: Bij welk type en wanneer starten met NIV
- Door wie: ALS teams en alle CTB's
- Subsidie : ALS stichting ?

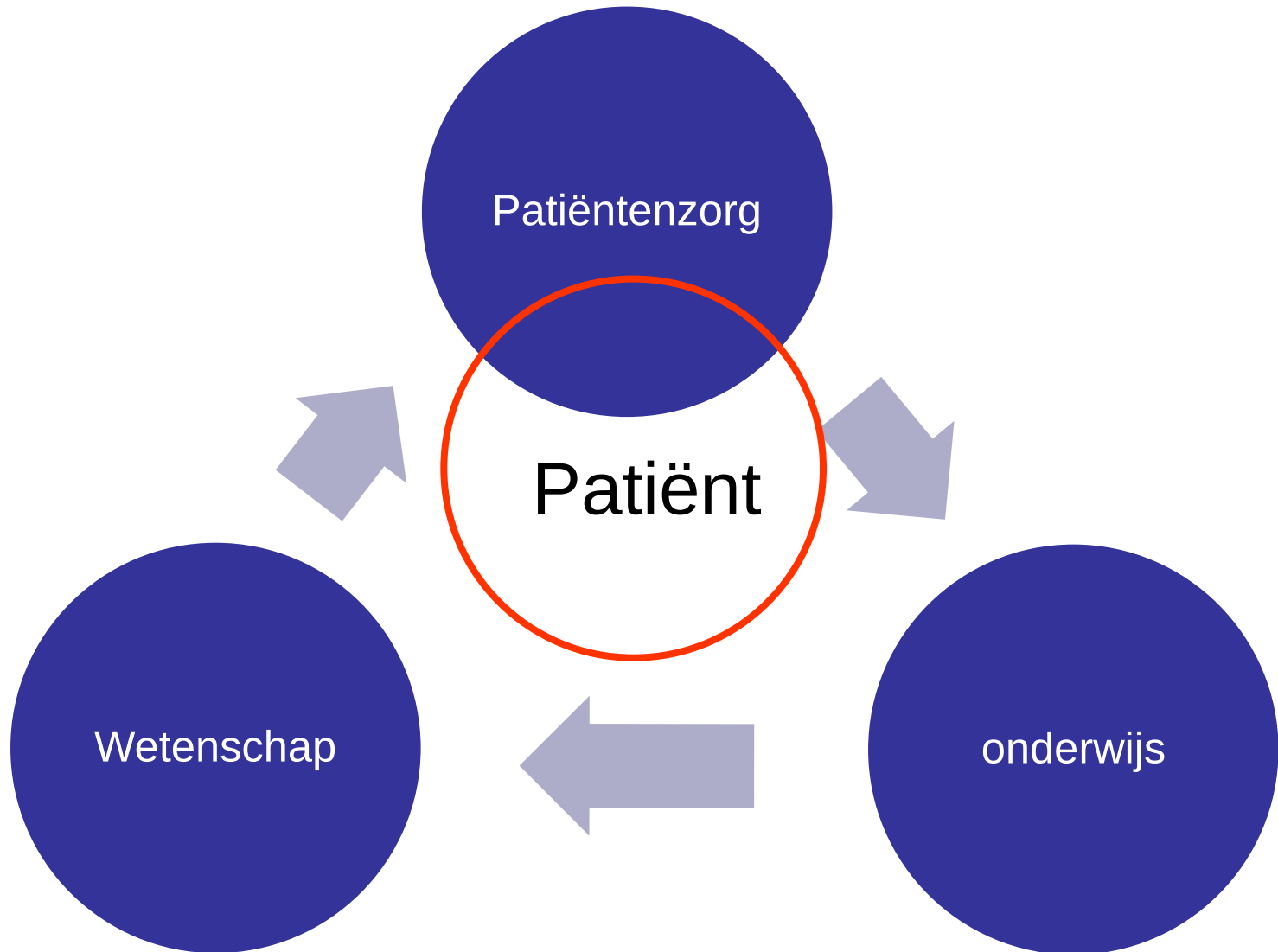
RECONSIDER

- Wie : COPD
- Hoe: Start NIV thuis versus ziekenhuis
Telemonitoring
- Doel: Thuis NIV starten
- Door wie: CTB UMCG (Duiverman/ Bladder)
- Subsidie : LONGFONDS/ PHILIPS

RECAPTURE

- Wie : COPD
- Hoe: NIV versus controle groep (RCT)
- Doel: Werkingmechanisme van NIV
- Door wie: UMCG / MUMC / ERASMUS / KOLN
- Subsidie : RESMED / TKI

Uitdagingen



Reconsider in COPD



3 months



PaCO₂
Long function
HRQoL
Costs



university of
groningen



University Medical Center Groningen

Who gets HMMV ?



COPD

- Stable
- After acute respiratory failure

Referral

- *1st visit*

- *Follow-up*

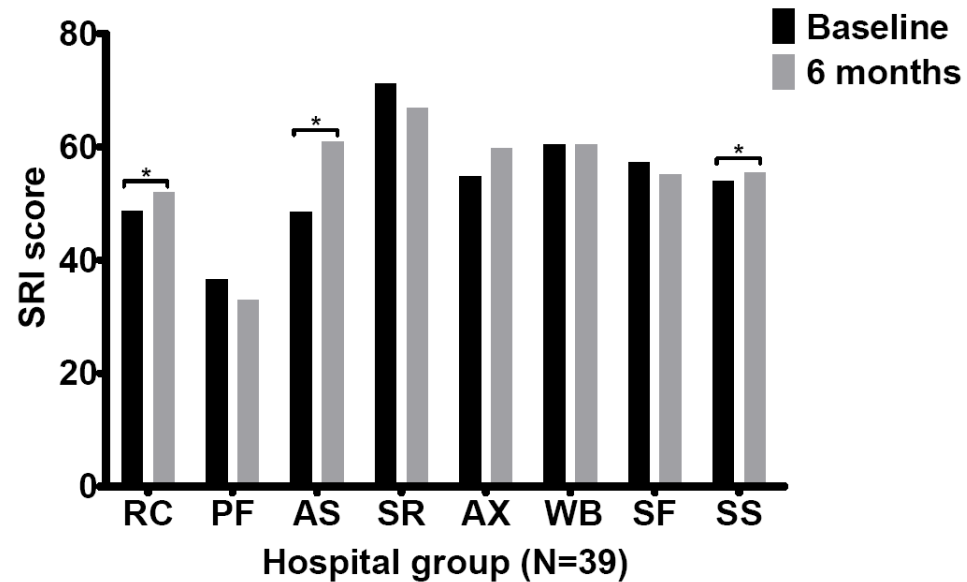
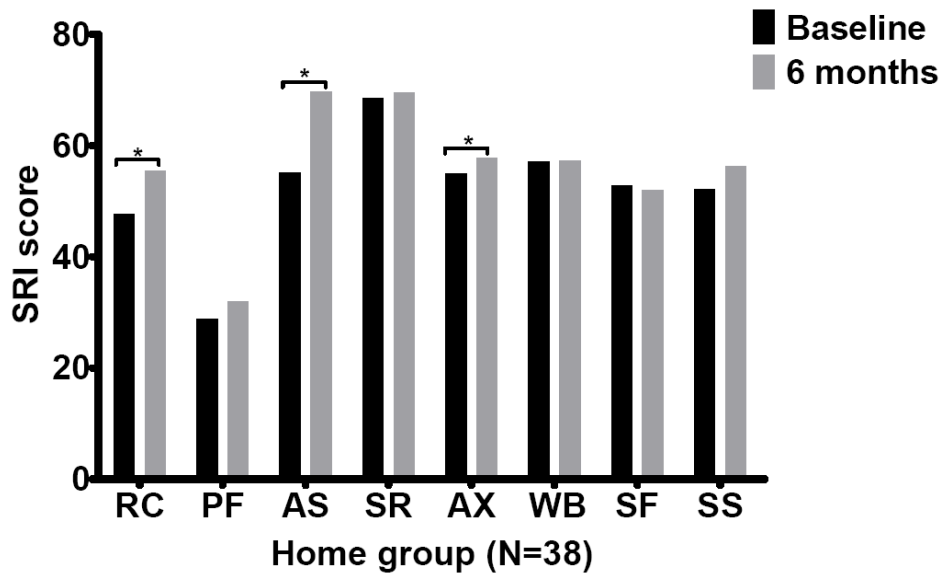
Where do we start HMOV?



Gasexchange

	Hospital (N=39)		Home (N=38)	
	T0	T3	T0	T3
pH	7,40	7,40	7,40	7,41
PaCO ₂ kPa	6,6	5,9*	6,6	5,7*
PaO ₂ kPa	9,5	10,3*	10,1	11,3*
SpO ₂ %	94	95*	95	96*
HCO ₃ mmol/l	30	27*	30	27*
BE mmol/l	4,6	2,1*	4,3	2,6*

Severe Respiratory Insufficiency



Costs per patient

	Hospital	Home
Admission	€ 3618	€ 268
Home visits	€ 198	€ 266
Travel costs	€ 97	€ 192
Tosca		€ 50
Total costs per patient	€ 3913	€ 776

€ 3137,-

Starting HMMV at Home

Veldnorm

Chronische beademering

Versie 1.0

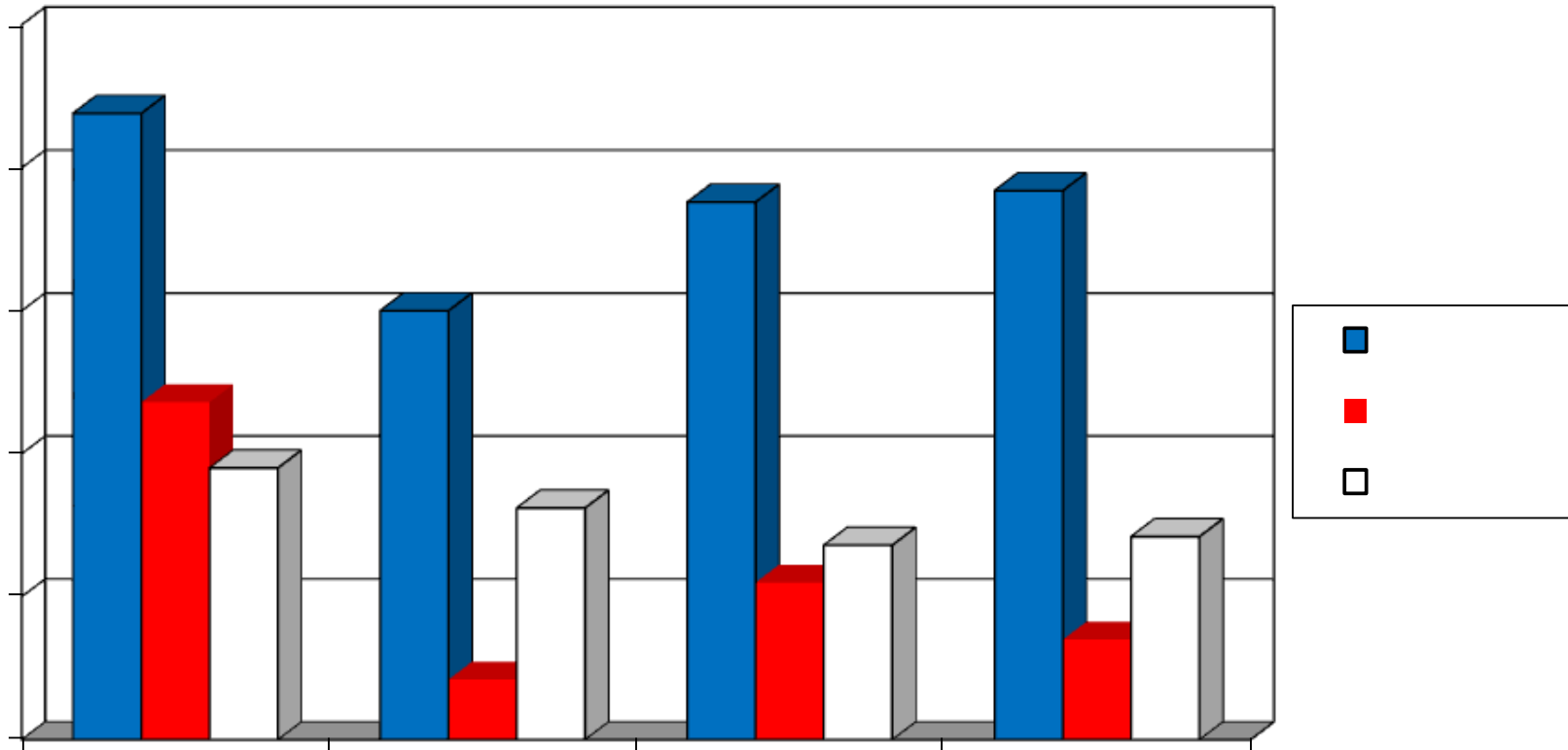
2012

Vereniging
Samenwerkingsverband
Chronische
Ademhalingsondersteuning

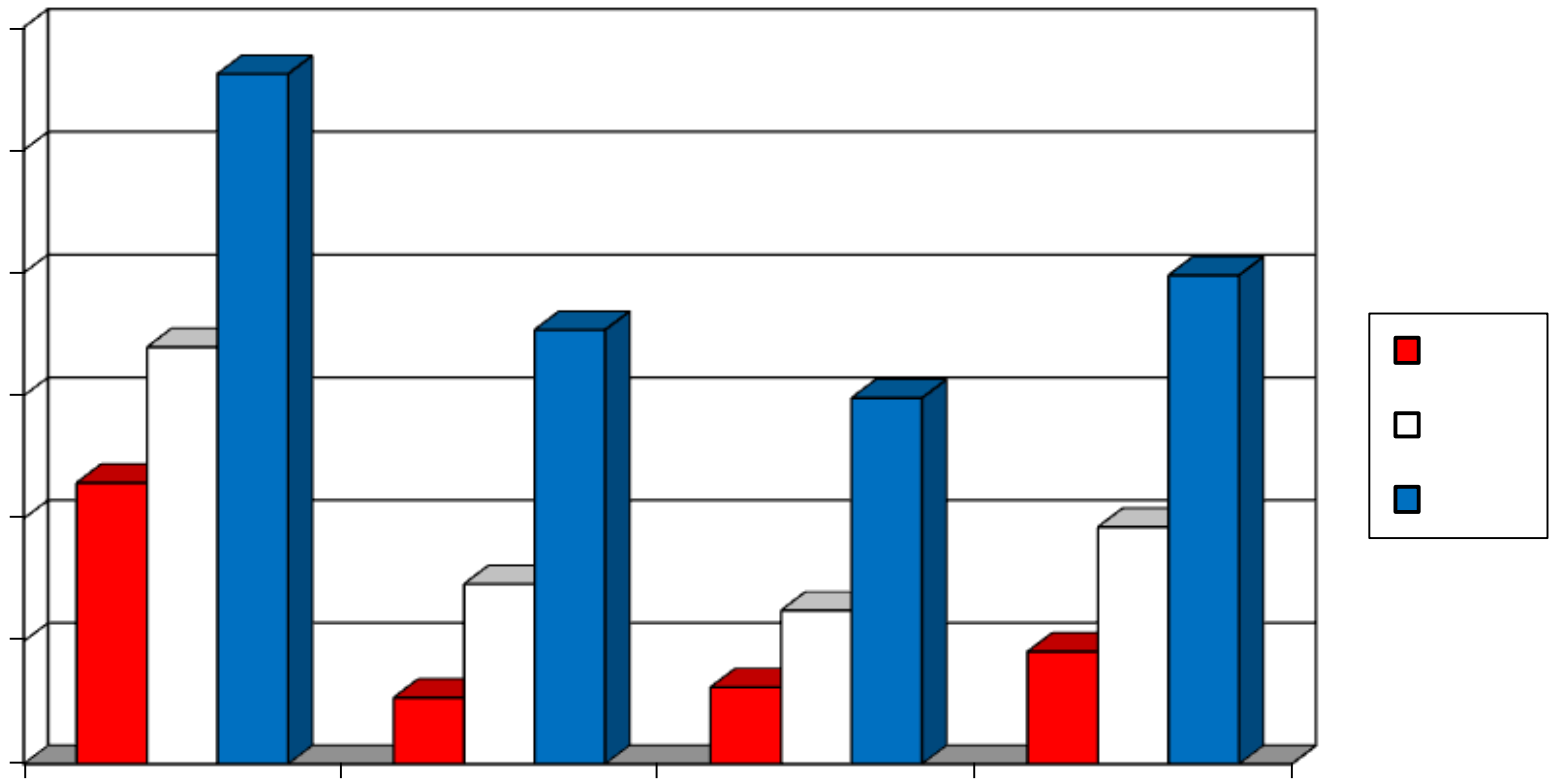


Dutch guideline 2012

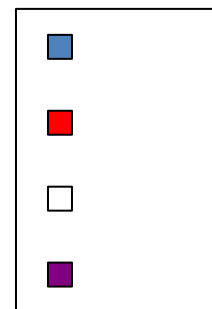
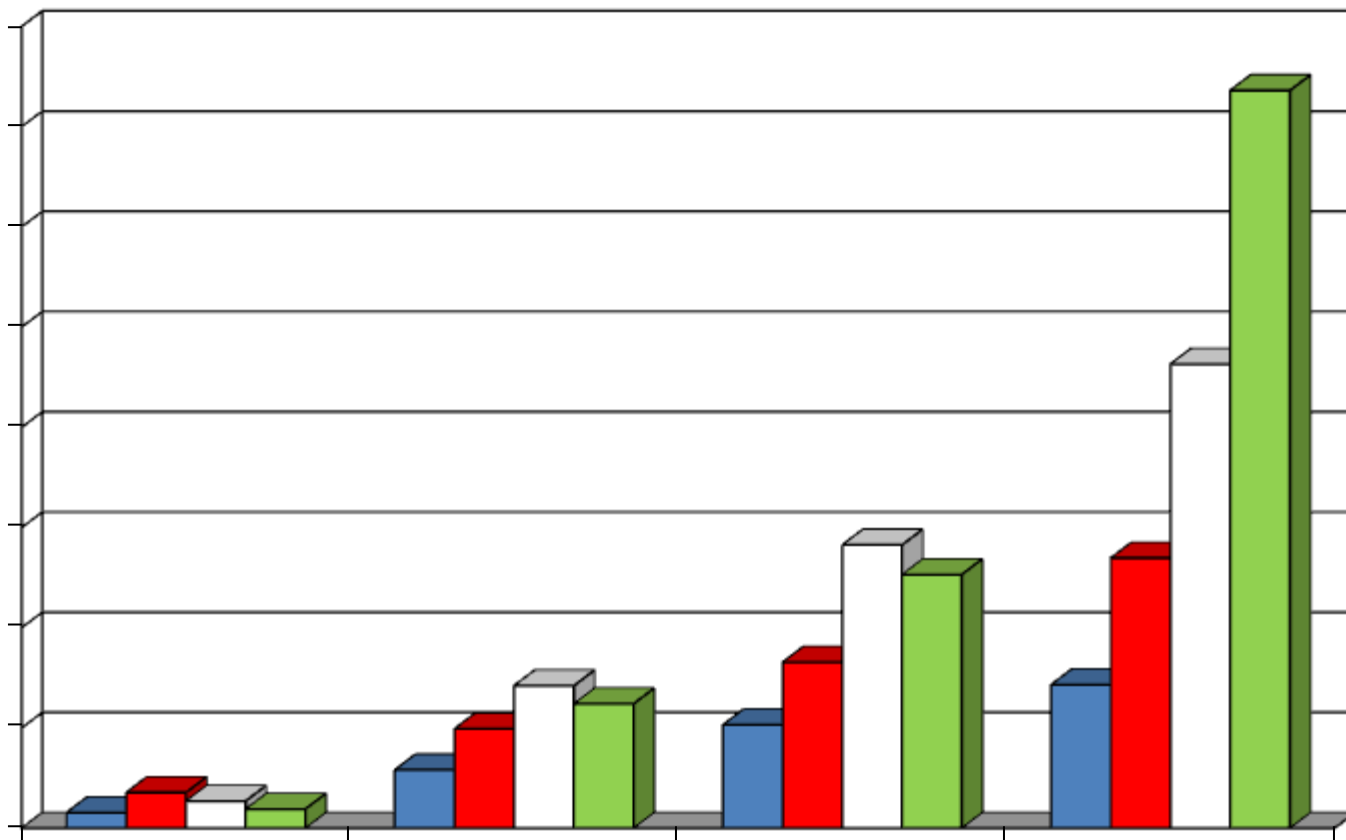
Growth per center in 2016



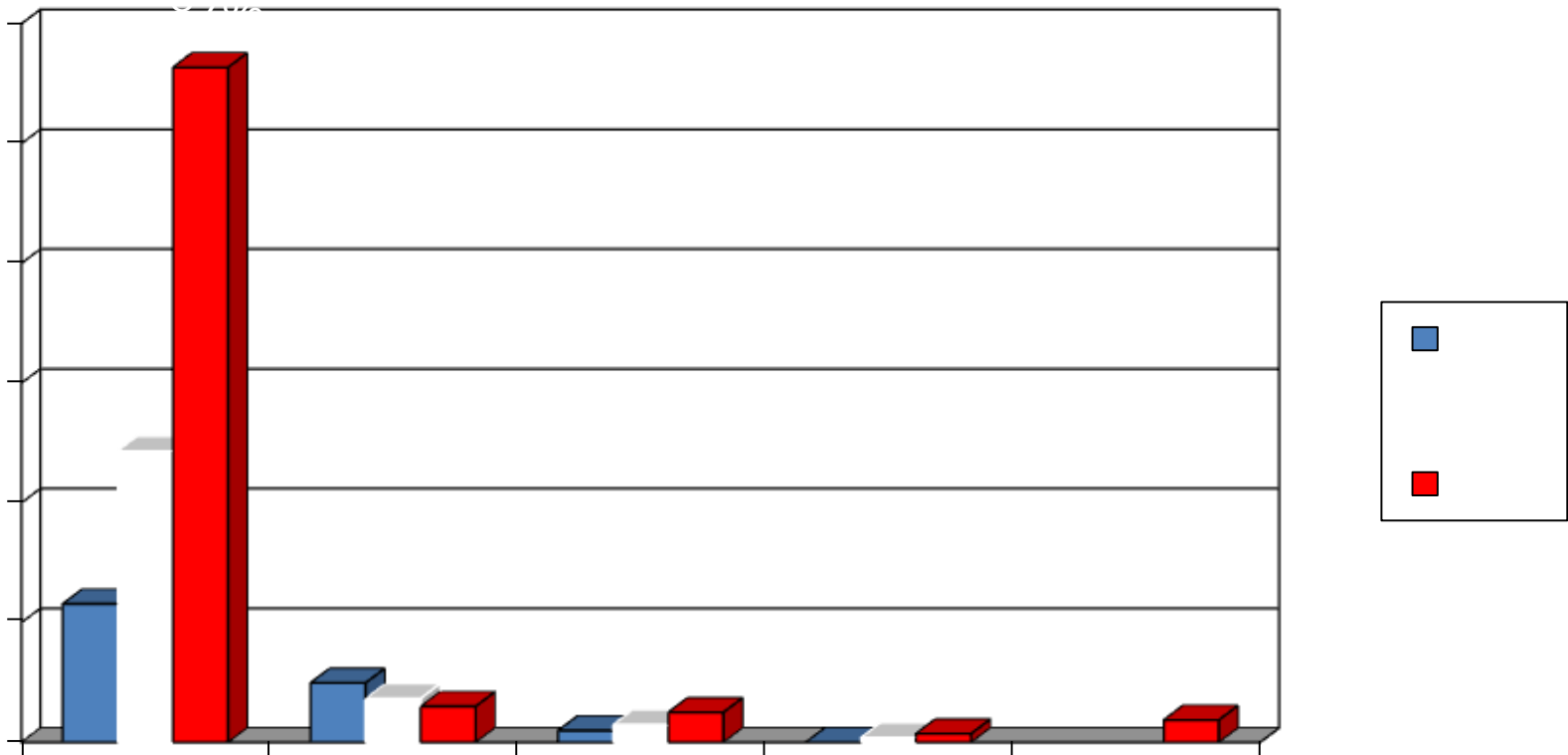
Total number of patients per center



Age



Where do they live?



Patient characteristics

(N=77)	
Age:	58 (19-80)
Male	45
female	32
Neuromuscular	68
Thoracic cage	9

Home mechanical ventilation

- How is it organised ?
- *Who receives it ?*



Home mechanical ventilation

- How is it organised ?
- Who receives it ?
- *Where*

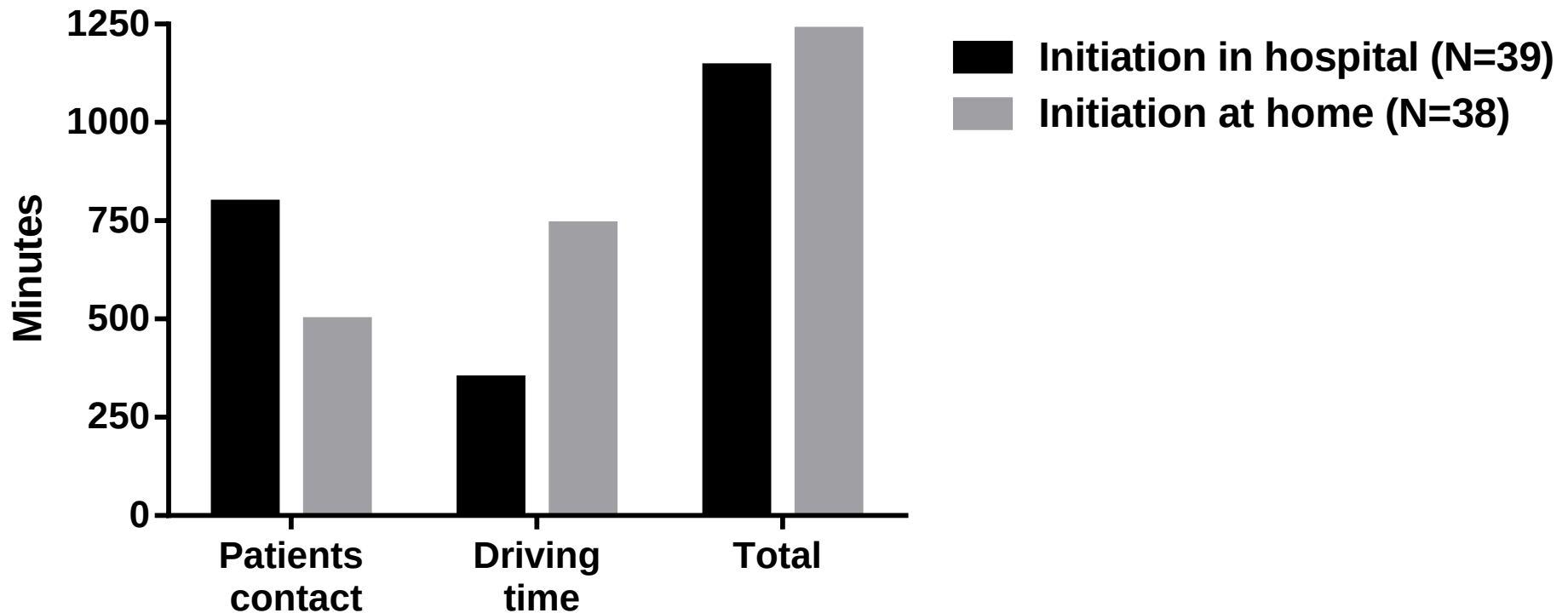


Conclusion

gasexchange quality of life
saves costs

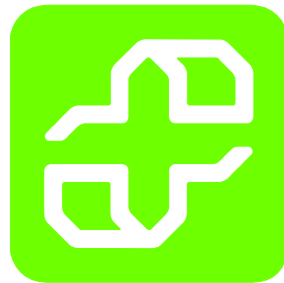
Hypothesis EOLUS

Time investment during 6 months





**SPIERZIEKTEN
NEDERLAND**



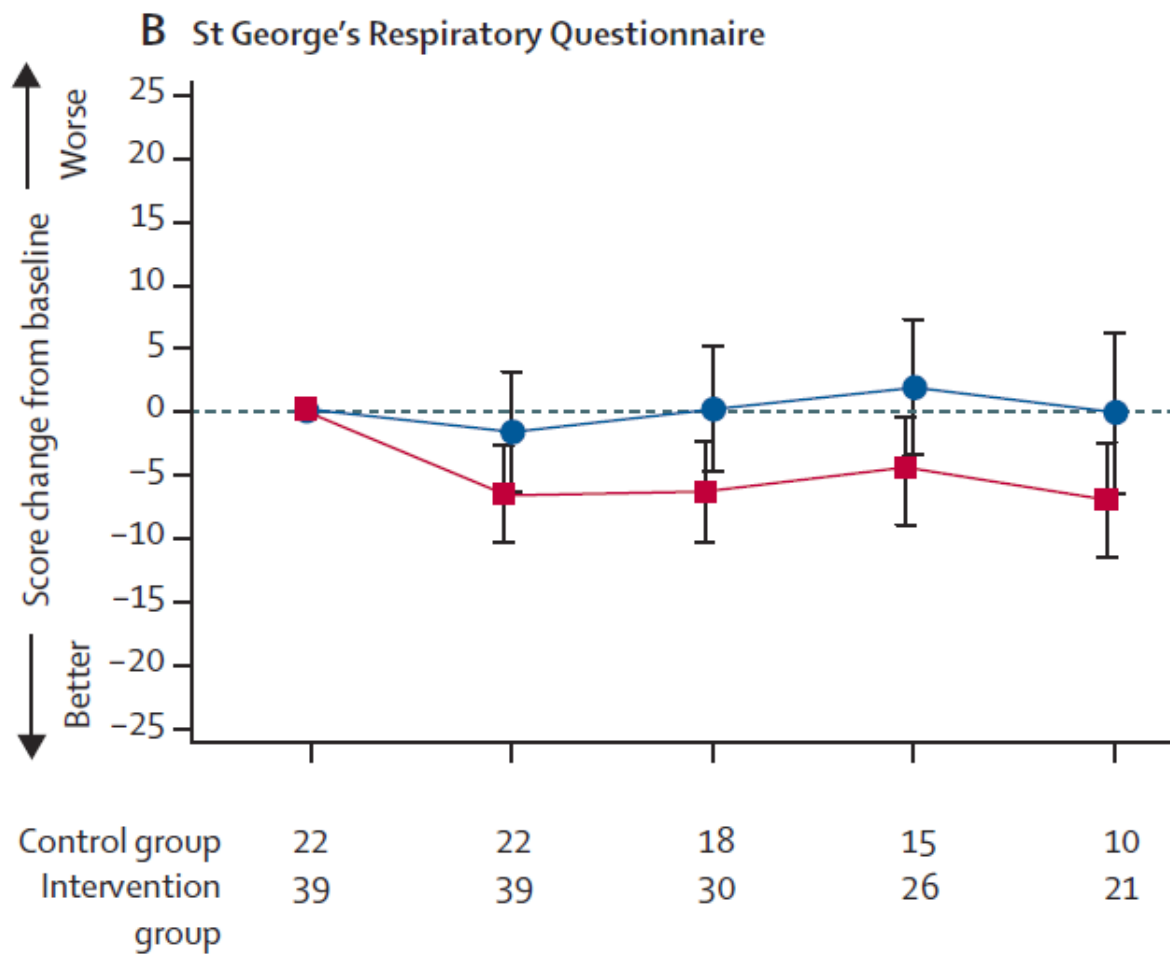
SOLGROUP

VIVISOL

Home Care Services

TNO innovation
for life

COPD and HMO



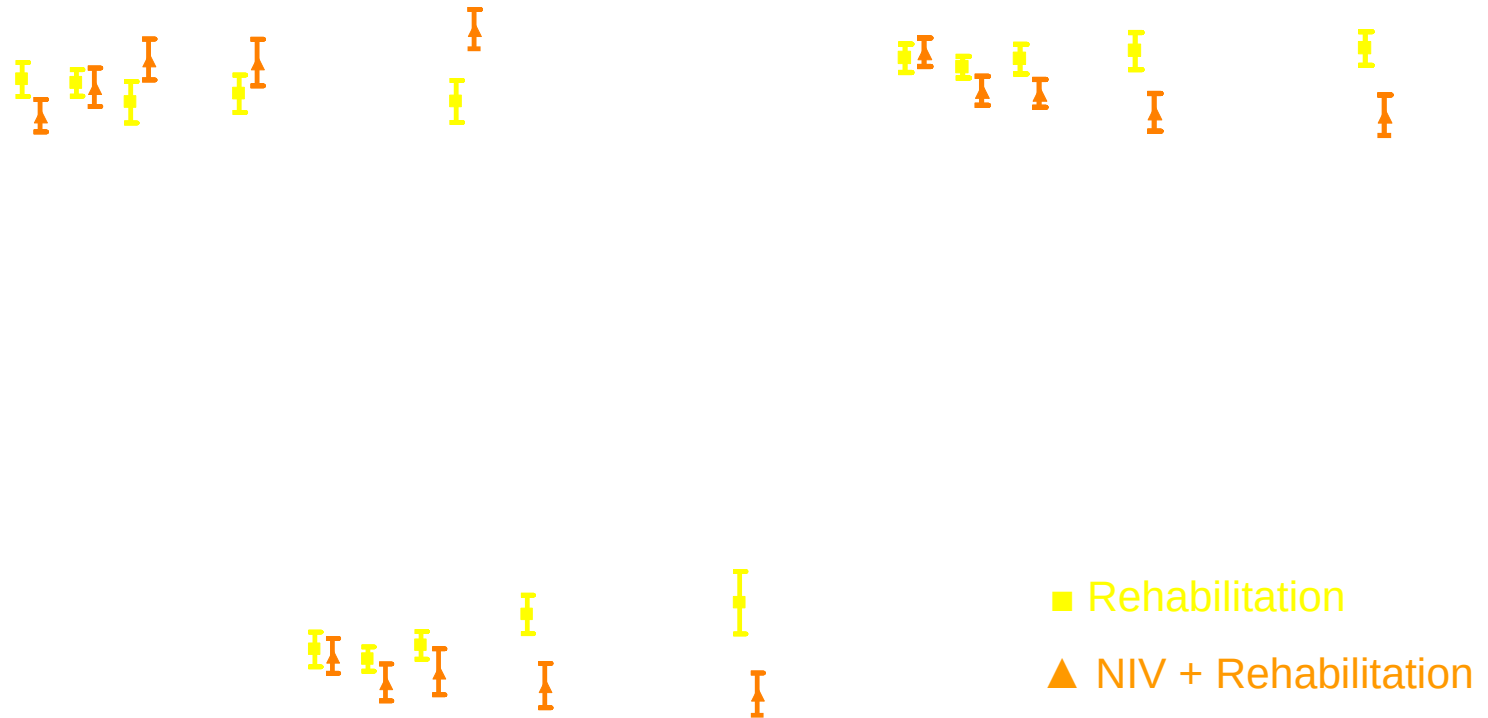


Rehabilitation + NIV

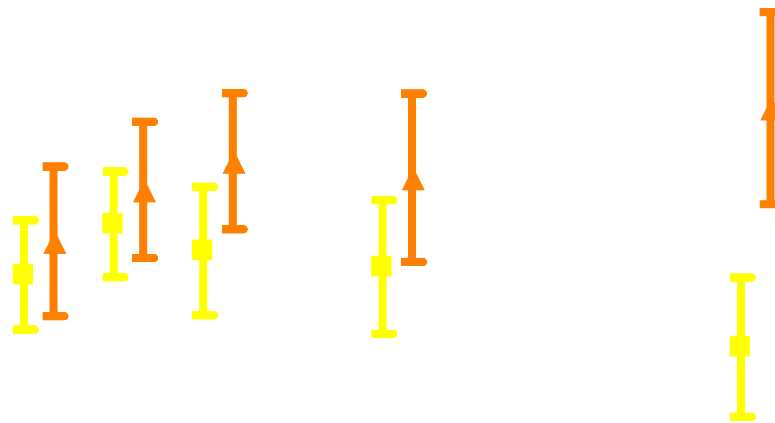


Rehabilitation

Arterial blood gasses (daytime)



6-minute walking distance

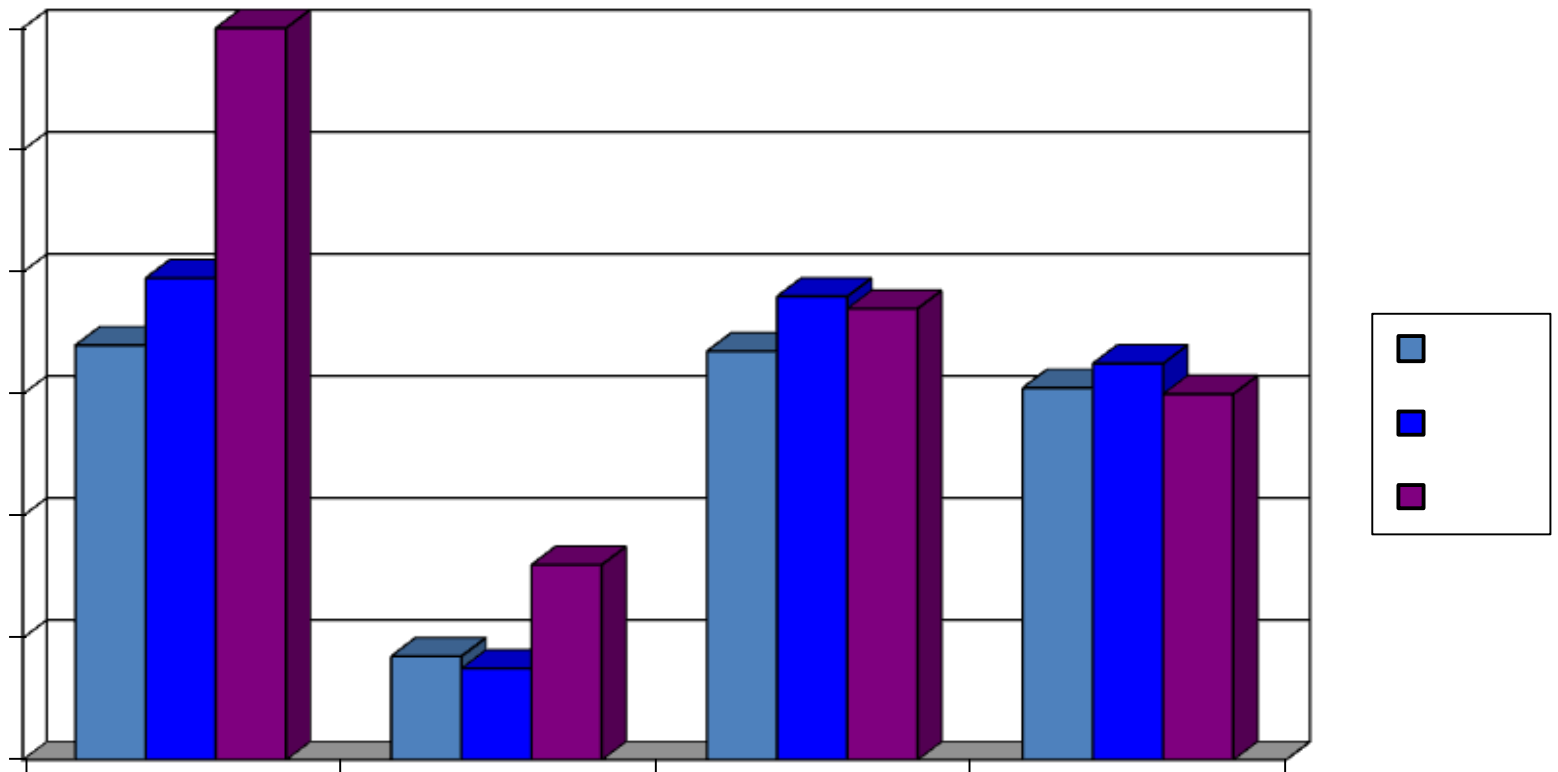


- Rehabilitation
- ▲ NIV + Rehabilitation

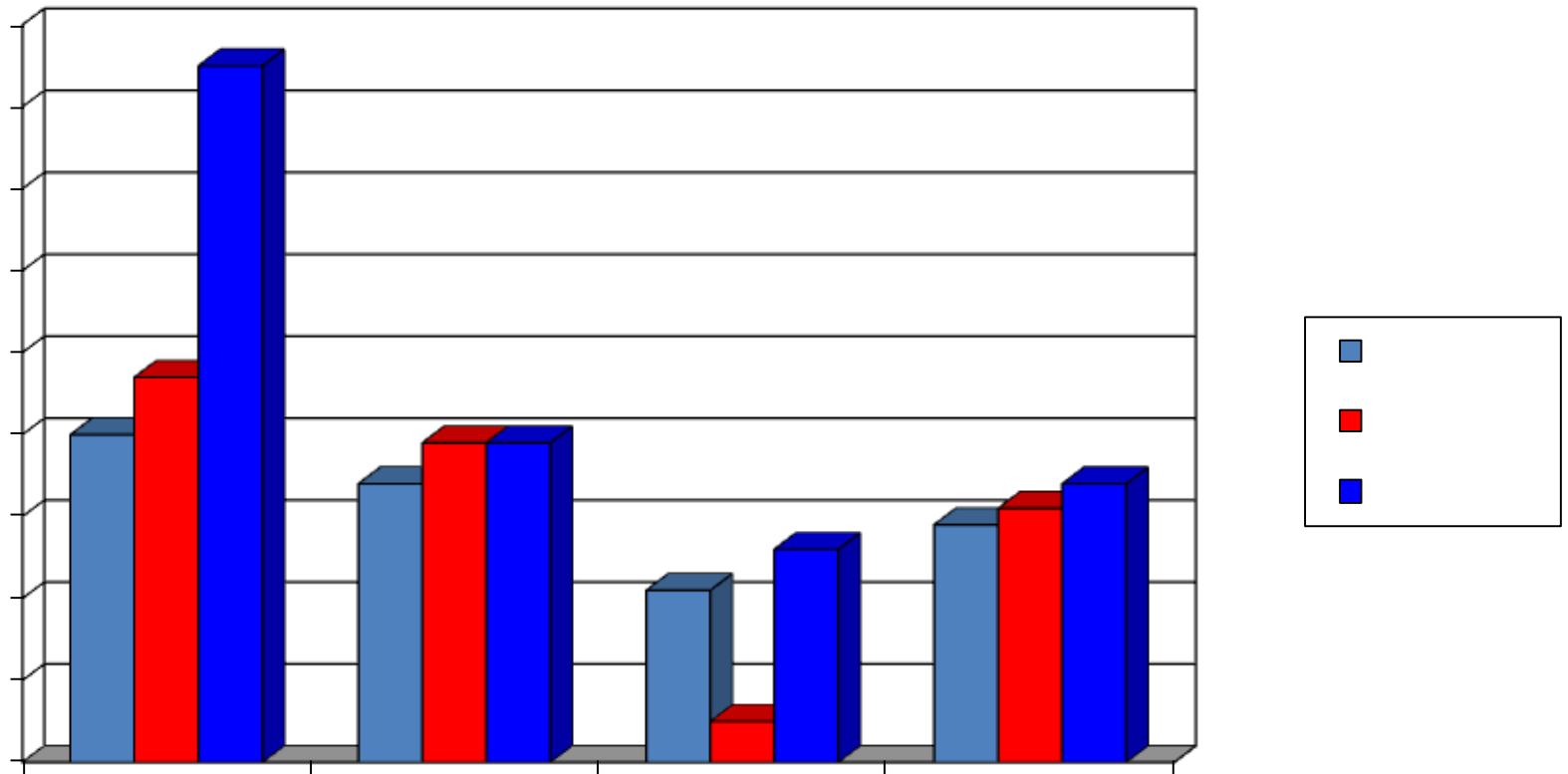
Out-of-Hospital ventilation

- *How*
- *Who*
- *Where*

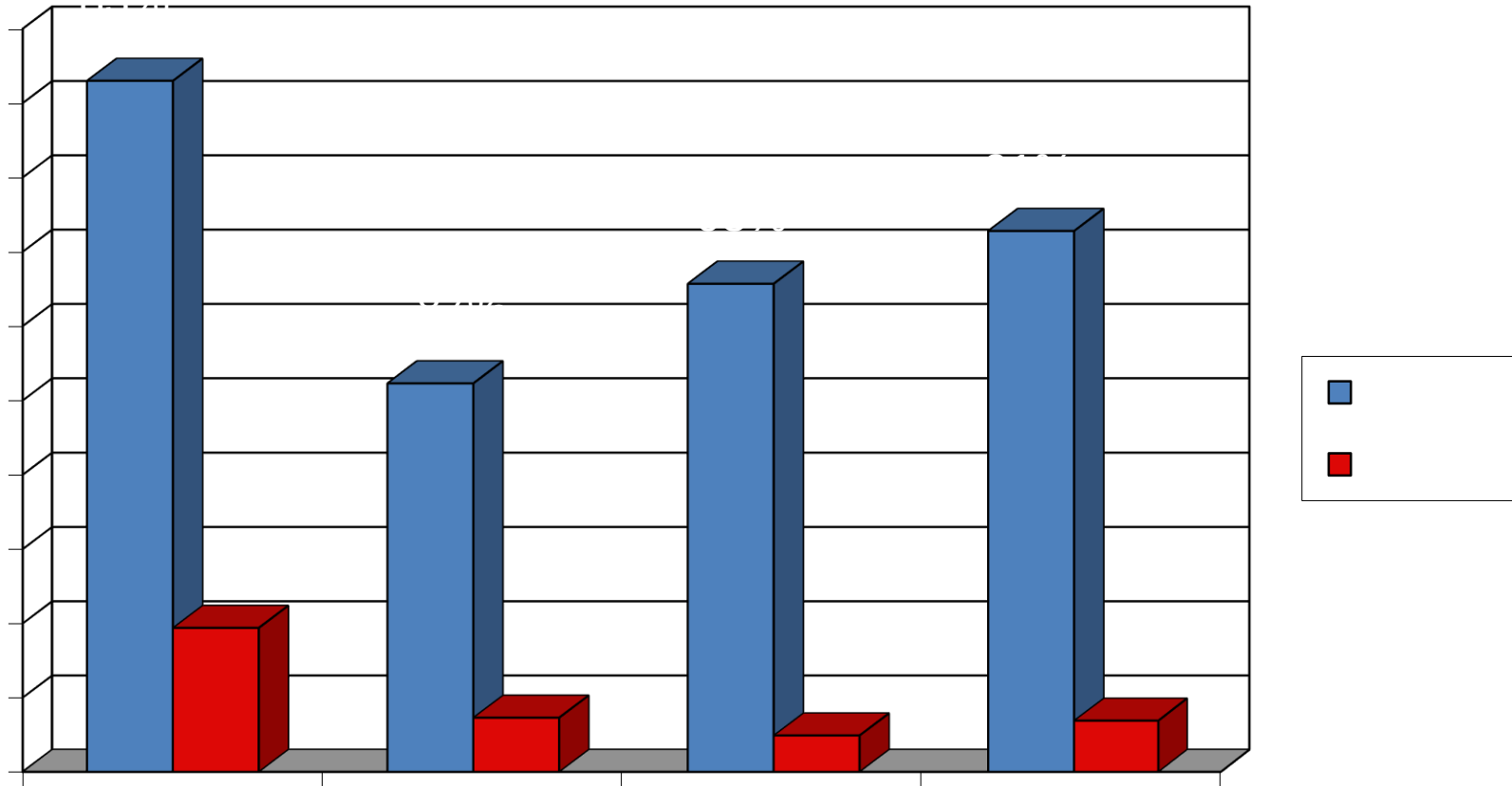
Aantal kinderen per centrum



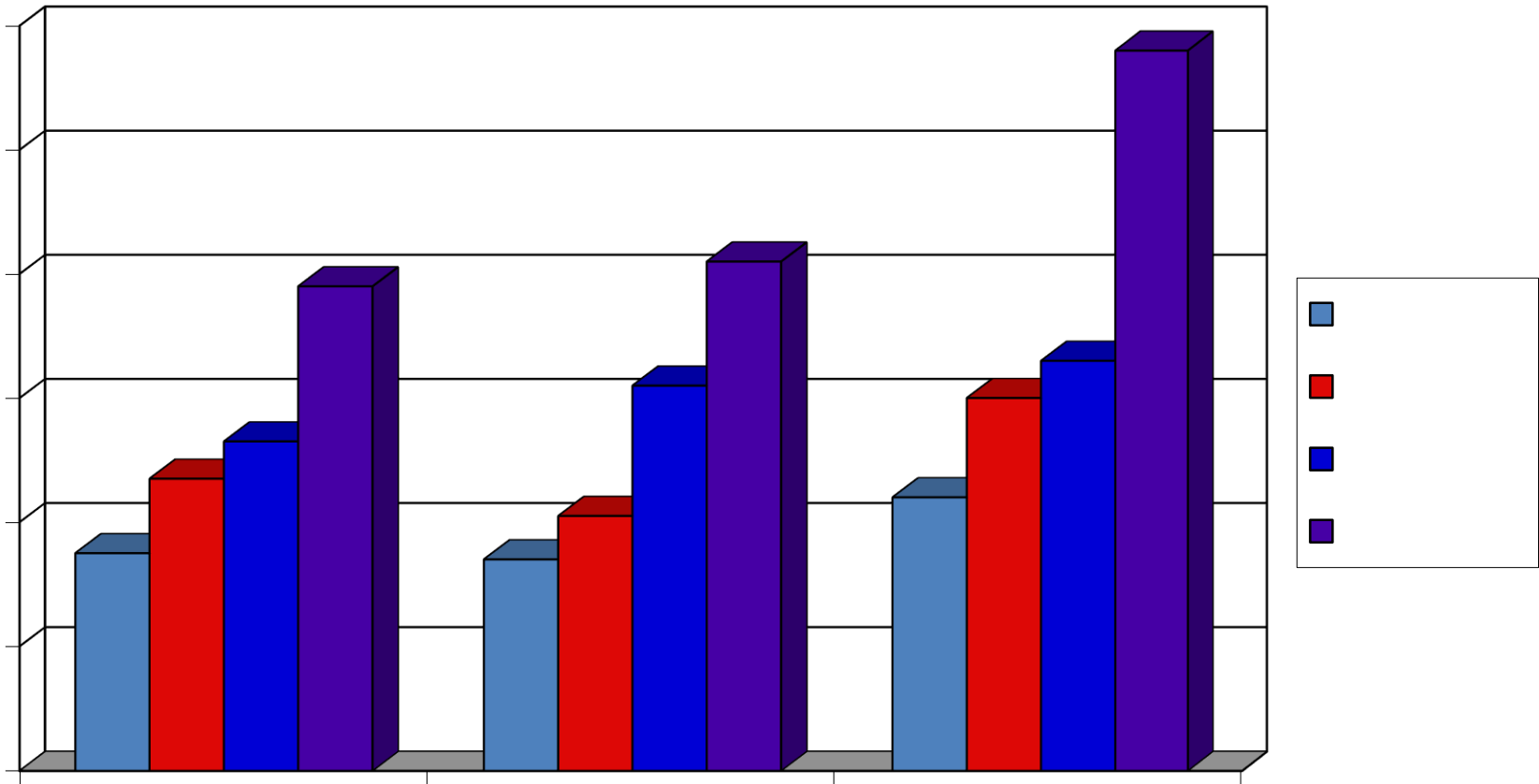
Groei ALS patiënten



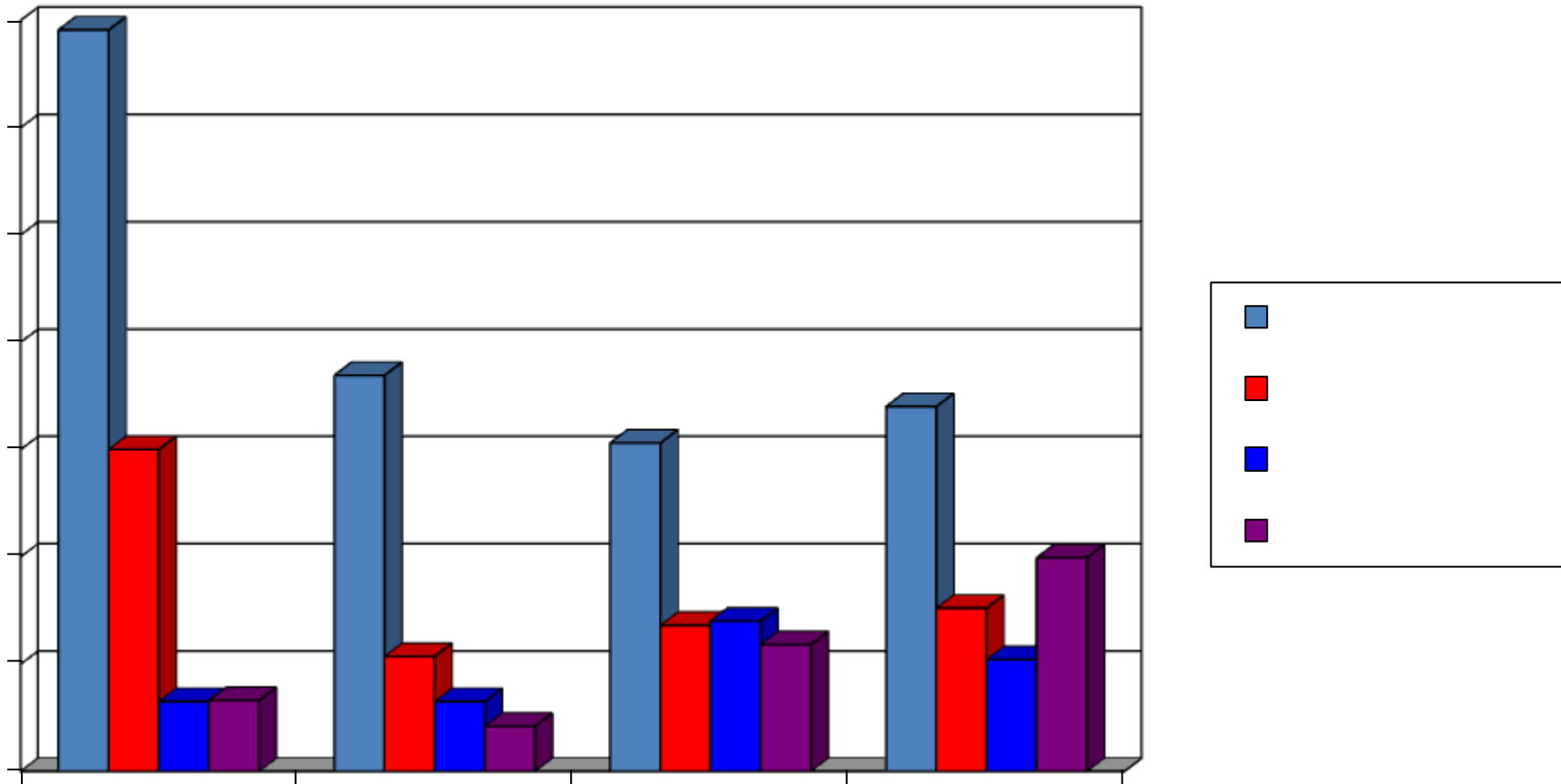
Type beademining anno 2017



Leeftijds opbouw kinderen



Verdeling per centrum



Inhoud presentatie

- Introductie
- EOLUS
- HOMERUN
 - Opzet
 - ZonMw
- Samenvatting

Waarom HOMERUN ?

Systematic review

Zoekterm:

- Neuromuscular disease OR
thoracic cage problem OR
obesity hypoventilation syndrome

AND

- Chronic ventilatory support OR home
mechanical ventilation OR non-
invasive ventilation

Systematic review

- Resultaat:
 - 1466 in Medline (PubMed)
 - 311 in Cochrane database
 - 35 in Health Economic Evaluation Database (HEED)

Systematic review

- Exclusie studies:
 - Acute setting
 - Populatie < 18 jaar
 - Oncologie
 - Klinisch
 - Invasief
 - COPD of Asthma
 - Cystic fibrose
 - Abstract of artikel niet in het Engels

Systematic review

- Wat bleef er over:
 - 9 studies met de volledige tekst is gelezen.
- Wat bleek:
 - EOLUS nog nooit eerder gedaan
- Daarom:
 - Verder onderzoek nodig

Projectleden HOMERUN

- **UMCG**
 - Peter Wijkstra, Anda Hazenberg, Huib Kerstjens, Gera Welker
- **MUMC**
 - Astrid Otten, Jef Broers
- **UMCU**
 - Michael Gaytant, Laura Verwey
- **ErasmusMC**
 - Marianne Zijnen, André Kroos

Hypothese HOMERUN

Instellen op chronische ademhalingsondersteuning in de thuissituatie bij een selecte groep patiënten is niet slechter dan het instellen in het ziekenhuis maar wel goedkoper.

Studiedesign

- Multicenter:
 - UMCG; ErasmusMC; MUMC; UMCU
- Gerandomiseerd:
 - 2 groepen van 48 (2 X12 per CTB)
- Non-inferiority:
 - PaCO₂ verschil < 0,5 kPA

Studiepopulatie

- Inclusie criteria:
 - Indicatie voor chronische thuisbeademing
- Exclusie criteria:
 - Al eerder beademing gehad
 - Jonger dan 18 jaar
 - Verblijf in een instelling
 - Inadequaat sociaal netwerk
 - Invasieve beademing

Uitkomst parameters

- Primair:
 - Arteriële bloedgas analyse overdag
- Secundair:
 - Kwaliteit van leven
 - Longfunctie
 - Transcutane registratie tijdens de nacht
 - Kosten

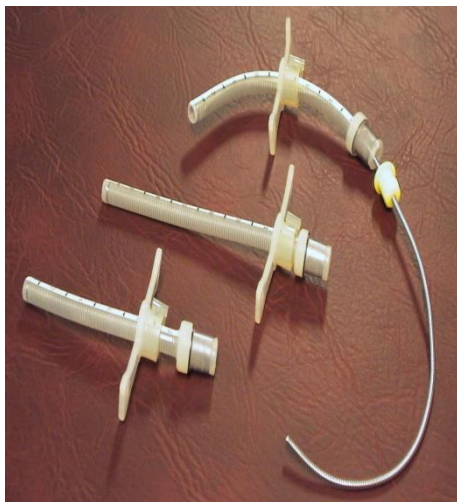
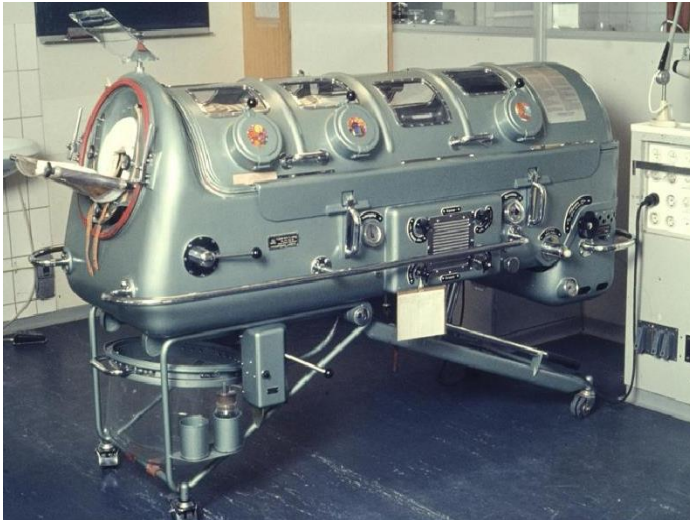
ZonMw

- Tijdsbalk

Samenvatting

- EOLUS laat zien dat het thuis kan
- HOMERUN is het vervolg
- ZonMw subsidie:
 - Start oktober 2014

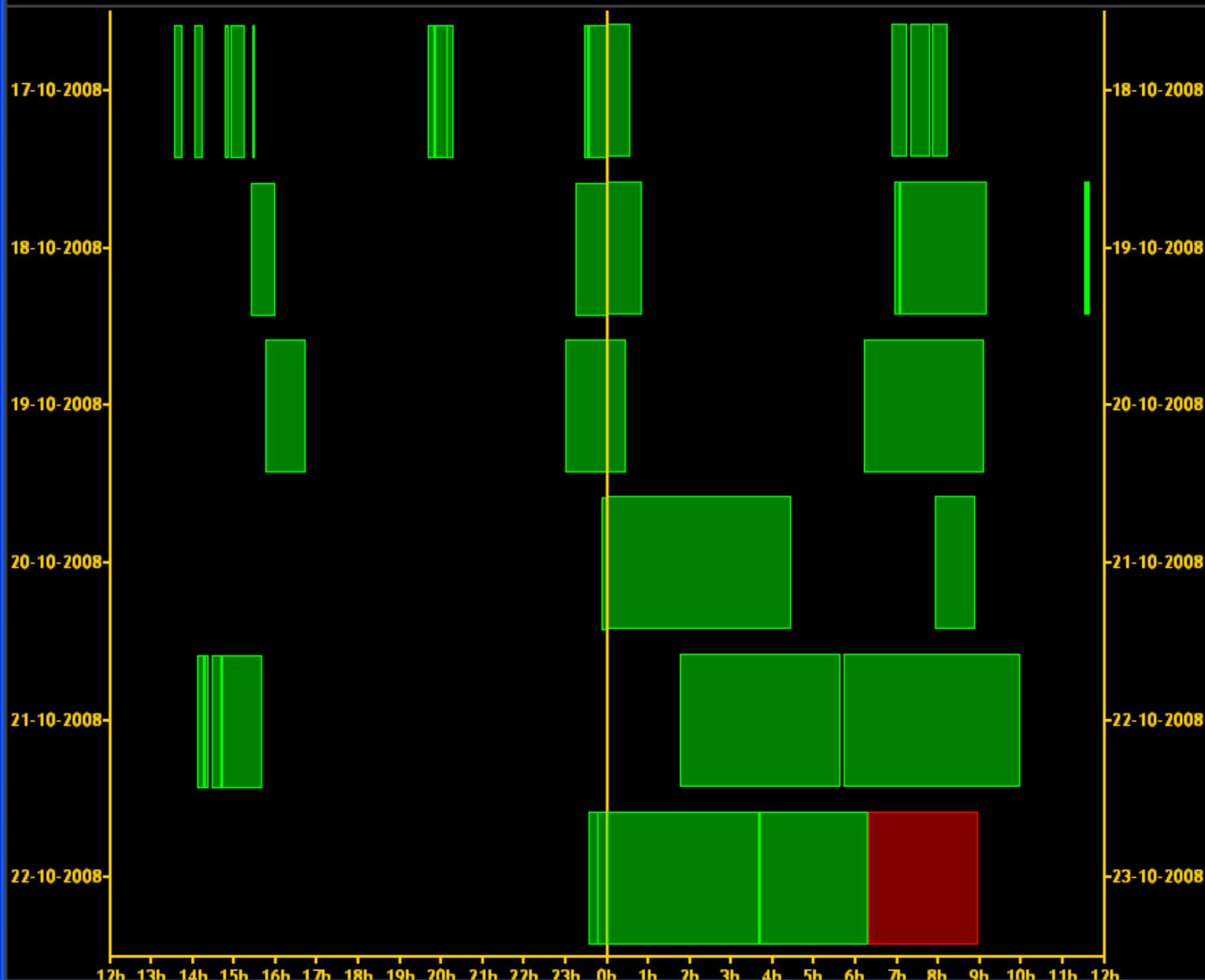
Types of chronic ventilatory support



Chronic ventilation in the Netherlands

- How is it organised ?
- Who gets it ?
- When and where do we start ?
- *How do we monitor it ?*

23-10-2008 -> 23-10-2008
6:17:54 8:55:54



DOWNLOAD

PRINT

DISPLAY

CURVES TYPE

FIT INTO SCREEN

HORIZ_SCALES

LOCK

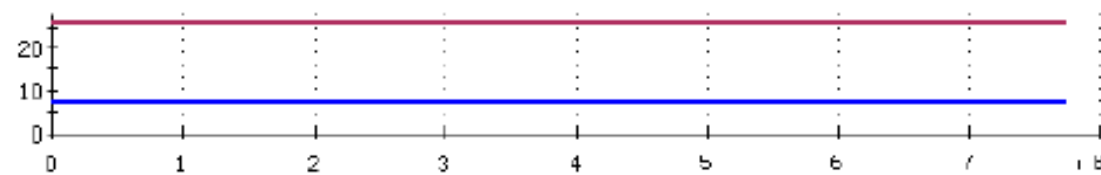
BACK

Ventilator Daily Details 9-11-2010 23:15:48

EPAP Pressure

IPAP Pressure

Pressure (cm H2O)



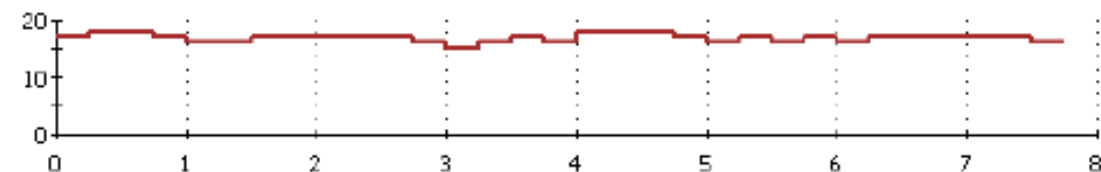
Avg. IPAP Pressure

26,0

Avg. EPAP Pressure

7,0

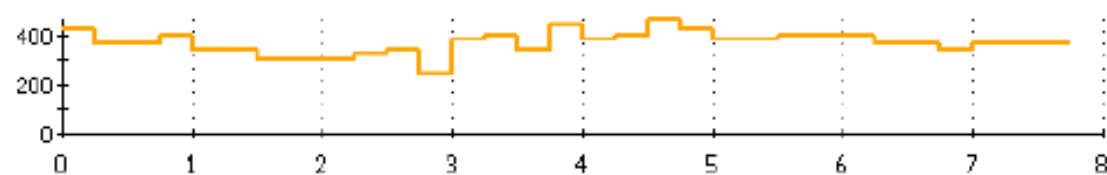
Breaths Per Minute



Avg. Breaths Per Minute

16,8

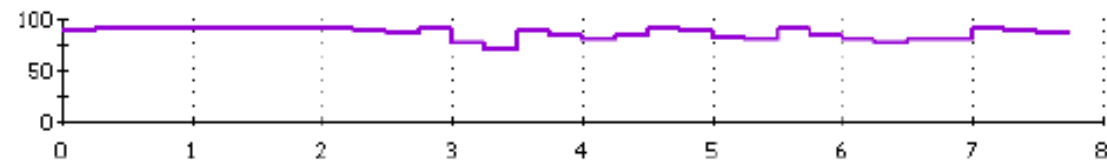
Tidal Volume (ml)



Avg. Tidal Volume

365,8

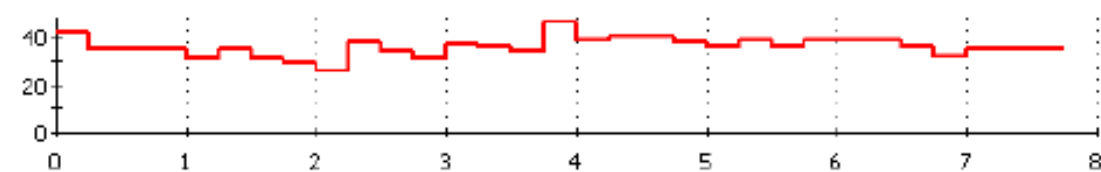
Patient Triggered Breaths (%)



Avg. Patient Triggered Breaths

85,5

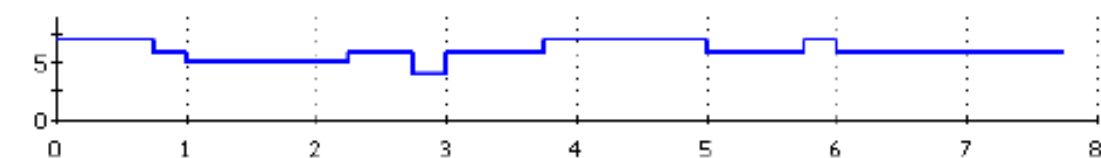
Peak Flow (liters/minute)



Avg. Peak Flow

35,9

Minute Vent



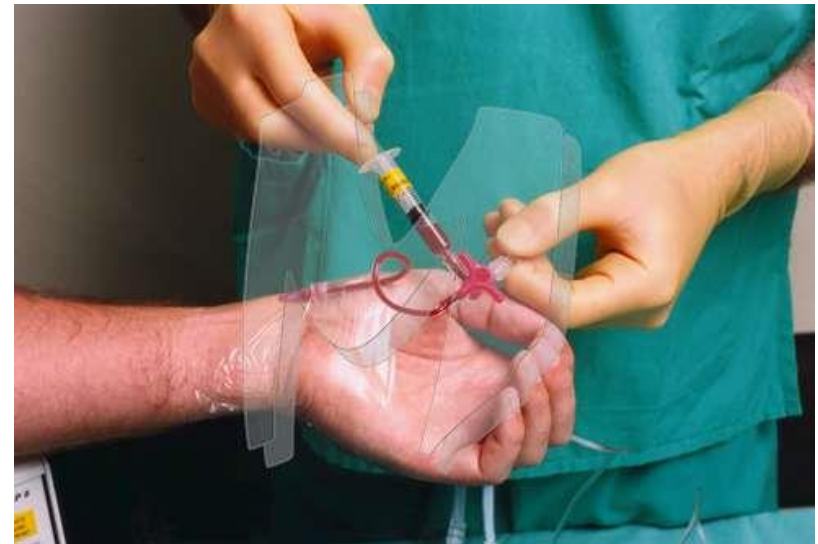
Avg. Minute Vent

6,1

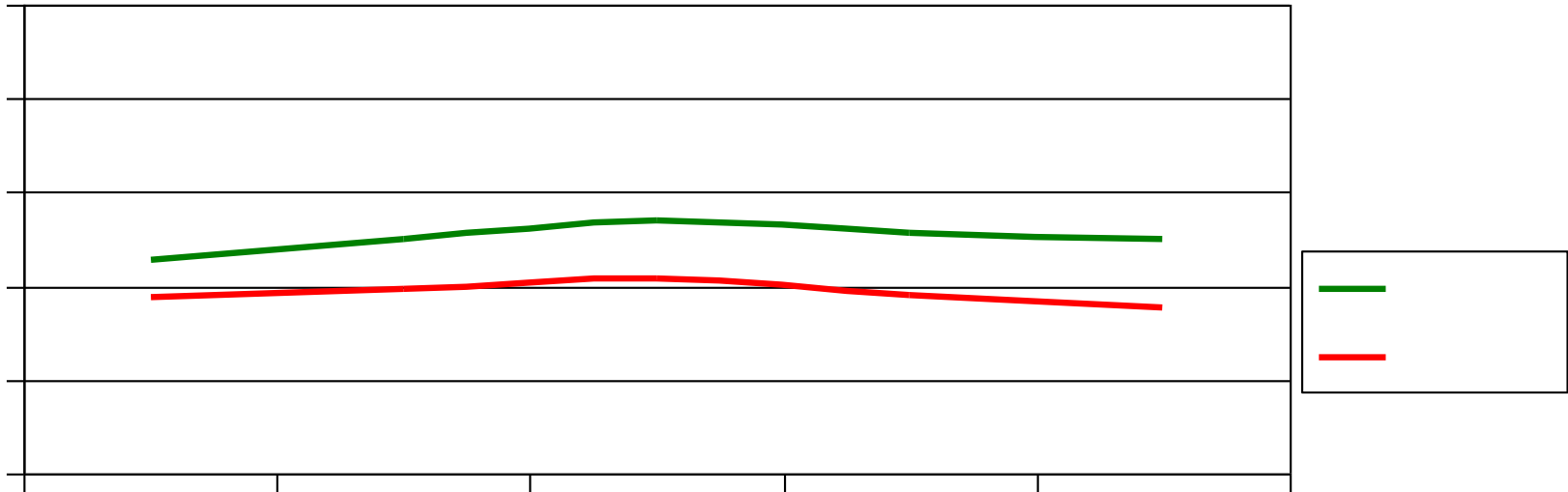
Nocturnal bloodgas registration

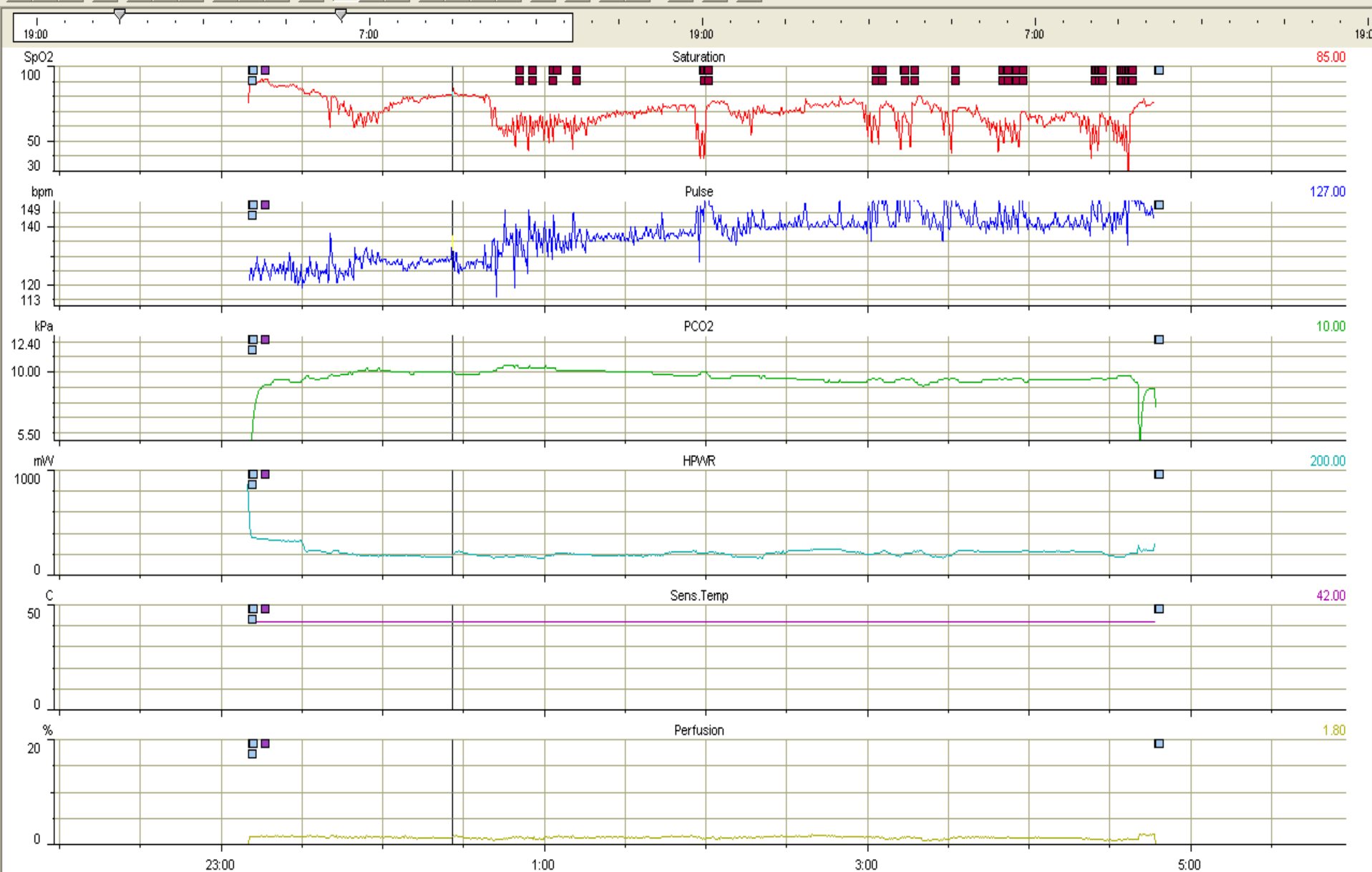
		14-11-2010 23:24	15-11-2010 01:13	15-11-2010 02:38	15-11-2010 03:45	15-11-2010 04:46	15-11-2010 06:18	15-11-2010 06:41
Lich.Temp	C							
Art.pH								
Art.pCO2	kPa							
Art.pO2	kPa							
Art.SATO2								
Art.HCO3	mmol/l							
Art. ABE	mmol/l							
Li.Temp.POCT	C	--	--	--	--	--	--	--
Art.pH POCT		7.38	7.38	7.38	7.34 	7.35	7.39	7.37
Art.pCO2POCT	kPa	7.3 	7.1 	6.1 	7.5 	7.5 	4.7	6.9 
Art.pO2 POCT	kPa	9.6	13.4	14.2 	10.7	8.8 	12.1	11.4
Art.SAT.POCT		0.95 	0.98	0.98	0.96	0.93 	0.98	0.97
Art.HCO3POCT	mmol/l	32 	30 	26 	30 	30 	21	29 
Art.ABE POCT	mmol/l	5.90 	4.60 	1.20	3.30 	3.90 	-3.50 	3.60 

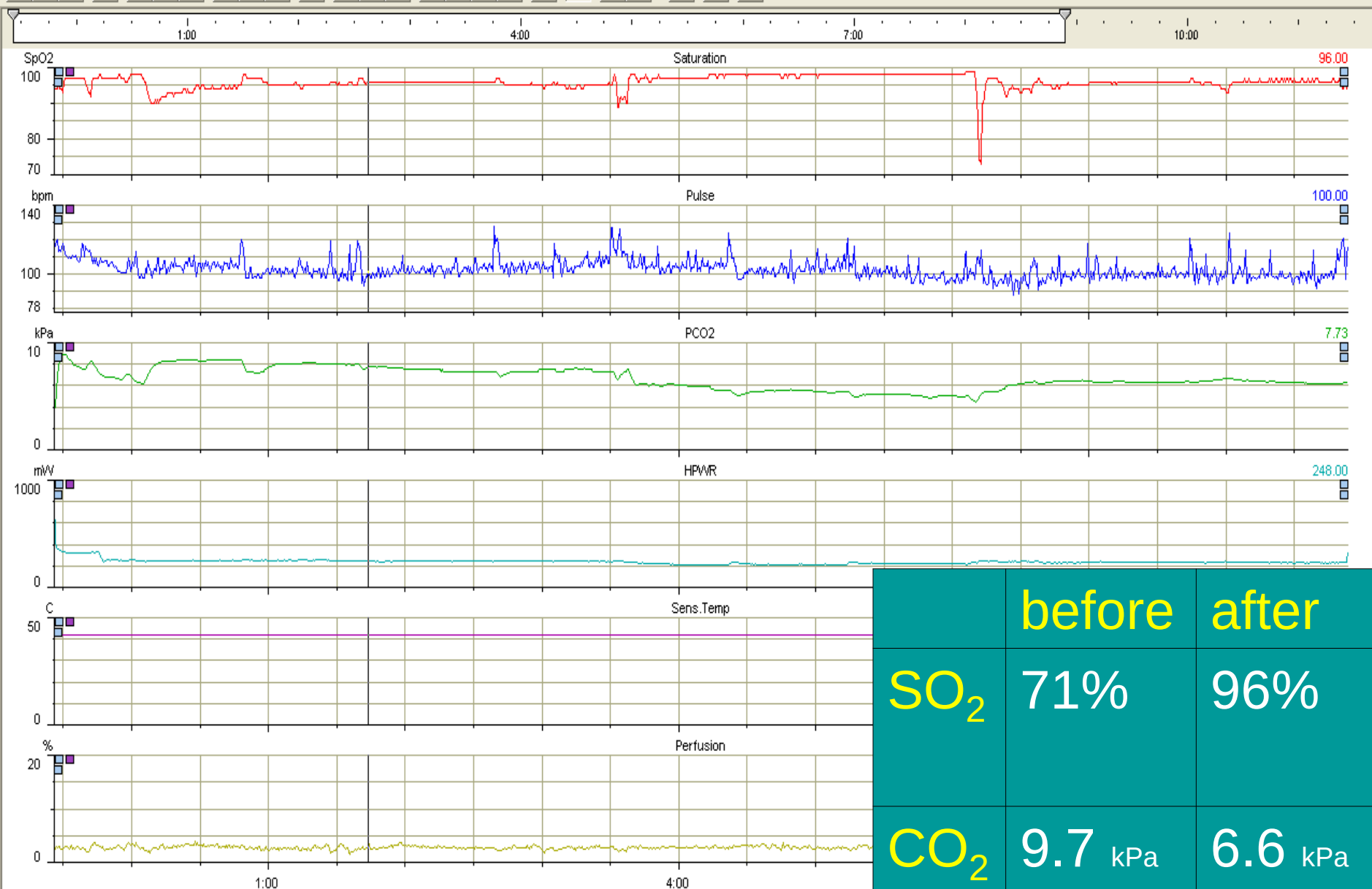
TOSCA validity study



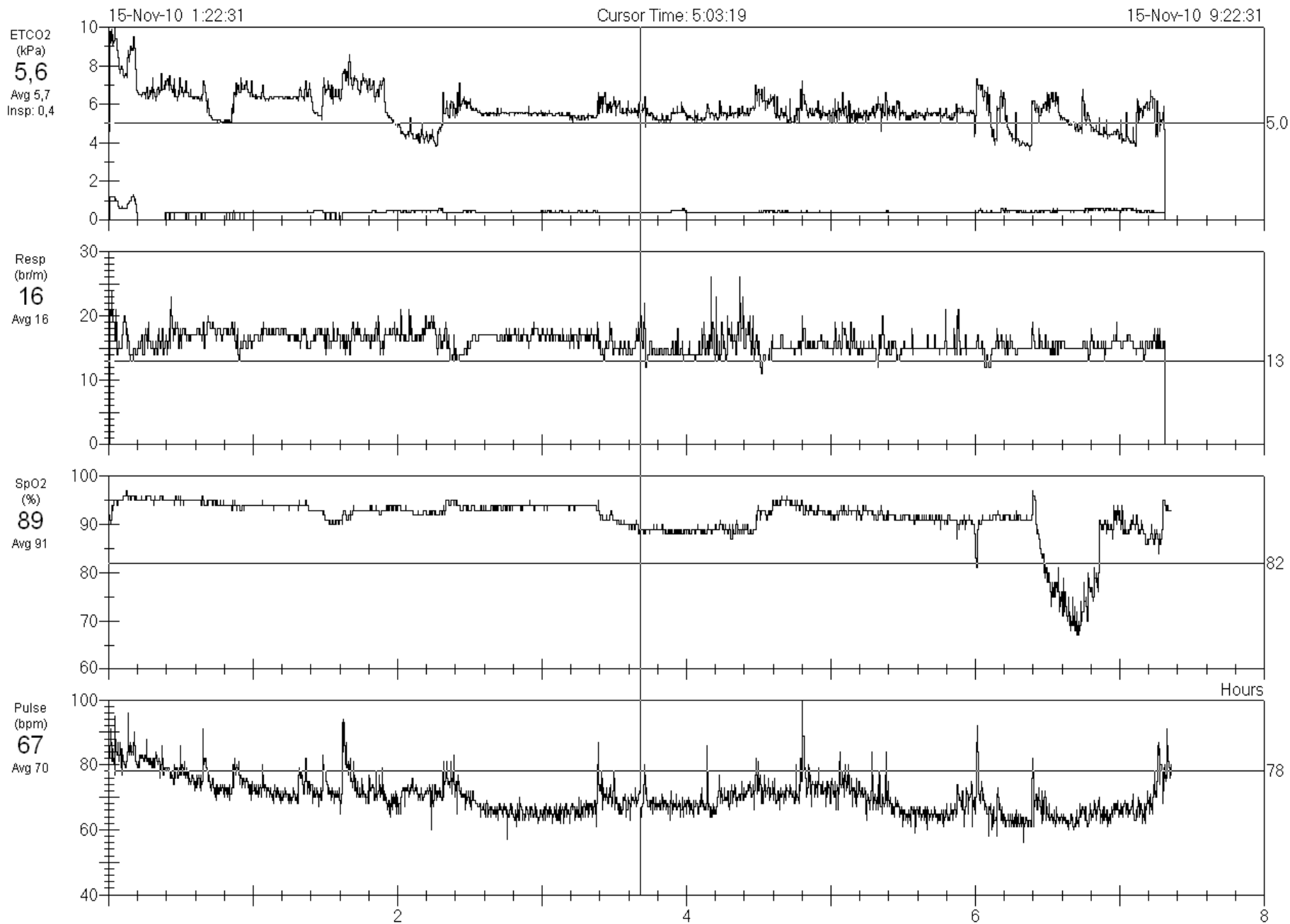
PtCO₂ versus PaCO₂







	before	after
SO ₂	71%	96%
CO ₂	9.7 kPa	6.6 kPa

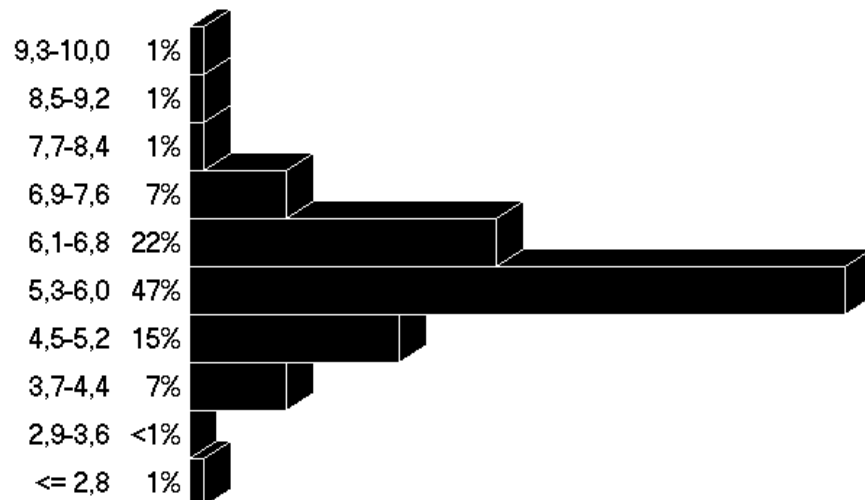


Start time: 15-Nov-10 1:22:31

Total Elapsed Time: 07:21:36

Total Non-monitored Time: 00:00:08

ETCO2 (kPa)



Min=0,0 Max=10,0 Avg=5,7

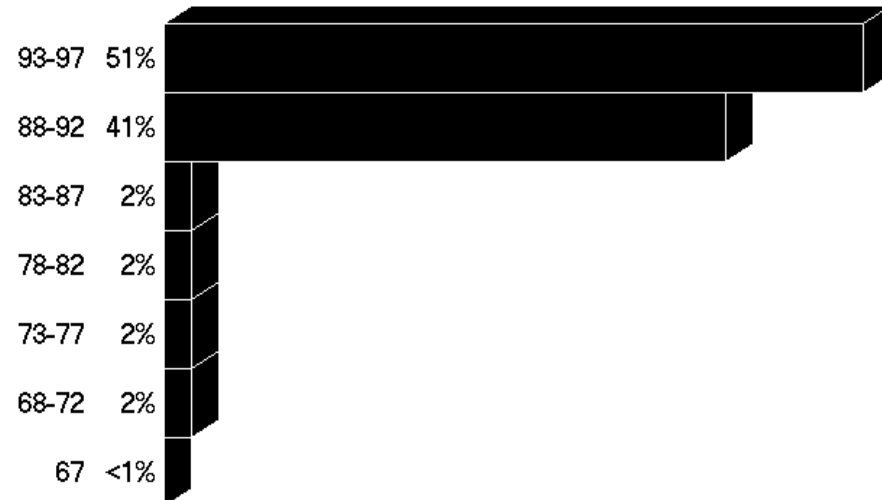
Resp (br/m)



Min=0 Max=26 Avg=16

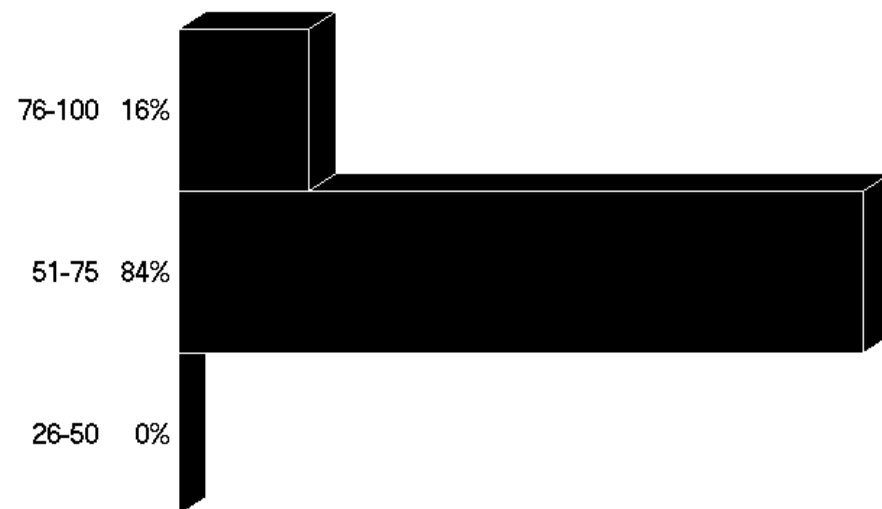
Total Non-monitored Time: 00:00:24

SpO2 (%)



Min=67 Max=97 Avg=91

Pulse (bpm)



Min=56 Max=100 Avg=70





April 2010

		Pred	Pre	% Pred	Post	% Pred
Datum test			130410		130410	
Time			10:17		10:21	
Baro. pressure			1022		1022	
Temperatuur			20		20	
VC IN	[L]	4.40	2.94	67 %	2.65	60 %
FVC	[L]	4.23	2.90	69 %		
FEV 1	[L]	3.35	2.16	64 %		
FEV1 % VC-IN	[%]	76.77	73.27	95 %		
FEV1 % FVC	[%]		74.30			

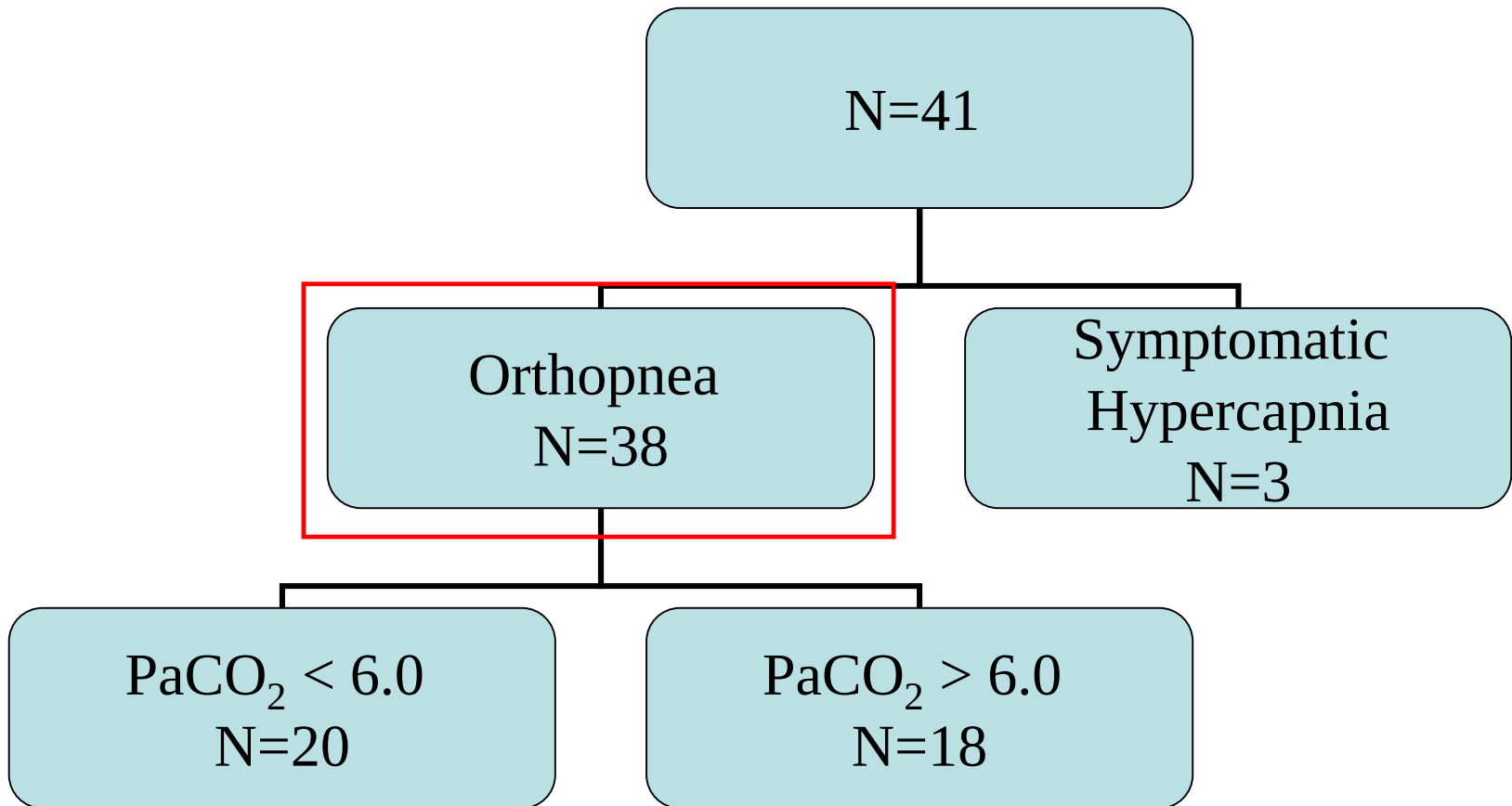
Art.pH POCT		7.41
Art.pCO2POCT	kPa	5.2
Art.pO2 POCT	kPa	10.1
Art.SAT.POCT		0.95 
Art.HCO3POCT	mmol/l	24
Art.ABE POCT	mmol/l	0.40

October 2010

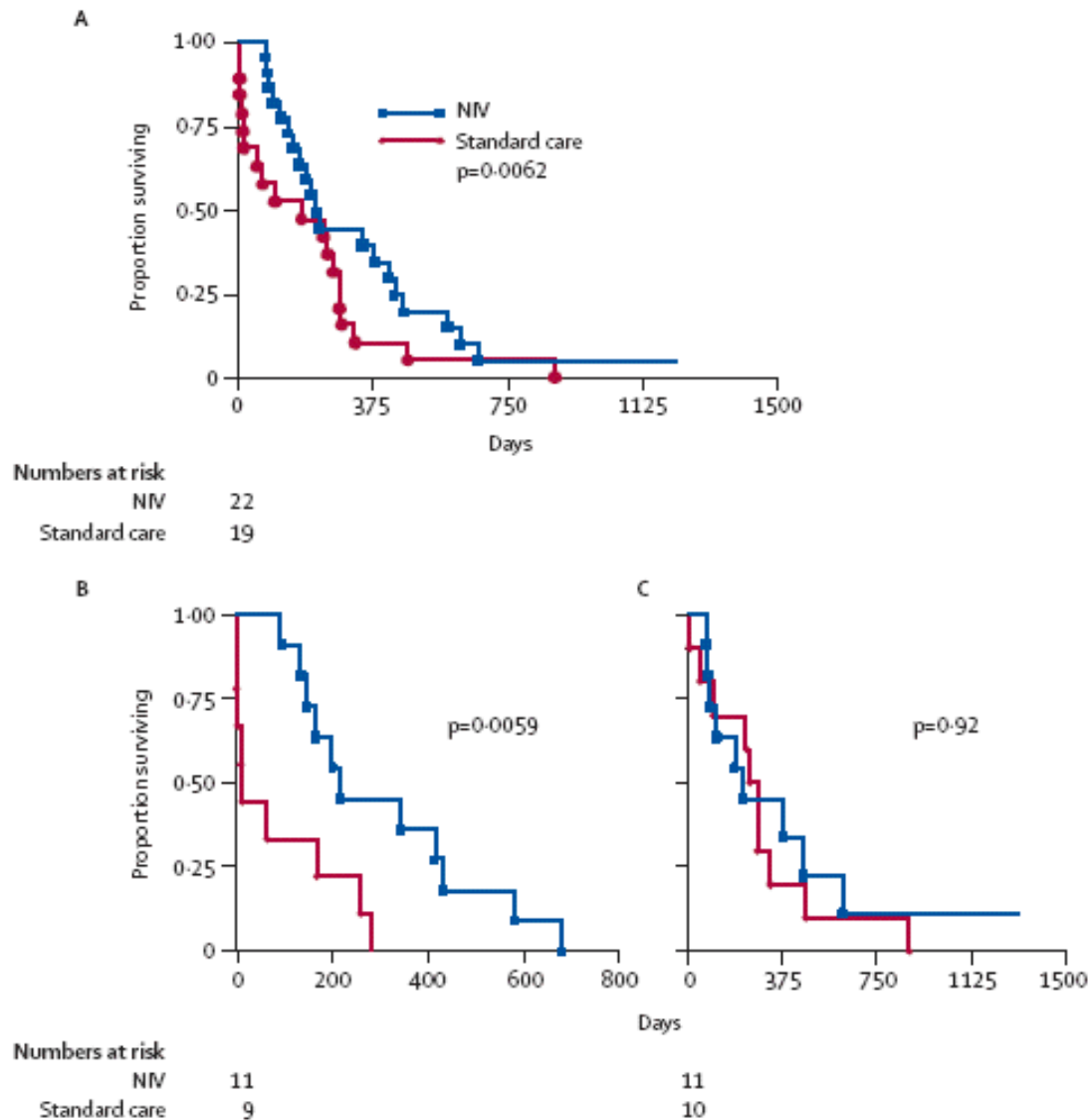
		Pred	Pre	% Pred	Post	% Pred
Datum test			061010		061010	
Time			11:06		11:09	
Baro. pressure			1006		1006	
Temperatuur			22		22	
VC IN	[L]	4.46	2.20	49 %	1.17	26 %
FVC	[L]	4.29	2.27	53 %		
FEV 1	[L]	3.40	1.61	47 %		
FEV1 % VC-IN	[%]	76.77	73.26	95 %		
FEV1 % FVC	[%]		71.03			

06-10-2010	
10:11	
--	
7.42	
6.8	↑
9.5	
0.96	
33	↑
6.8	↑

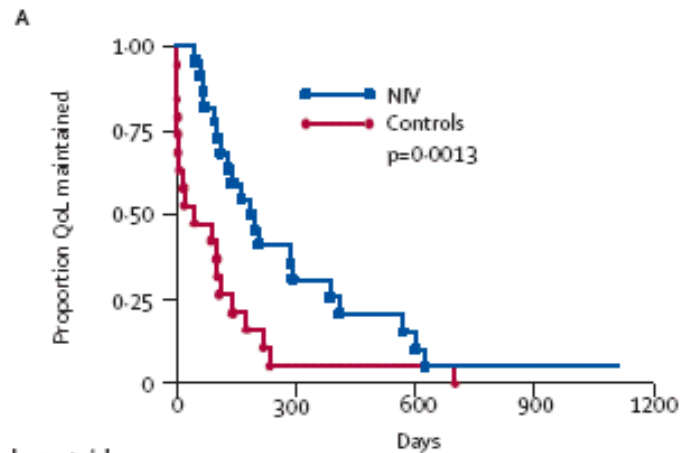
Study population



ALS and survival

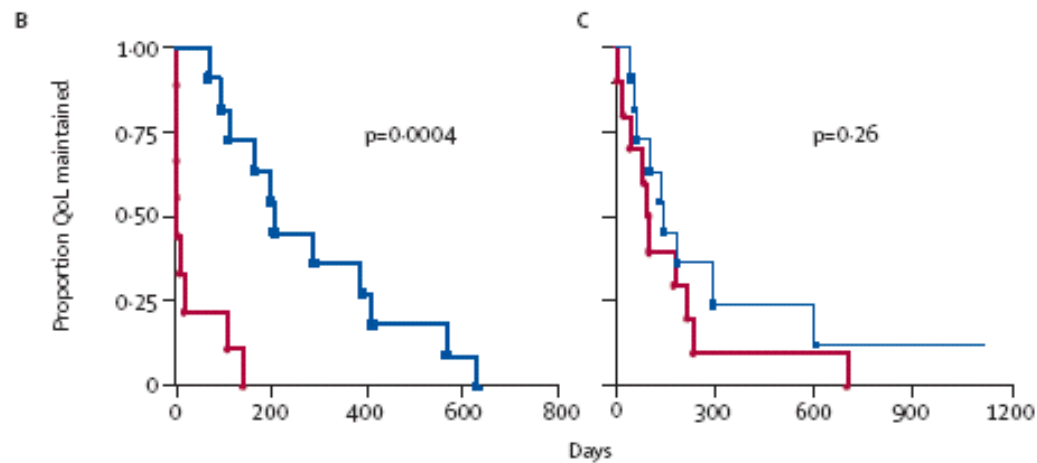


ALS and quality of life



Numbers at risk

NV	22
Standard care	19

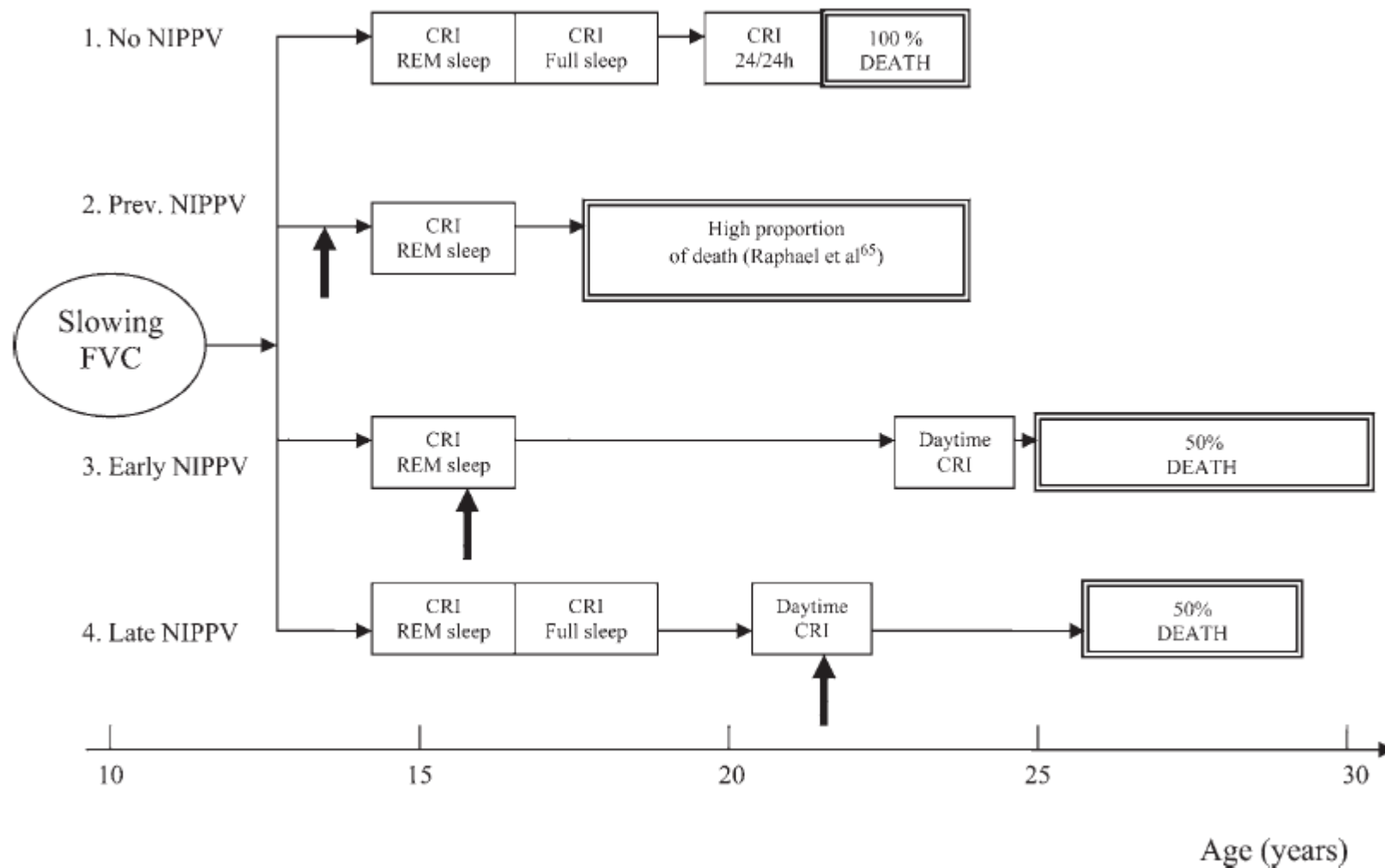


Numbers at risk

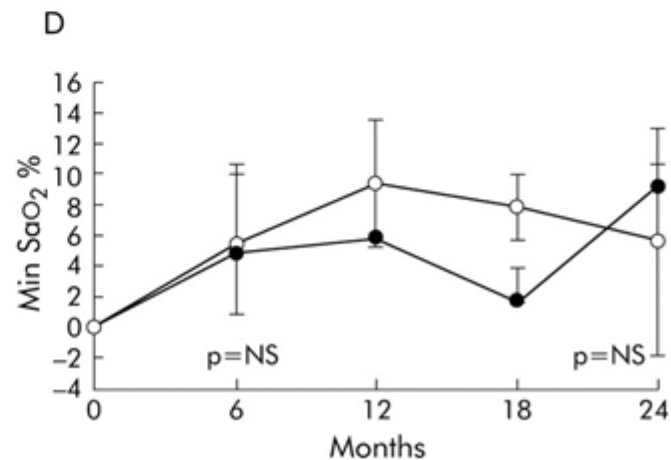
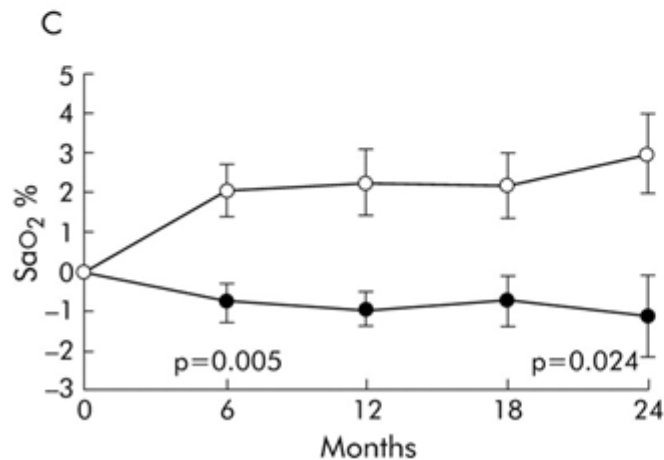
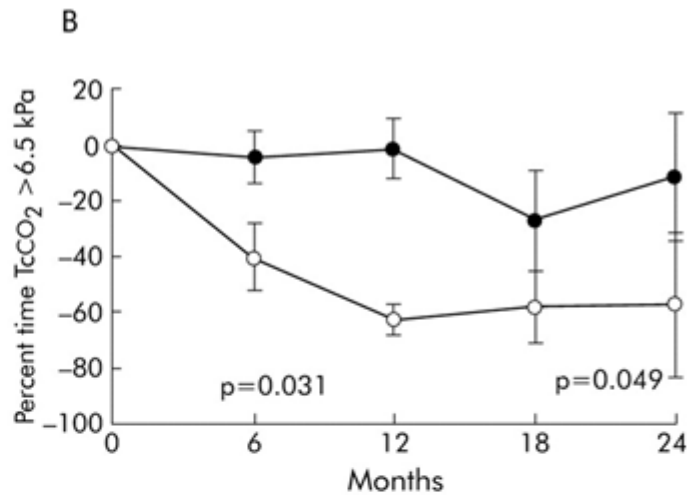
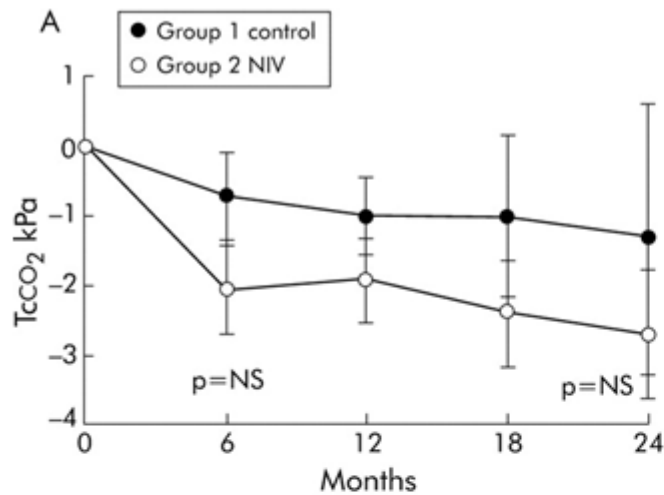
NV	11
Standard care	9

11
10

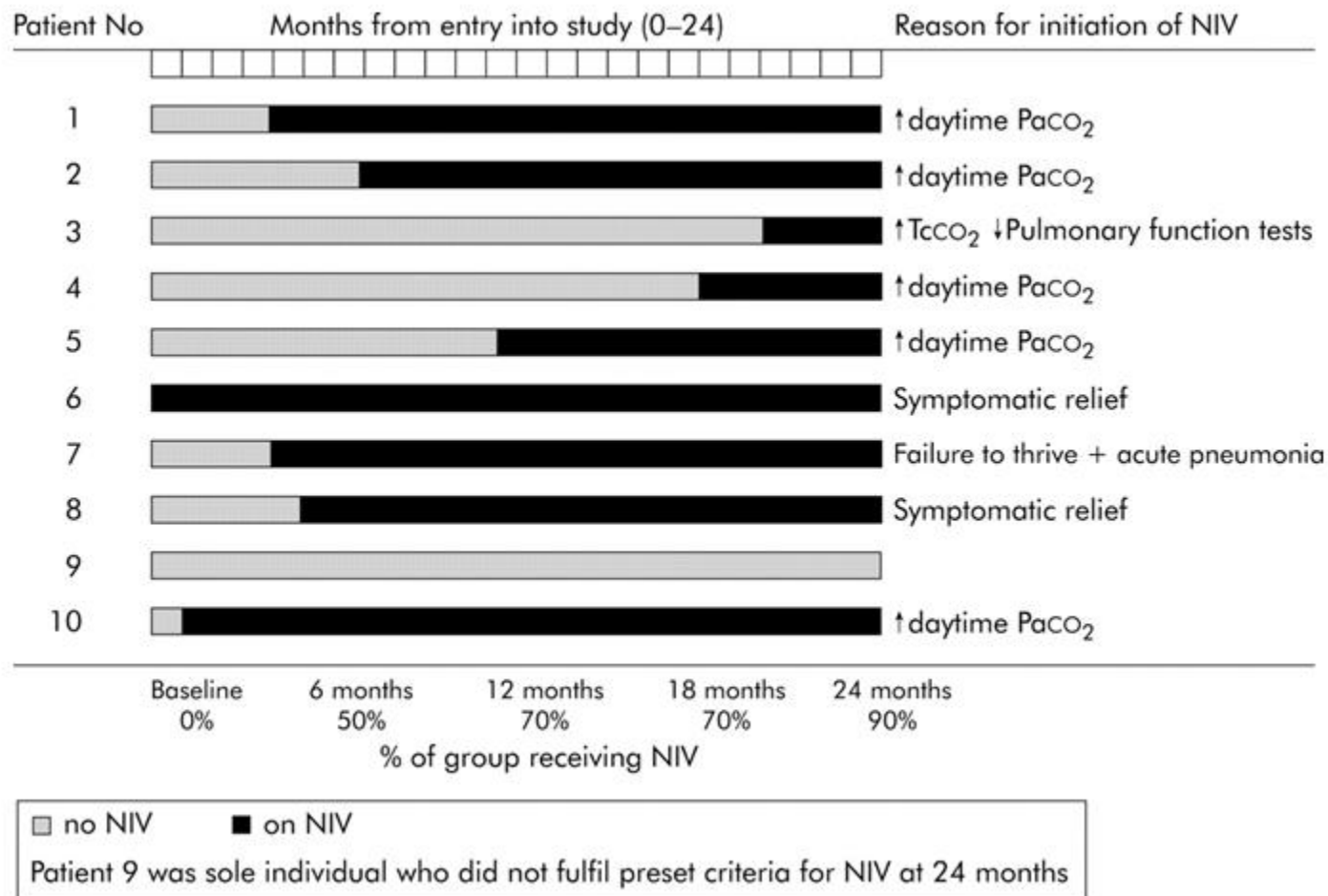
When to start with NIV in Duchenne ?



Start of NIPPV in Duchenne patients



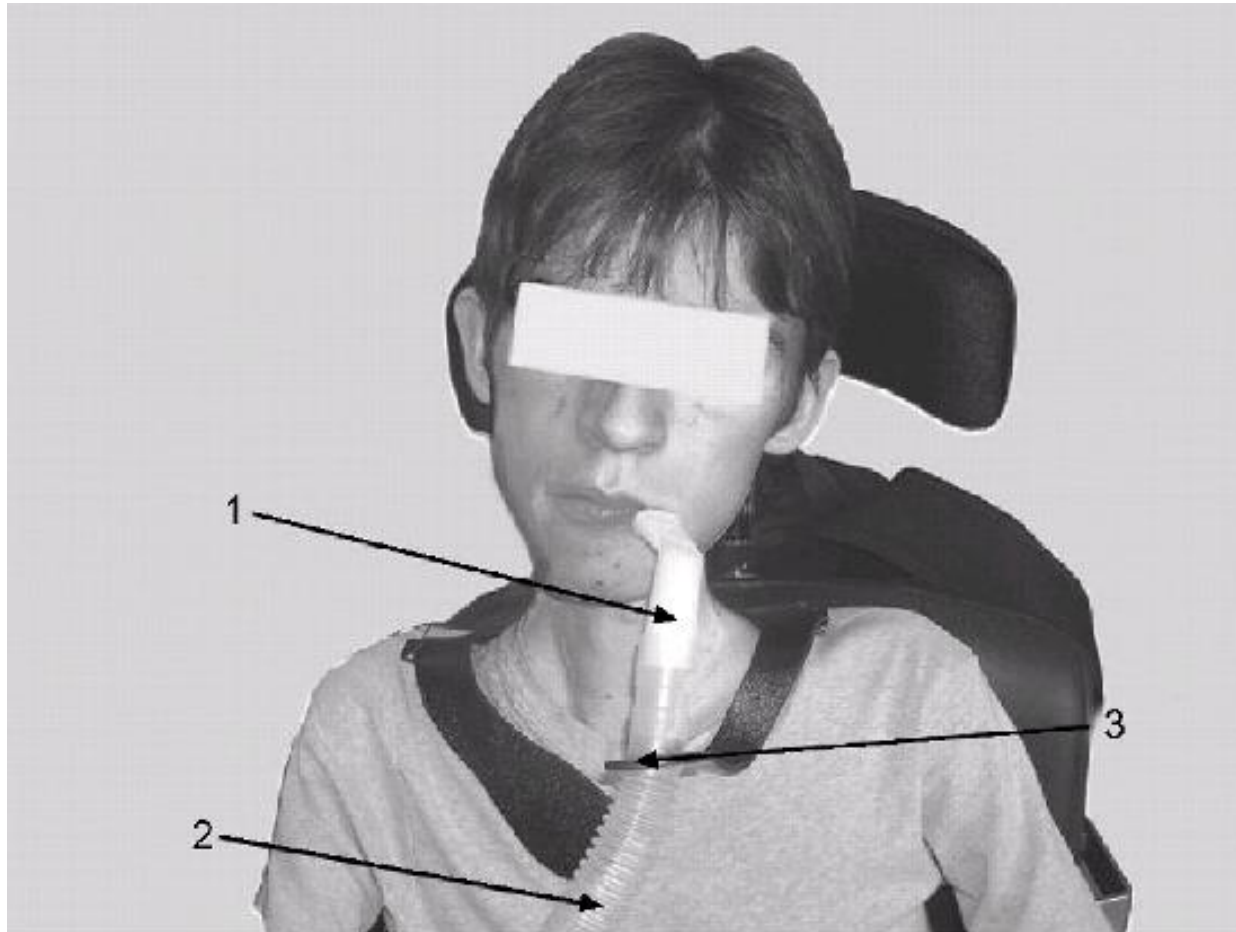
Start van NIPPV in Duchenne patients



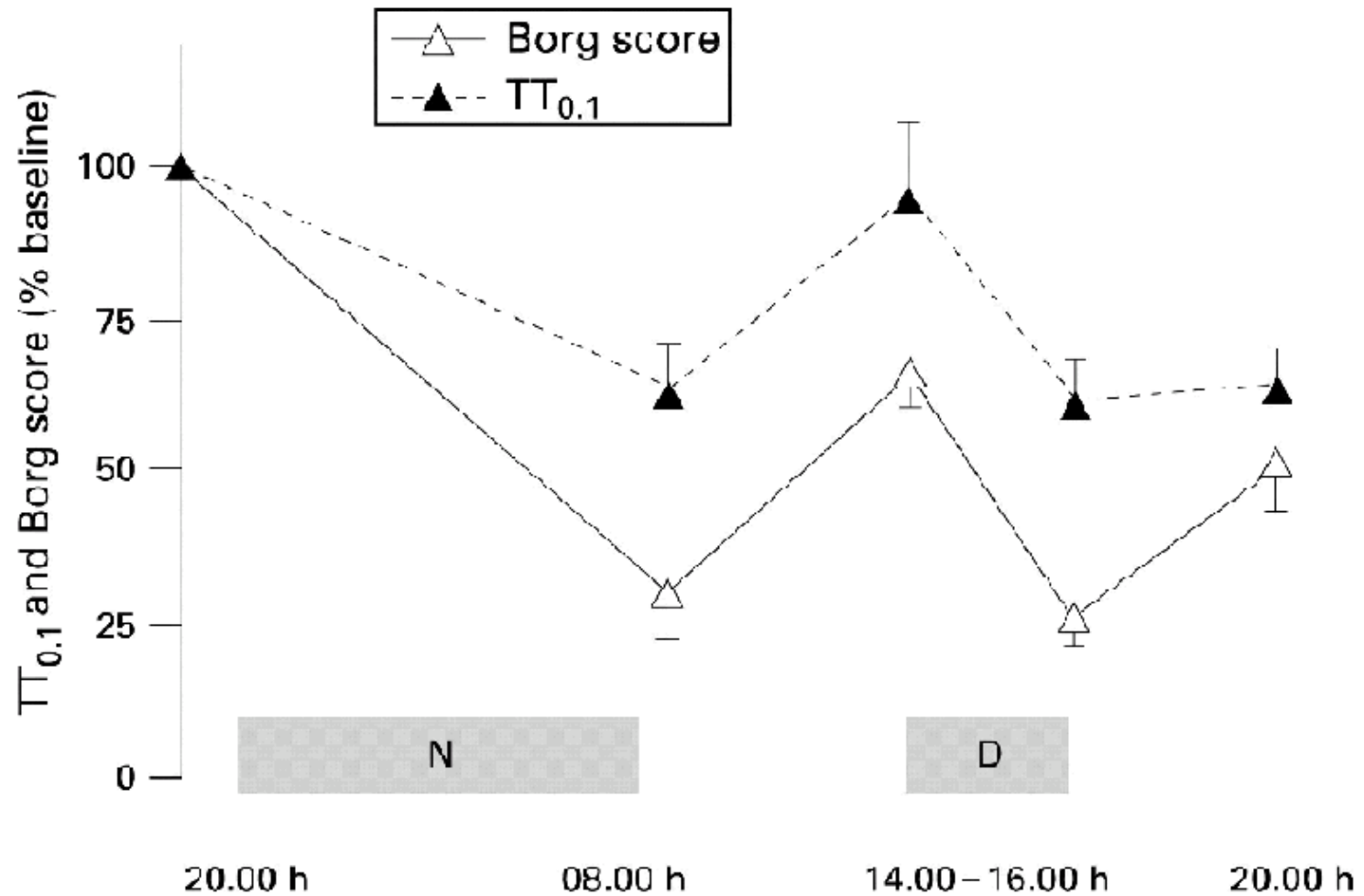
Chronic ventilation in the Netherlands

- How is it organised ?
- Who gets it ?
- *When and where do we start ?*

Mouth piece ventilation (MIPPV)

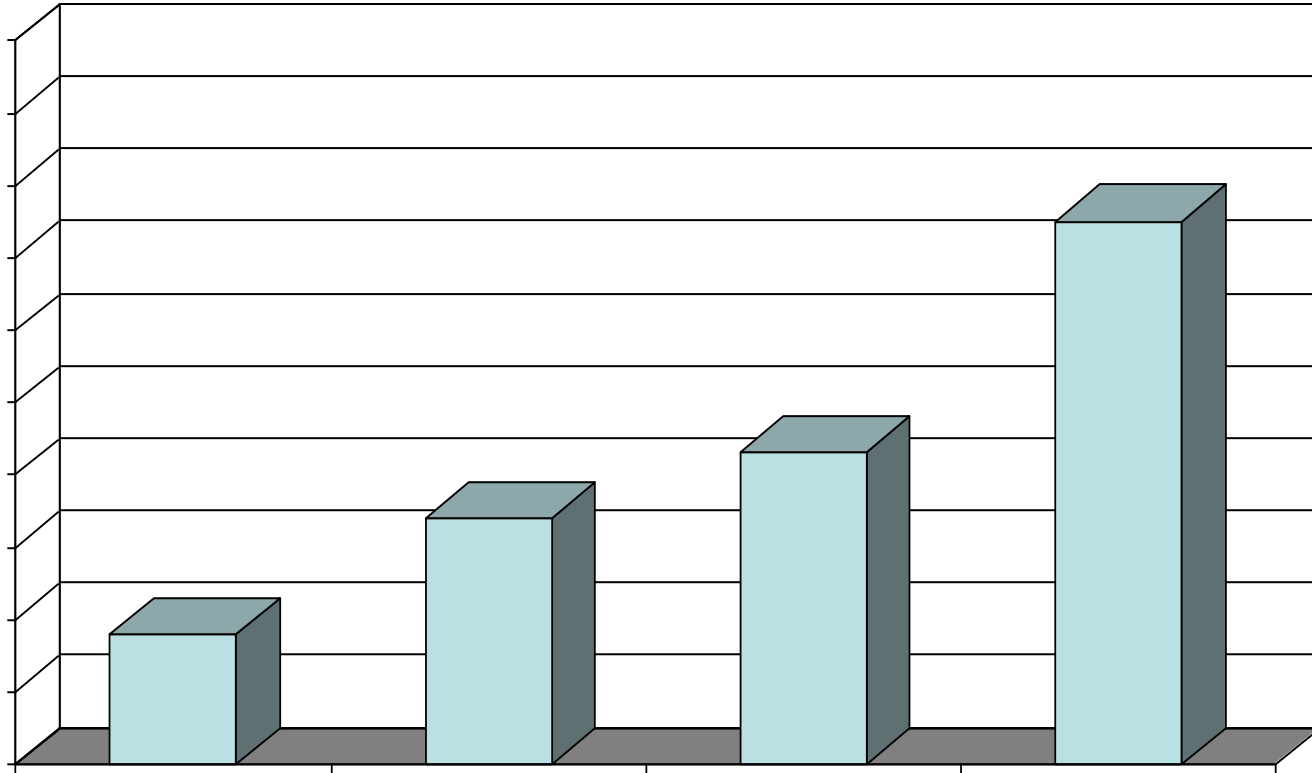


Influence of N(M)IPPV on load and dyspneu

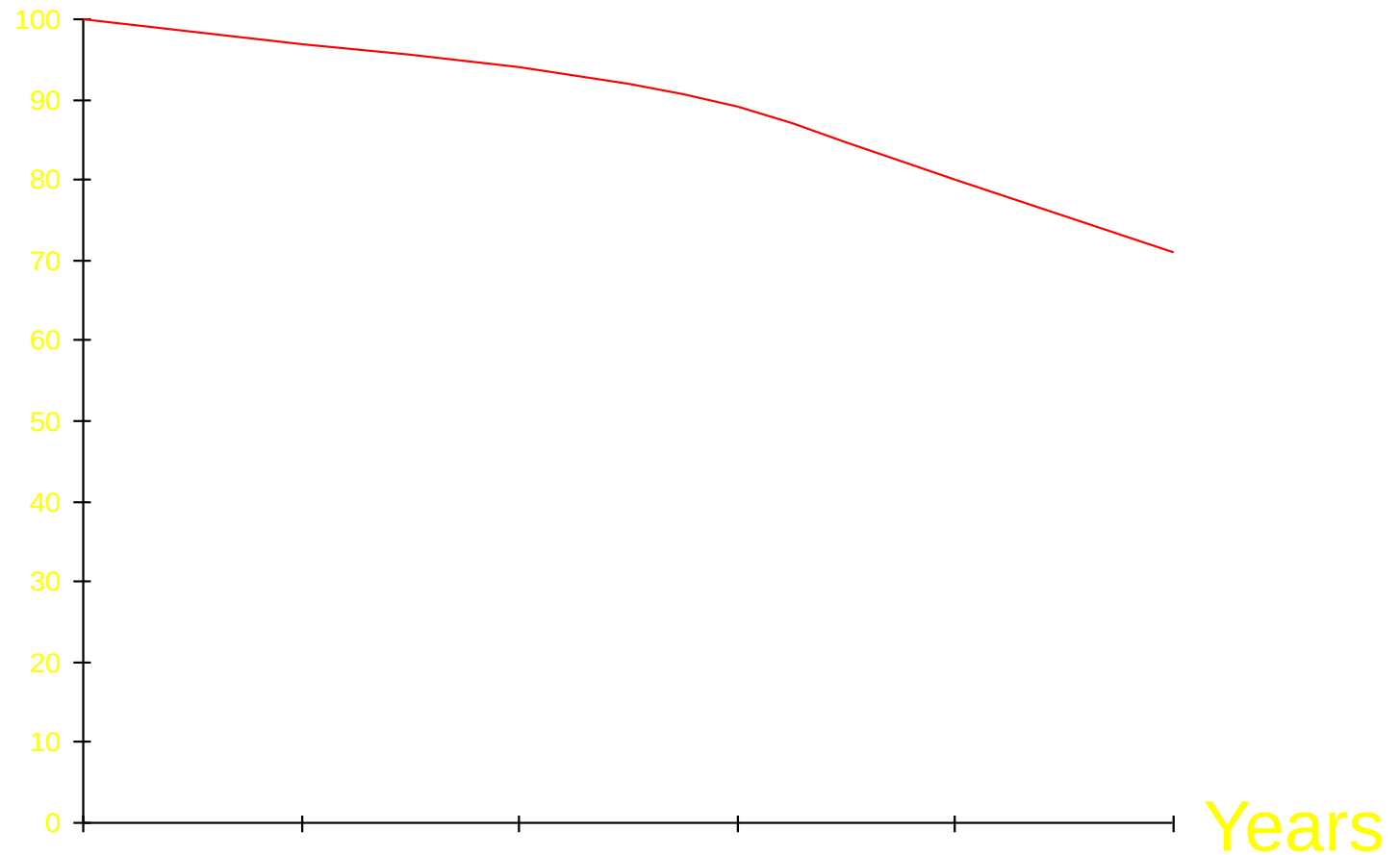


Physical therapy

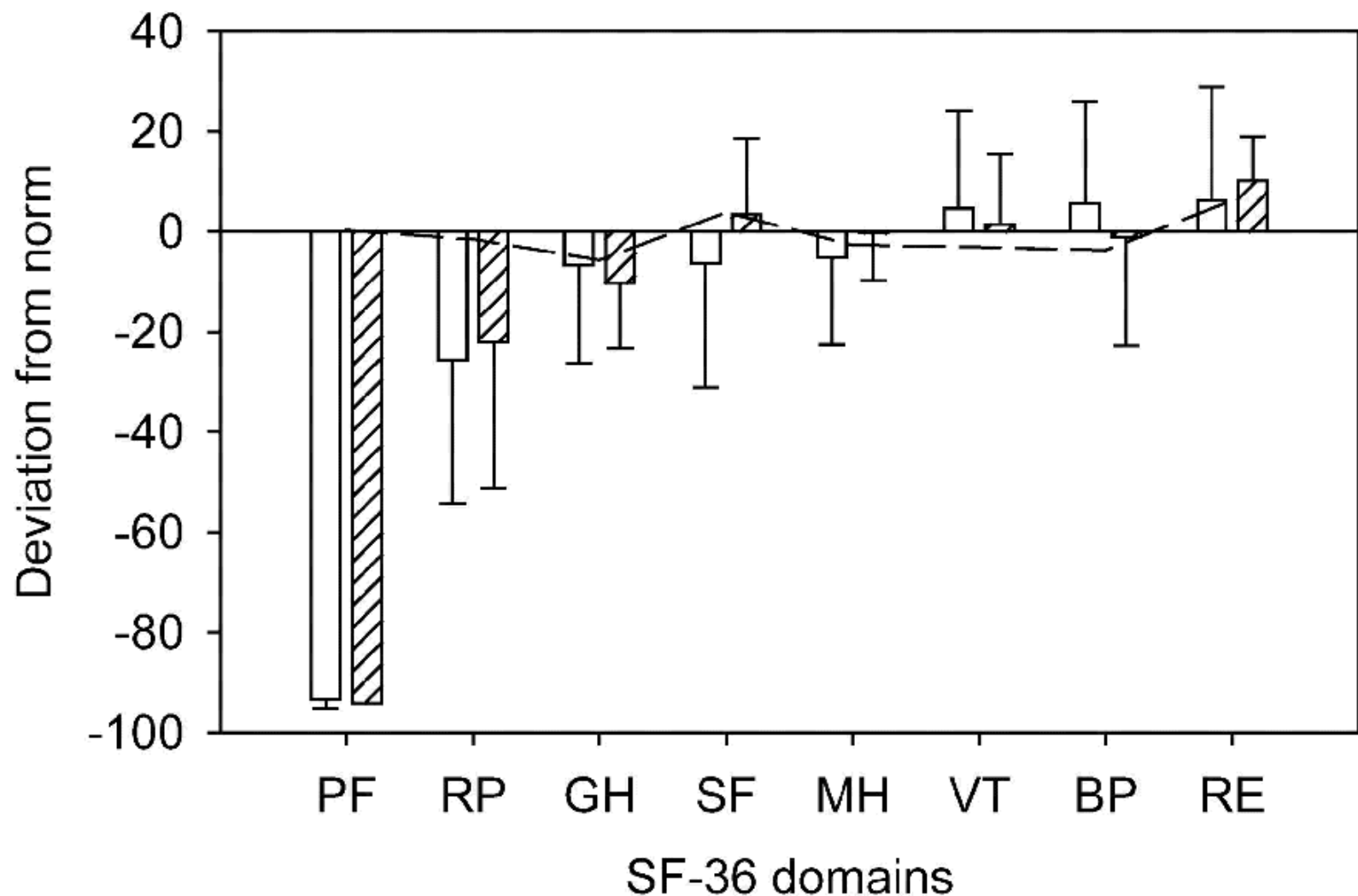
Peak cough flows



Survival curve Duchenne patients



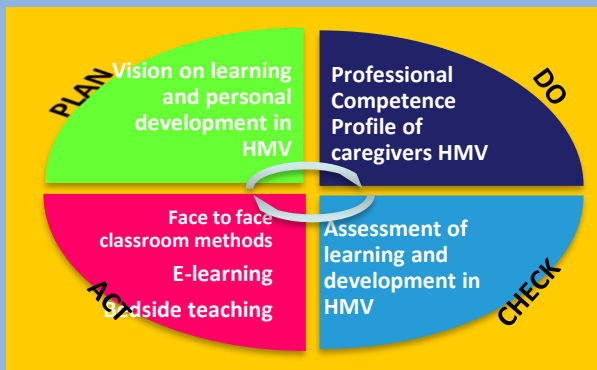
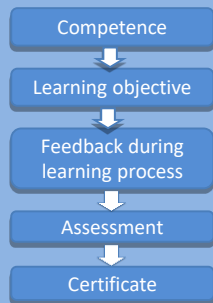
Quality of life in Duchenne patients



National Education Program for HMOV

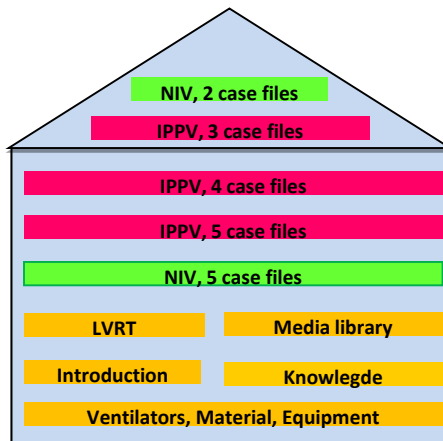
Process design

Cycle of Quality Control



elevator Urgency

4
3
2
1
0
-1



Blended learning is the central educational method of this program. A blended learning approach combines:

- Face-to-face classroom methods
- E-learning
- Bedside teaching

