

# Kvalitetssikring blodgass - Ekstern kvalitetsvurdering (EKV)

Workshop 10.03.20

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# Mål med EKV

- å oppdage analysefeil (og utføre korrigerende tiltak)
- å overvåke analysekvaliteten (riktighet)
- å dokumentere analysekvaliteten
  
- Evaluering av deltaker (det enkelte laboratorium)
- Evaluering av analyse-metodene

# Nøkkel faktorer

1. Kontrollmaterialet
2. Fasitverdi
3. Antall replikater
4. Akseptgrenser

# Aktuelle EKV-program blodgass

## LABQUALITY

### **2610 Acid-Base Status and Electrolytes**

62 norske deltakere

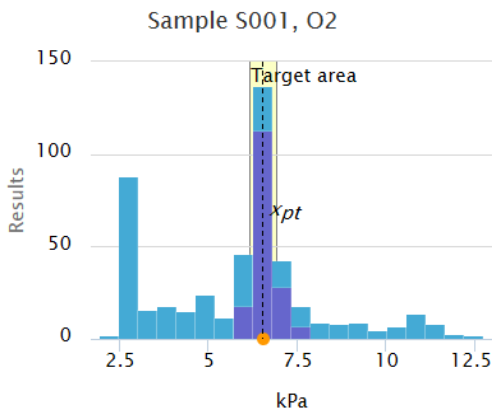
## EQUALIS

### **Blodgas och elektrolyter (248)**

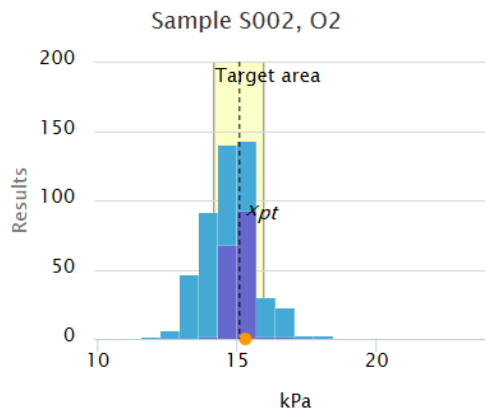
Ingen norske deltakere

## Status and Electrolytes

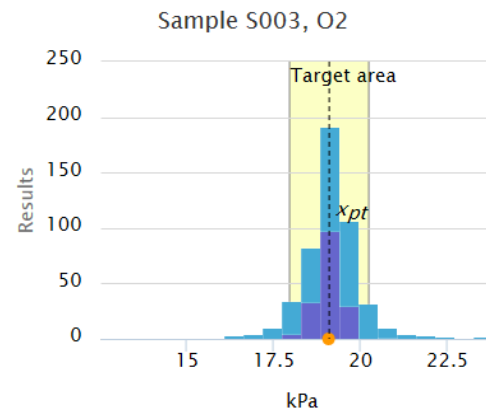
- 4 – 2019
  - 276 deltakere totalt (503 instrumenter) fra 22 land og 52 deltakere fra Norge
  - Kontrollmateriale: 3 prøver i 3 nivå, fremstilt tonometrisk ved å tilsette blandinger av karbondioksyd, oksygen og nitrogen i en fysiologisk bufret matriks med rensset bovint albumin og rene salter. Vandig løsning
  - Frekvens 4/år , preanalytisk case 2/år
  - Metodespesifikk fasit



■ All method groups    ■ ABL 800-837 + FLEX  
● Own result: 6.5 | Diff%: -0.1 |  $x_{pt}$ : 6.5 |  
 Target area: 6.2-6.9 | Target:  $\pm 6\%$



■ All method groups    ■ ABL 800-837 + FLEX  
● Own result: 15.3 | Diff%: 1.4 |  $x_{pt}$ : 15.1 |  
 Target area: 14.2-16.0 | Target:  $\pm 6\%$



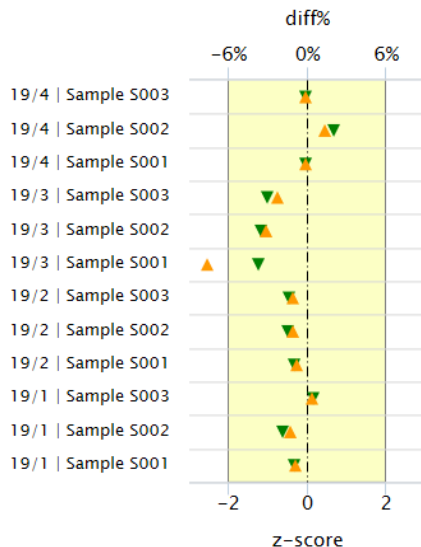
■ All method groups    ■ ABL 800-837 + FLEX  
● Own result: 19.1 | Diff%: -0.1 |  $x_{pt}$ : 19.1 |  
 Target area: 18.0-20.3 | Target:  $\pm 6\%$

	$x_{pt}$	sd	SEM	CV%	n
ABL 800-837 + FLEX	6.5 kPa	0.3	<0.1	4.4	166
All methods	5.9 kPa	2.3	0.1	38.1	484

	$x_{pt}$	sd	SEM	CV%	n
ABL 800-837 + FLEX	15.1 kPa	0.3	<0.1	2.0	167
All methods	14.8 kPa	0.9	<0.1	6.3	492

	$x_{pt}$	sd	SEM	CV%	n
ABL 800-837 + FLEX	19.1 kPa	0.4	<0.1	2.0	167
All methods	19.2 kPa	0.7	<0.1	3.8	493

### History



Round	Sample	$x_{pt}$	Result	diff%	z-score
19/4	Sample S003	19.1	19.1	-0.1%	-0.04
19/4	Sample S002	15.1	15.3	1.4%	0.69
19/4	Sample S001	6.5	6.5	-0.1%	-0.02
19/3	Sample S003	19.2	18.8	-2.2%	-1.00
19/3	Sample S002	15.2	14.7	-3.1%	-1.18
19/3	Sample S001	6.6	6.1	-7.6%	-1.22
19/2	Sample S003	21.5	21.3	-1.1%	-0.45
19/2	Sample S002	17.1	16.9	-1.1%	-0.48
19/2	Sample S001	12.8	12.7	-0.8%	-0.31
19/1	Sample S003	21.82	21.90	0.36%	0.17
19/1	Sample S002	17.22	17.00	-1.26%	-0.62
19/1	Sample S001	12.91	12.80	-0.87%	-0.33

## Preanalytics

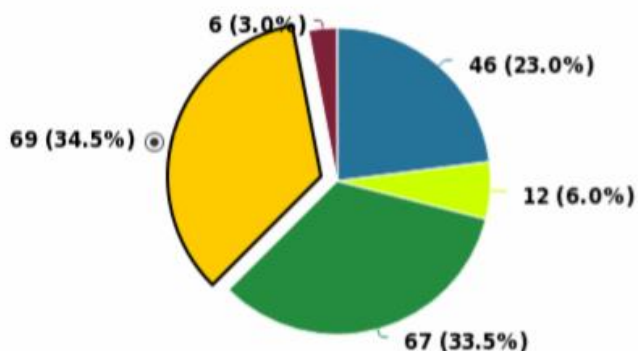
### Case history:

The blood gas sample taken in a syringe is analyzed within 10 minutes of sampling. The results of analysis are as follows:

pH 7.38  
 pCO<sub>2</sub> 4.7 kPa  
 pO<sub>2</sub> 15.7 kPa  
 BE -4.7 mmol/L  
 HCO<sub>3</sub> 20.6 mmol/L  
 Hb 100 g/L  
 K 8.6 mmol/L  
 Na 141 mmol/L

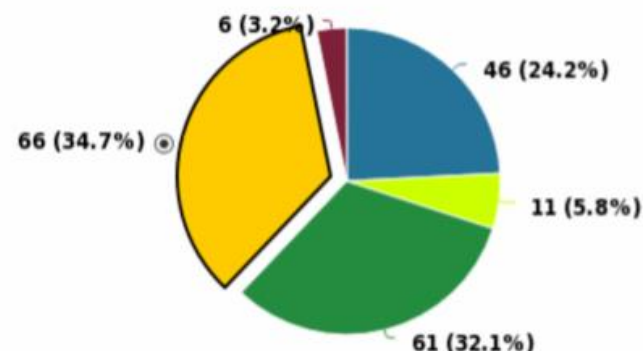
What would you do and why?

All profession groups



- I would accept the referral/sample/result with a comment that clarifies the consequences of the preanalytical error.
- I would accept the referral/sample/result without a comment.
- I would reject the sample for testing and ask for another sample.
- I would ask for further information from the physician-in-charge/clinical staff before I might accept the referral/sample/result.
- OTHER If you cannot find your corrective action from the list below, please describe it precisely in the comment field.

Biomedical laboratory scientist/technician



- I would accept the referral/sample/result with a comment that clarifies the consequences of the preanalytical error.
- I would accept the referral/sample/result without a comment.
- I would reject the sample for testing and ask for another sample.
- I would ask for further information from the physician-in-charge/clinical staff before I might accept the referral/sample/result.
- OTHER If you cannot find your corrective action from the list below, please describe it precisely in the comment field.

### Sample S001 | O<sub>2</sub>, kPa

Methodics	$x_{pt}$	Median	sd	CV%	SEM	min	max	Outliers	n
ABL 5	-	-	-	-	-	6.2	6.2	-	1
ABL 80 FLEX	4.2	4.4	0.9	21.1	0.3	2.7	5.5	-	8
ABL 800-837 + FLEX	6.5	6.5	0.3	4.4	<0.1	5.9	7.5	5	166
ABL 9	-	-	-	-	-	4.3	4.3	-	1
ABL 90 FLEX	3.0	2.9	0.4	15.0	<0.1	1.9	4.7	5	117
Cobas b 123	-	-	-	-	-	10.8	10.8	-	1
EasyBloodGas	4.7	4.5	1.6	33.1	0.8	3.2	6.8	-	4
EasyStat	4.8	4.8	0.3	6.9	0.2	4.5	5.2	-	3
epoc Blood Analysis System	4.4	4.4	0.5	10.9	0.1	3.5	5.1	-	15
Gastat-1810	8.0	8.0	0.8	10.0	0.6	7.4	8.5	-	2
Gem Premier 3000-3500	6.5	6.4	0.6	8.7	0.1	5.9	7.7	-	16
Gem Premier 4000	6.1	6.1	0.4	7.3	<0.1	5.1	6.9	1	39
IRMA TruPoint	5.8	5.7	0.6	9.7	0.3	5.2	6.3	-	3
i-Smart 300	-	-	-	-	-	7.8	7.8	-	1
i-STAT	9.6	9.3	1.6	16.6	0.3	5.9	12.7	-	21
Modular Pro	-	-	-	-	-	6.8	6.8	-	1
OMNI S / Cobas b 221	10.8	10.7	0.5	4.5	<0.1	9.8	11.9	-	27
OPTI	-	-	-	-	-	8.8	8.8	-	1
Opti CCA - TS	8.7	8.5	0.8	9.4	0.3	7.8	9.7	-	6
RAPIDLab 1200 series (RL1240-RL1265)	5.3	5.0	0.6	11.8	0.2	4.6	6.6	-	11
RAPIDLab 248	3.6	3.7	0.6	17.5	0.4	2.9	4.2	-	3
RAPIDLab 348/348EX	3.8	3.6	1.1	27.8	0.4	2.6	5.6	-	8
RAPIDPoint 400/500 series	7.6	7.6	0.9	11.6	0.2	6.4	9.5	-	29
<b>All</b>	<b>5.9</b>	<b>6.3</b>	<b>2.3</b>	<b>38.1</b>	<b>0.1</b>	<b>1.9</b>	<b>12.7</b>	-	<b>484</b>

3,0-10,8 kPa

4,4-33,1 %

*Labquality: ...betydelig sprik i pO<sub>2</sub>-resultatene. Ingen god forklaring på dette siste (Johan Kofstad).*



## Blodgas och elektrolyter (248)

- 8-2018
  - 167 instrument, alle deltakere fra Sverige
  - Kontrollmateriale: Stabilisert og tonometrert hemoglobinløsning for måling av P-pO<sub>2</sub> (prøve 1) og vannbasert proteinløsning for måling av øvrige undersøkinger (prøve 2)
  - Frekvens 10/år, alle prøver sendt ut i august, prøve 1 oppbevares i frys og prøve 2 i kjøleskap
  - Metodespesifikk fasit

Analysomgång: 2018:08

Sida: 20 (21)

**P-pO2 (kPa)**

Prov : /pO2

Instrument Radiometer ABL 825--Instrument nr2

Kvalitetsmål (%) ± 6

Egen rapportgrupp Radiometer, ABL700/800

**Eget svar 4,43**

Förväntat svar  
(Totalmedelvärde) 4,43 ± 0,04

**Egen avvikelse**

Absolut (kPa) 0

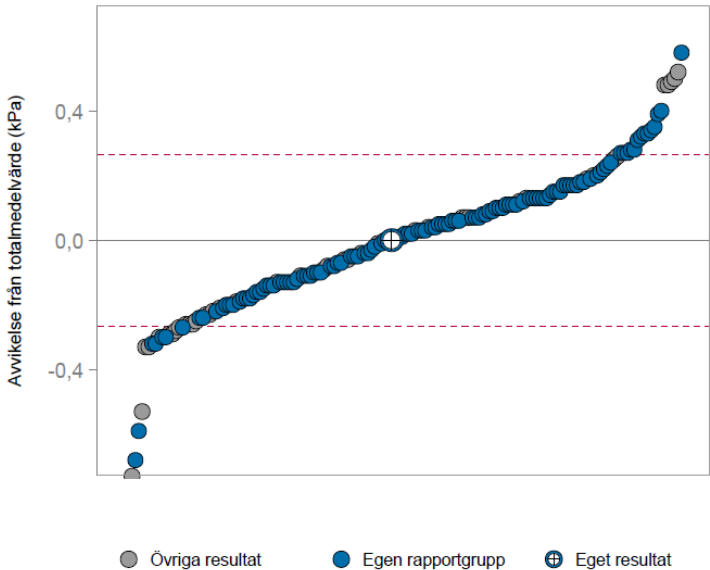
Relativ (%) 0,0

Egen rapportgrupp (123)		Samtliga (167)	
Medelvärde	4,45	Medelvärde	4,43
SD	0,19	SD	0,22
CV%	4,2	CV%	4,9
<b>Egen avvikelse från rapportgruppsmedelvärde</b>		<b>Egen avvikelse från totalmedelvärde</b>	
Absolut (kPa)	-0,02	Absolut (kPa)	0
Relativ (%)	-0,5	Relativ (%)	0,0
Antal SD	-0,13	Antal SD	+0,01
Medelavvikelse (%) (senaste 9 omgångarna)	+0,93	Medelavvikelse (%) (senaste 9 omgångarna)	+1,41

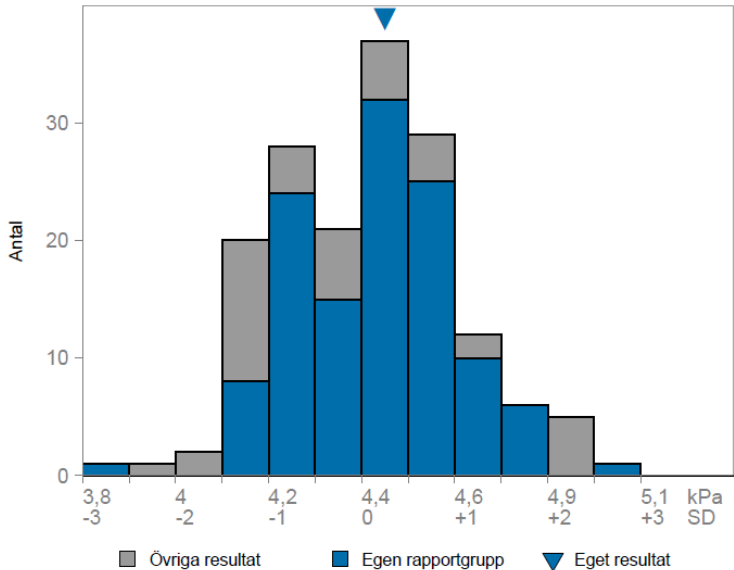
Samtliga deltagares avvikelse

<= 4 Antal resultat utanför diagrammet 0 =>

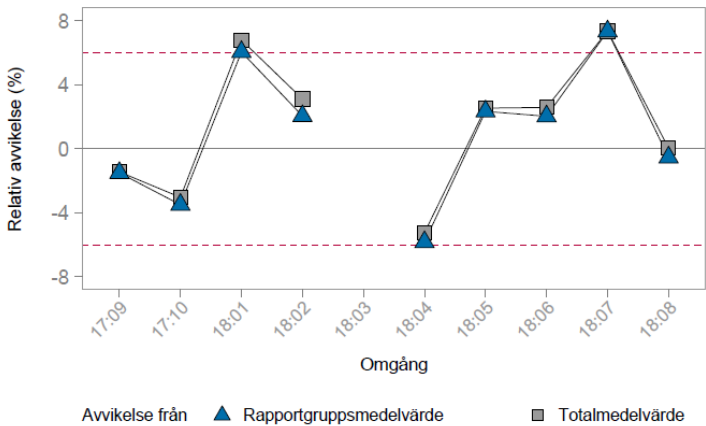
Samtliga deltagares avvikelser



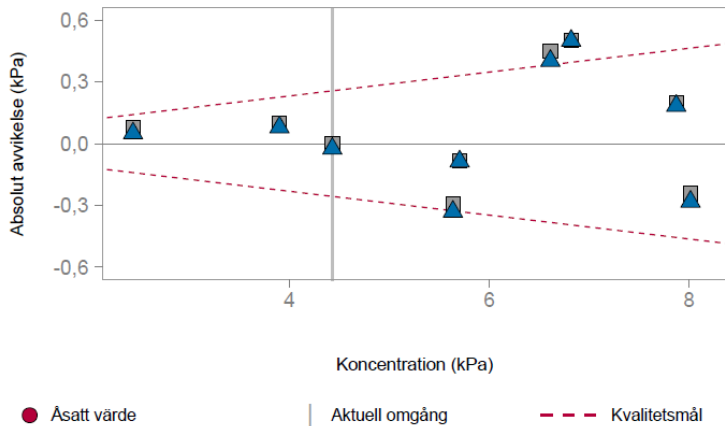
<= 4 Antal resultat utanför diagrammet 0 =>



Egen avvikelser de senaste 10 omgångarna



Egen avvikelser i förhållande till koncentration de senaste 10 omgångarna



Analysomgång: 2018:08

Sida: 3 (3)

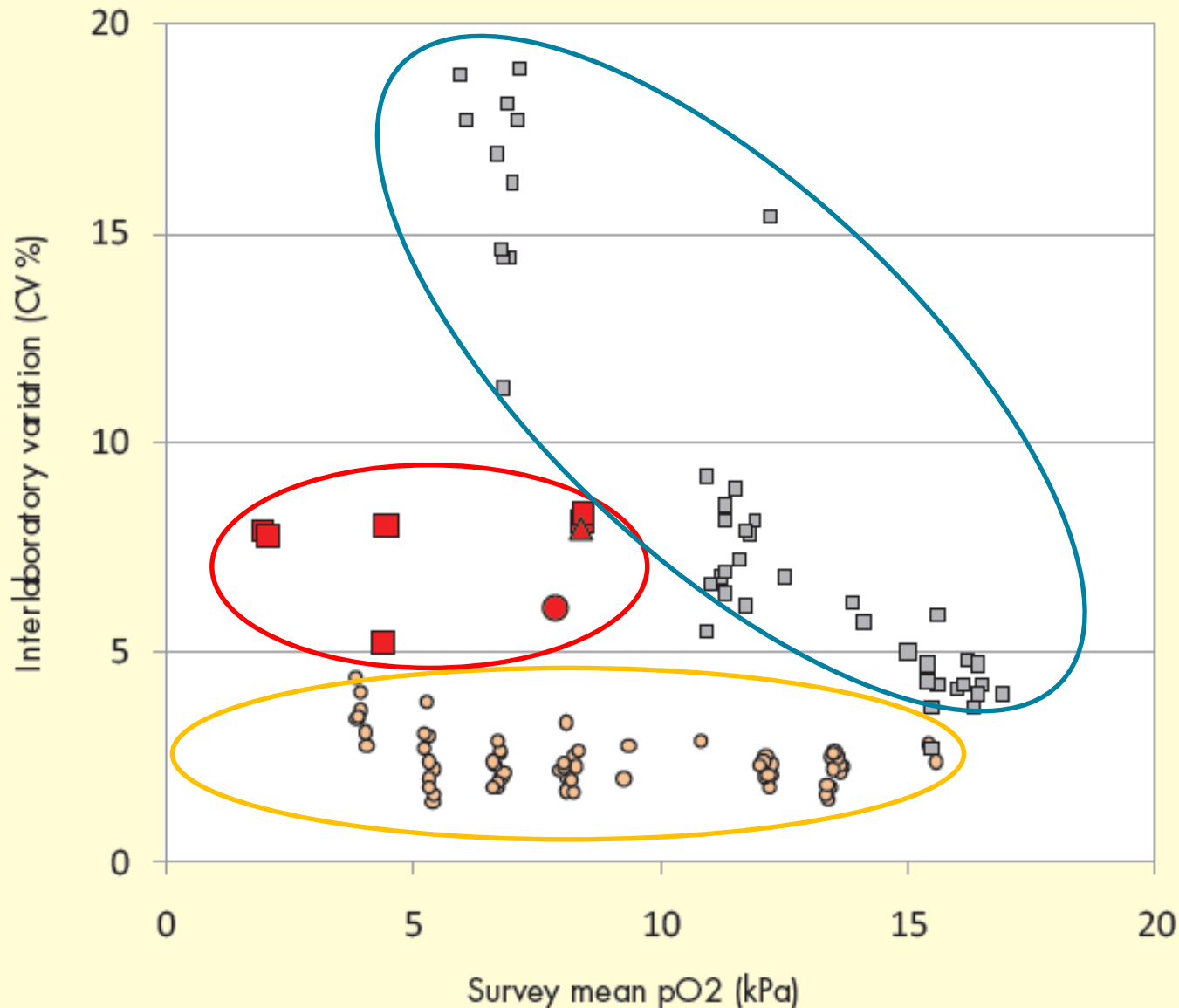
Prov	Komponent	Rapport-grupp	n	Medelvärde	SD	CV%
/pO2	P-pO2 (kPa)	Samtliga resultat	167	4,43	0,22	4,9
		EPOC	1	4,37		
		i-STAT	3	4,23		
		IL	1	3,90		
		Radiometer, ABL 90	26	4,28	0,22	5,3
		Radiometer, ABL700/800	123	4,45	0,19	4,2
		Radiometer, övriga	2	4,20		
		Siemens	10	4,59	0,24	5,2
		Uppgift saknas	1	4,37		

3,90-4,59 kPa

4,2-5.3 %

# Sammenligning...

Nøkkelfaktorer	Labquality	Equalis
Type kontrollmateriale	Vannbasert	Vannbasert og blodbasert (O2)
Antall prøver/utsendelse	3	2
Nivå	3 (lav, middel, høyt)	Ett nivå
Type fasit	Metodespesifikk	Metodespesifikk
Frekvens	4/år	10/år
Replikater	Nei	Nei
Akseptgrenser	± 6 %	± 6 %
Inkluderer preanalyse	Ja	Nei



▲ Tonometrol 2002    ● Tonometrol 2005    ■ Tonometrol 2008  
 □ Aqueous material tonometered by manufacturer 1994-1999

○ Hæmoglobin material local tonometered directly before use 2002-2007

**NOKLUS**

**FORSKJELL I CV  
 AVHENGIG AV  
 TYPE  
 KONTROLL-  
 MATERIALE  
 (pO<sub>2</sub>)**

**EQUALIS**

*New material  
 for external  
 quality  
 assessment of  
 blood gases,  
 especially pO<sub>2</sub>*

Håkan Lund  
et al, 2008

# Sammenligning instrument

Rapportgrupper	Labquality (4-2019)	Equalis (8-2018)
EPOC	16	1
i-STAT	21	3
Radiometer, ABL 90	122	26
Radiometer, ABL 700/800	172	123
Radiometer 80 + øvrige	8	2
OMNI S/Cobas b 221	28	
RapidPoint/Lab Siemens	51	10

# *Hvilket EKV-program?*

- *2610 Acid-Base Status and Electrolytes fra Labquality*
- *Blodgas och elektrolyter (248) fra Equalis??*

*Eller noe annet?*