


Finnish Red Cross  
Blood Service

## THE IMPACT OF ANALYTICAL VARIATION OF HEMOGLOBIN MEASUREMENT ON BLOOD DONORS' HEMOGLOBIN AND DEFERRAL RATES

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## Background

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### Why? Whats happening?

- The asking curve of hb-deferrals a curve of cHb values
  - males
  - females
  - new donors
  - frequent donors
  - mobile sessions
  - fixed sites
  - All geographical locations





Fig. 2 Monthly deferral



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## Study 2016-2017

- Literature (and FRC Blood Service donor deferral data):
  - Low Hb is the leading reason for donor deferral
  - Many donor-related and external factors associated with low Hb are known, but no studies have been conducted concerning the effects of analytical variation on donor Hb measurements and deferrals.
- Aim:
  - To investigate the effect of analytical variation of the cHb measurement method on blood donor Hb and deferral rates.

\*HemoCue (POC method) cuvettes' batch-to-batch deviation from ICSH reference method



## Material and Methods

### *Study population*

- from 2010 to 2016
  - 1.7 million cHb values (HemoCue) (eProgesa)
  - results of HemoCue's quality control management process; **cuvette batch deviation from the ICSH reference method** (max.  $\pm 1.5\%$ ) from 2010 to 2016
- from 2000 to 2009
  - 3.1 million cHb values (HemoCue) in analyses of measured cHb value and Hb deferral rate correlation
- from 2000 to 2016
  - **deferral rate data** (eProgesa)

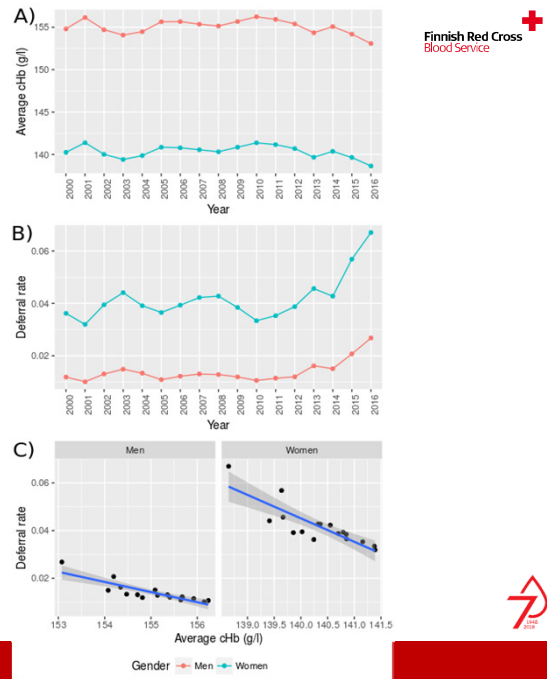
### *Statistical methods and models (in order to explain the variation of cHb values)*

- **cHb values as monthly means** for women and men
- a **multiple linear regression** model; variables
  - monthly **gender and age distribution**
  - **month of the donation**
  - daily distribution of the donations
  - **deviation of the HemoCue cuvettes** from the reference method



## Results 1

- A statistically significant correlation between the mean annual cHb and Hb deferral rate in both women and men



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## Results 2

Explanatory factors for the monthly variation of cHB

- Season
- Batch-to-batch variation in HemoCue cuvettes
- Donors age
- Our model covers 36-37% of the observed variance

Variable	Statistic	Women	Men
Mean Hb of month	Coefficient of the slope	0.792	0.949
	p-value ≤	0.000	0.000
	Percentage of variance explained	25 %	31 %
Average quvette error	Coefficient of the slope	0.91	0.97
	p-value ≤	0.007	0.011
	Percentage of variance explained	6.8 %	7.4 %
Proportion of donors older than 42 years in donations	Coefficient of the slope	17.4	-13.2
	p-value ≤	0.002	0.037
	Percentage of variance explained	2.5 %	2.4 %
Total observations		84	84
Total percentage of variance explained by the whole model		36 %	37 %

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## Conclusion



- Small and, in most clinical settings, negligible analytical variation in Hb measurement methods can have significant consequences when used for Hb screening of blood donors
- This should be minimized by using methods in which analytical variation is under control and kept as low as possible.



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## Thank You



- Our contact persons in HemoCue
- Study group



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