Blood sample haemolysis: Staff confidence and knowledge on the causes

1Nkhoma NM, 2Whittaker V.
1. Registered General Nurse, Acute Services, The James Cook University Hospital, Middlesbrough, UK
2. Senior Lecturer Research Methods, Statistician, Teesside University, Middlesbrough, UK

South Tees Hospitals NHS Foundation Trust

BACKGROUND

- Pre-analytical blood sampling is associated with high haemolysis (breakdown of red blood cells) rate impacting on its quality.
- This is attributed to material used, technique in sample collection and handling.
- However, venepuncture (act of collecting blood using a needle) training is generic.
- Relationship between staff confidence level in venepuncture and knowledge of pre-analytical sample haemolysis is not known.

INCLUSION CRITERIA

Clinical staff / phlebotomists that conducted venepuncture in the past three months prior to data collection.

AIM

To investigate the association between staff confidence level in venepuncture and knowledge on causes of pre-analytical sample haemolysis.

METHODOLOGY

- A purposive sample of 290 clinical staff and phlebotomists in one North England hospital participated.
- A quantitative survey design was used.
- Data was collected for a period of 6 weeks in 2012.
- A web-based questionnaire, consisting of a structured demographic profile, confidence level (at first and last venepuncture) and 10 knowledge questions, was used to collect data.
- Inter-quartile range (IQR) was used to determine the distribution of the frequencies, on knowledge by staff category and knowledge by confidence level, around the central point.
- The Chi square test for independence was used to compare the distribution of responses for categorical data.
- Kolmogorov-Smirnov statistics test was conducted to test normality of data.
- T-test and ANOVA was used to determine mean difference in knowledge scores by venepuncture training methods, staff categories, years of experience and different confidence levels.

FINDINGS

Staff confidence level at first and last venepuncture (n=281)

- Response rate of almost 25% was achieved.
- The phlebotomists and staff of other category reported having more confidence at first venepuncture (Median 2.5).
- The confidence increased at last venepuncture amongst staff of all categories (Median 1.0).

Dispersion of knowledge score by staff category (n=230)

- Doctors’ knowledge scores were the highest.
- Health Care Assistants (HCAs) were lowest.
- Nurses’ scores were spread and contained the lowest score overall.

Dispersion of knowledge score by confidence level at last venepuncture (n=230)

- 95% of scores within staff reporting more confidence at last venepuncture were within IQR Q1 and Q3 median.
- Scores of 10 were in the more confident category.
- The outlier score of 2 was within this category.

Distribution of knowledge score

- A test of normality confirmed the distribution was normal (KS test=0.21 (df 230) p=0.001). The differences in professional background and mode of venepuncture training could have caused the skweness.
- There was a statistically significant difference (at the 5% level) in the total knowledge scores in the 6 staff categories, F (5, 224) = 6.84, p=0.001.
- Doctors had the highest score above mean compared to the other staff category.
- HCAs had the lowest knowledge scores, below mean.

Mean (with 95% CI) total knowledge score by staff category (n=230)

- Doctors’ scores were 1.67 higher on average than the HCAs with 95% CI (0.65, 2.69).
- Doctors’ scores were 0.88 higher on average than nurses with 95% CI (0.32, 1.45).
- There was no significant difference between the doctors knowledge score and phlebotomists (p=0.90), midwives (p=0.27) and staff in the other category (p=0.13).

Total knowledge score by mode of training, years of experience and confidence level (n=230)

- No statistically significant difference in knowledge score was observed (at the 5% level) between the formal and informal venepuncture trained groups, t = -0.12 (228df), p=0.90.
- There was no statistically significant difference (at the 5% level) in the total knowledge scores and years of experience, F (2, 227) = 1.027, p=0.36.
- There was no statistically significant difference (at the 5% level) in the total knowledge scores between the 3 confidence levels of last venepuncture, F (2, 4.69) = 1.67, p=0.31.

LIMITATION

- Single data collection method might have excluded potential eligible participants with cyber phobic and or technophobic.
- Design had no control of who completed questionnaire.
- Lack of data base on staff conducting venepuncture led to estimation of participating staff in the category.
- Use of sample from one hospital undermined external validity.
- The calculated minimum sample size was not reached; therefore, results must be interpreted with caution.

CONCLUSION

The results confirmed inconsistence in the staff knowledge on causes of blood sample haemolysis. Confident staff in venepuncture were not always knowledgeable in the causes of pre-analytical blood sample haemolysis. Inclusion of evidence based causes of haemolysis in the training, regular updates shared amongst all staff involved in venepuncture is the basis to minimising blood sample haemolysis and facilitating proficiency across all staff categories. Furthermore, monitoring and evaluation of the training, the conduct and the rate of haemolysis is required in facilitating implementation of high quality services based on current evidence.

Contact: Nellie.nkhoma@tees.nhs.uk
Telephone: +44 (1642) 854501

REFERENCES


[McGrath, J.K., Rankin, P. and Schendel, M. (2012) ‘Let the Data Speak: Decreasing haemolysis rates through evidence based causes of haemolysis in the training, regular updates shared amongst all staff involved in venepuncture is the basis to minimising blood sample haemolysis and facilitating proficiency across all staff categories. Furthermore, monitoring and evaluation of the training, the conduct and the rate of haemolysis is required in facilitating implementation of high quality services based on current evidence.]

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- Relationship between staff confidence level in venepuncture and knowledge of pre-analytical sample haemolysis is not known.

### AIM

To investigate the association between staff confidence level in venepuncture and knowledge on causes of pre-analytical sample haemolysis.

### INCLUSION CRITERIA

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### METHODOLOGY

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- Parametric t-test and ANOVA was used to determine mean difference in the knowledge scores 2 different venepuncture training methods of different staff categories, years of experience and staff with different confidence levels.

### FINDINGS

#### Staff confidence level at first and last venepuncture (n=281)

- Response rate of almost 25% was achieved.
- The phlebotomists and staff of other category reported having more confidence at first venepuncture (Median 2.5).
- The confidence increased at last venepuncture amongst staff of all categories (Median 1.0).

#### Dispersion of knowledge score by staff category (n=230)

Staff knowledge scores was analysed to determine the spread within the categories and within the level of confidence:

- Doctors’ knowledge scores were the highest.
- Health Care Assistants’ (HCAs) were lowest.
- Nurses’ scores were spread and contained overall lowest score.

#### Dispersion of knowledge score by confidence level at last venepuncture (n=230)

- 95% of scores within staff reporting are confidence at last venepuncture were within IQR Q1 and Q3 median.
- Scores of 0 were in the more confident category.
- The outlier score of 2 was within this category.
- A test of normality confirmed the distribution was not normal (K-S test=0.21 (df 230) p=0.001).
- Although data was slightly negatively skewed (-0.51; SE 0.16), there was positive kurtosis (0.30; SE 0.32).
- The differences in professional background and mode of venepuncture training could have caused the skewness.

- ANOVA was used to determine the variability of knowledge score by staff categories.
- There was a statistically significant difference (at the 5% level) in the total knowledge scores in the 6 staff categories.
- Doctors had the highest score above mean compared to the other staff categories.
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### FOCUS ON KNOWLEDGE AND CONFIDENCE

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean (95% CI) total knowledge score by staff category (n=230)</th>
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<tr>
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<td>Post-hoc test was conducted to quantify the extent of the difference</td>
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### CONCLUSION and implications for clinical nursing

The results confirmed inconsistent no the staff confidence on causes of blood sample haemolysis. Confident staff in venepuncture were not always knowledgeable in the causes of pre-analytical blood sample haemolysis. Inclusion of evidence based causes of haemolysis in the training, regular updates shared amongst all staff involved in venepuncture is the basis to reduction of pre-analytical blood sample haemolysis and achieving level knowledge across all staff categories. Furthermore, monitoring and evaluation of the training, the conduct and the rate of haemolysis is required in facilitating implementation of high quality services based on current evidence.

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