Preanalytical Errors;

. . . continued from previous page

liquid contents of the cells (haemoglobin and other components) are released into the serum/plasma.
To avoid haemolysing specimens during the draw, collectors can adhere to the following practices:

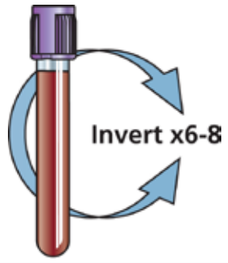
- Avoid slow draws that come from improperly positioned needles;
- Avoid pulling too hard on the plunger of a syringe;
- Fill tubes to their stated capacity;
- Gently invert tubes instead of vigorous mixing;
- Avoid using 25-gauge needles or smaller;

Pre-warm infant heels or the fingers of older children and adults when performing a skin puncture so that excessive squeezing or "milking" of a puncture site is not necessary.
When the blood specimen is as good as "garbage" in representing the patient's actual health status, the actions the clinician takes based on the results that come from it can lead to over- or under-medication, misdiagnosis, or general patient mismanagement.
Those who draw blood specimens must always be aware of the changes they can impose on the blood before, during and after collection.
Due to the complexity of human blood and physiology, many factors threaten accurate test results before the specimen is even drawn. All of these factors, individually and collectively, work to change a representative blood specimen into a test result that is no better than garbage to the clinician.
To make sure the specimens you draw don't earn you the title of "garbage collector", adhere to sound specimen collection practices based on the CLSI standards, your employer's procedure manual, and published studies. When you do, you become part of an elite community of healthcare professionals who safeguard sample quality through all aspects of specimen collection.
Remember, accurate results begin with you.

The Importance of Mixing

BD

A BD Vacutainer® tube is an evacuated tube for the collection of blood which contains an additive. These additives have one of 2 purposes, either to stop the coagulation process in blood i.e. clotting, or else to speed up clotting in blood in the case of Serum tubes. The common types of anti-coagulatants used in blood are Lithium Heparin, Potassium EDTA, Sodium Fluoride / Potassium Oxalate and Sodium Citrate. In the case of Serum tubes the additive used is the clotting agent Silica. With the exception of Sodium Citrate in the Coagulation tubes, all other anticoagulatants are in salt form.
To ensure that these anti coagulation salts are homogenously mixed through the blood sample in the BD Vacutainer® tube, it is imperative that tubes are mixed correctly immediately after being filled. Similarly with the serum tubes it is very important that the blood clots homogenously and therefore you must ensure that all the blood comes in contact with the clot activator on the walls of the tube, as soon as possible after collection.
If BD Vacutainer® tubes are not mixed correctly you run the risk of affecting the diagnostic result which could lead to a patient misdiagnosis. Also a clot may cause an analyser to crash, which can result in a delay in reporting all sample results and possibly require patients' samples to be retaken. Therefore increasing the workload for both the Laboratory and Phlebotomy Departments.



TRAIN THE TRAINER DATES 2009

NAP

Saturday 31st January 2009	Princess Royal Hospital
Sunday 1st February 2009	Princess Royal Hospital
Tuesday 3rd June 2009	Venue to be confirmed
Wednesday 4th June 2009	Venue to be confirmed
Saturday 19th September 2009	Ashford Hospital, Middlesex
Sunday 20th September 2009	Ashford Hospital, Middlesex

Booking form can be downloaded from www.phlebotomy.org
For more details contact Jacqui via email jacqui.hough@asph.nhs.uk

Oh no not appraisal !

Having taught a Train the Trainer course recently I have been inspired to share my thoughts with you. Once again I have met like minded souls from the world of Phlebotomy, professionals that are passionate about passing on good practice, generous with their time and energy to ensure those taking on the skill benefit from their experience and knowledge. The group consisted of a variety of grades as follows one Phlebotomy Manager graded a 4 but takes vast responsibility for all aspects of service delivery, educational and staff management, a grade 3 who is responsible for service delivery, staff management and development, a grade 2 who has vast experience trains staff in the community and a practice nurse (grade not known) in community. If all these staff have the responsibilities of formulating, delivering and assessing training for a variety of Healthcare professionals then I believe they are graded incorrectly.

For years now NAP has encouraged Phlebotomists to developed knowledge and understanding to support their role in Healthcare however time and time again I have to remind staff that it needs to be relevant to the role and evidence based. Ongoing assessment of experienced staff is non-existent or poor, if staff are assessed there is little or no documentation – ask yourself when did you last put anything in your PDF – if you need to know what that is then you have been in the broom cupboard far too long, PERSONAL DEVELOPMENT FOLDER! Come on shake those feathers get your act together, stop whining get learning but make sure it is relevant and evidence based.

Agenda for Change provides the opportunity for staff to be rewarded for depth of knowledge and understanding needed to support your role. Has your job developed? Are you taking on more responsibility than when you signed your job description (JD)? Have you developed your knowledge to extend skills? If you have said yes to any of these you need to discuss your JD with your line manager preferably at your appraisal. Plan your appraisal, do not go in with unstructured thoughts, prepare and evaluate your own JD. Look at your knowledge and skills framework (KSF), make notes, take your PDF with you but make sure all the certificates you have achieved to support your role are in there. Look at the training program your Trust provides or within the professional body - are there courses that will support your job, or any weak areas you may have? Are there any changes in the department that would improve the service for patients or staff? It may be that your banding remains the same band but it may just tip your scoring over the edge taking through a gateway to the next banding.

Phlebotomists didn't score highly on the job profiles because the role involves one task with no entry qualifications. When writing the JD and efforts proforma, you need to think about every subtitle very carefully, if you have never seen your knowledge and skills framework, I'm worried.

Appraisals should be once a year, it should review your previous year and set objectives for the next, with predicted completion dates.

THIS IS YOUR TIME
USE IT WISELY!

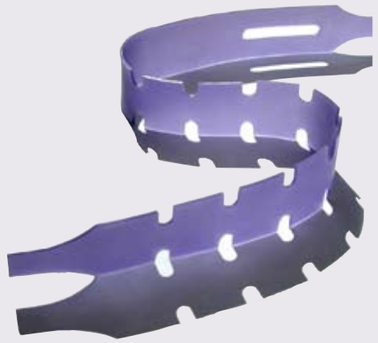
Your colleague
Jacqui Hough

NAP

The Newsletter of the National Association of Phlebotomists November 2008 Volume 9.1

The saint is helping in the fight against Healthcare Associated Infections

Dr. Iain Davies MBBS - Sinia Medical Ltd



Patients. They are the general public, the bill-payers, the service users, and the people that look to us for healthcare. We, as clinical staff, have a privileged relationship with anyone who calls upon our services and asks for our help. With this relationship comes responsibility – we are obliged to work solely in the best interest of the patient. This is often difficult yet, with help from innovation and the concerted effort of like-minded people, we can gather the momentum to ensure patient safety is our priority.

We are increasingly aware of the high mortality surrounding Hospital acquired infection, and the £10 billion price tag that accompanies it (Plowman et al. 2001). We are equally aware that tourniquets should be disposable thanks to the pages and pages of data freely available concerning gold-standard phlebotomy (Hepatitis 'B' remains viable for 1 week in dried blood is the most convincing evidence). As a clinician and a patient I saw a problem with this – we have disposable

continued on page 2. . .

TOURNIQUETS, DECIDING ON BEST PRACTICE

Roger Hoke BSc (Hons) PG Cert TLHE, RODP.

Tourniquets are traditionally used in phlebotomy and venous cannulation to encourage distension of the veins to facilitate easier venepuncture. Two types of tourniquet are available: those, that are intended to be reusable, and those designed to be disposable, single use items. The former is often constructed of a thick, woven elastic material, which may also contain natural rubber latex, and invariably incorporates a plastic or metal quick release mechanism. Disposable tourniquets often consist of little more than a simple strip of synthetic, latex free, stretch material. The reusable type is easy to apply whilst disposable tourniquets require the user to apply them correctly as a flat band to avoid pinching the skin.

For sometime, there has been considerable discussion over which type of tourniquet constitutes best practice. Whilst some hospital trusts have now changed to disposable tourniquets, others have not. From a financial perspective, the cost per single-use disposable tourniquet is approximately seven pence each and to a busy department, these additional costs must be justified by considering cost against patient risk.

Re-usable tourniquets have been shown to have the potential to spread nosocomial infections [Berman et al, 1986]. In this study, 24 tourniquets were cultured and Staphylococcus aureus was found on 12 (50%), 7 of which were methicillin-resistant strains (MRSA).

A separate study examined 200 tourniquets from a cross section of healthcare workers from a large teaching hospital [Rourke et al, 2001]. They found that 75 (37.5%) of tourniquets were visibly blood-stained. Proportionally, 72.7% of house officers' tourniquets and 69.2% of laboratory phlebotomists' tourniquets carried visible bloodstains followed by 53.3% of tourniquets belonging to nurses.

In a similar study [Golder et al, 2000] found that 50% of tourniquets (25) were also visibly blood-stained. Additionally, all 50 in the sample group (100%) contained heavy growth of skin flora including coagulase negative staphylococci, coryniform, micrococci, candida and Acinetobacter. Other important bacterial cultures were also obtained from 17 (34%) of tourniquets. These included E.coli, (4%) Enterococcus faecalis, (2%), Pseudomonas (2%) Stenotrophomonas maltophilia (2%) and methicillin-sensitive Staph. aureus (24%). The high bacterial colonisation may be attributable to bacteria being trapped within the weave of the tourniquet fabric.

More recently, another study found that even when tourniquets were replaced on a daily basis, MRSA could be detected on nearly 25% of the tourniquets sampled [Leitch et al, 2006].

These results confirm that tourniquets have the potential to act as a vehicle to transmit pathogenic bacteria from one patient to another. Some workers have suggested that hand washing is the single most effective action to reduce cross infection. Yet handling contaminated tourniquets during an aseptic procedure will negate even the most stringent hand washing.
Many research articles report bloodstains on reusable tourniquets suggesting that in addition to bacterial infections there is also the potential to transmit blood-borne viruses to patients—especially so if the blood is wet as may be the case in a quick turnover area such as a phlebotomy clinic. The potential for inoculation will increase where there areas of broken skin such as in eczema, insect bites and cuts or abrasions.

Protection against this form of inoculation is the basis of Standard or Universal Precautions, which healthcare staff should use routinely to protect themselves. Failure to extend the same basic protective measures to patients leaves healthcare teams open to the suggestion at best, of double standards and at worst, negligence through failure in their duty of care. The risks may be greater than it first appears when we consider that healthcare staff are vaccinated against hepatitis B virus whilst the vast majority of patients are not. It is impossible to disinfect reusable tourniquets between patients and the use of any potentially contaminated equipment is always regarded as a serious breach of infection control protocol.

As part of an Inter-Professional Learning Unit (ILPU) for healthcare students from the Universities of Portsmouth and Southampton (Group 62), the students were asked to evaluate the two types of tourniquet and make recommendations based on risk to patients. Where additional funding was required, the students were asked to provide costs and to provide a case for funding. They presented their findings to senior Trust staff including the Intravenous Therapy Team, Modern Matrons and Infection Control nurses.

Although the cost of introducing single use disposable tourniquets was significant, the student group presented a convincing argument that costs could be met from an over all reduction in infection rates. Infection Control estimated the average cost of treating a bacteraemia at £7000. The same amount would buy 100,000 disposable tourniquets.

Portsmouth Hospitals NHS Trust has amended its policy for all intravenous access including phlebotomy and have now changed exclusively to single use, disposable tourniquets.

Roger Hoke is Clinical Educator at Portsmouth Hospitals NHS Trust.
Roger.Hoke@porthosp.nhs.uk

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Goulder M, Chan CLH, O'Shea S, Corbett K. The Lancet. London Jan 1, 2000. Vol 355, Iss 9197: 44
Leitch A, McCormick, Gunn I, Gillespie T. Reducing the potential for phlebotomy tourniquets to act as a reservoir for methicillin-resistant Staphylococcus aureus. Journal of Hospital Infection 2006; 63: 428-431.
Rourke C, Bates C, Read RC. Poor hospital infection control practice in venepuncture and use of tourniquets. Journal of Hospital Infection. 2001; 49: 59-61

NAP

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tourniquets available, but, fabric reusable tourniquets are used almost exclusively! Little did I know that this was about to change…

When I arrived at my GP's for a blood test in 2002 I did not expect that an episode of phlebotomy would shape the following five years. A very stretchy disposable tourniquet was tied around my arm - tightly! Releasing the tourniquet seemed to go hand in hand with the needle stirring my vein, causing discomfort and causing a large haematoma. The tourniquet was finally removed leaving a deep red mark around my arm. Thinking about the effect this would have had on the skin of an 84-year-old, or someone on long-term steroids, I realised this method needed to be changed.

Five years later another clinician and I founded Sinia Medical Ltd - one of the UK's newest medical innovation companies.
At Sinia we have successfully developed the Single use Anti-INfection Tourniquet, or SAINT. We combine clinical experience with an expert design team to produce devices which improve both patient care and efficient use of clinician time. Our SAINT tourniquet is a great example of this - its patient friendly and ease of use is a proven winner with Hospital and Ambulance Trusts across the UK only six months after its launch!

The SAINT is latex-free, manufactured in the UK, has remarkable functionality and has the seal of approval of the NAP. Having had very kind remarks from Cathy Williams, Jessie Harris, and Gordon Hurst, we are confident that use of the SAINT will grow nationwide. We are proud to assert that our patient and user-friendly tourniquet will continue to play a pivotal role in the everyday fight against Healthcare associated infections for years to come!

The SAINT is available from Greiner Bio-One.
Tel: 01453 825255. email: info@uk.gbo.com
Product Code: ADSAINT07
Unit of issue: 100

AGM / Conference 2008 - Jessie Harris

The last AGM was held in the Education Centre at Ashford Hospital. The AGM was concise and to the point with delegates given information on what the committee have been doing. Though the committee is not high profile they have been beavering away on behalf of the membership attending many meetings and of course the IBMS Congress.

Education, training and registration are still top of the committee's agenda though progress is still very slow, the committee is still determined to carry on until our goals are achieved.

After the AGM there was a very well received extremely interesting lecture on Infection Control bringing home to many the importance of adhering to Universal Precautions.

Second item on the agenda was a very funny sketch performed by staff from Ashford. The delegates having to complete a quiz on the performance and I'm sure we have all at some time in our careers met a Phlebotomist and a patient that matched those portrayed.

After a very enjoyable buffet lunch the day carried on with the delegates being split into three groups for the breakout sessions which again were enjoyed by many, the topics covered were

1. Basic Paediatric Tips,
2. Hand washing technique
3. NVQ optional units.

The day I felt went well especially the breakout sessions and if anybody as any suggestions for topics for future conferences the committee would welcome them. We need your input to make sure that Conference continues to explore new idea's that meet the needs of Phlebotomists.

Finally the committee would like to thank the following for their continuing sponsorship:

Greiner Bio-One, Becton-Dickinson and Sarstedt

AGM & CONFERENCE 2009

THE THEME FOR 2009 WILL BE PAEDIATRICS PHLEBOTOMY

SATURDAY 4th APRIL 2009

at

BIRMINGHAM CHILDREN'S HOSPITAL
Postgraduate Centre
Steelhouse Lane
Birmingham
B4 6NL

REGISTRATION 9.30am
AGM 10.00am
CONFERENCE 10.30 – 16.00

A light lunch will be provided

Arrive early to take a look at the many sponsors that will be exhibiting a range of Phlebotomy equipment

Pre booking is critical to reserve one of the limited 150 spaces the cost will be £10 per member, £25 for non members. Confirmation of booking will be made via email inclusive of agenda and directions so please provide an email address

The NAP executive is always looking for motivated colleagues that are able to commit themselves to developing Phlebotomy either are EC level or at a regional level, if you believe you have the time and drive to become more involved in NAP then please email phlebotomy@btinternet.com

5 Questions to help you decide on Tourniquet Best Practice

Consider the following

1. The next time you take a blood sample from a patient, will you wear gloves to protect you from blood borne viruses?

2. The next time you have a blood sample taken, are you happy for the phlebotomist to use a tourniquet which may have bacteria such as MRSA or E. Coli on it?

3. Are you happy for the phlebotomist to use a tourniquet on you which may have splatters of blood which may be from a patient with HIV or hepatitis?

4. What type of tourniquet would you prefer to be used on you?

5. What do you consider to be 'Best Practice' - single use disposable or re-usable tourniquets?

There are many choices of disposable tourniquets out there all of which the user can get used to!

Dennis J. Ernst MT
(ASCP)
USA

NAP

Preanalytical Errors;
the role of the phlebotomist in minimising them

Many collection errors that alter test results occur before the needle is ever inserted into the arm. The following are some of the more significant mistakes phlebotomists can make that turn the information the lab reports on the specimen into garbage.
Misidentification — when patients are treated according to someone else's results, catastrophes can occur. Make sure all patients are asked to state their name and that the arm bracelet you are using to identify inpatients is attached to their person.
Wrong time of collection — make sure all patients requiring fasting lab work are indeed fasting. By definition, fasting is a complete dietary restriction of everything except water and medication. Fasting for a glucose level must be overnight.
Timing blood cultures; when blood cultures are ordered, the timing of their collection is critical to recovering the bacteria that could be infecting the patient. Whenever blood cultures are ordered because the patient's temperature exceeded a predetermined level, timing is critical. Typically, the fever spikes 30 minutes after bacteria have shed into the bloodstream and reached its peak concentration. Any delay in the collection diminishes the concentration of bacteria in the sample, and delays the time it takes for them to multiply to detectable levels within the blood culture bottle.
Site prep solutions; When cleansing a site with alcohol, CLSI recommends allowing the area to air dry to prevent haemolysis of the specimen. (1) Additionally, some bacteria are killed during the drying process; do not retouch the site as palpating for the vein after cleansing.

The following practices will minimize the potential for specimen collection personnel to contaminate blood culture specimens:

- Cleanse the site thoroughly with a friction scrub for at least 30 seconds;
- Allow the antiseptic to dry a minimum of 30 seconds prior to puncture;
- Do not palpate a cleansed site, not even if you have cleansed the tip of your gloved finger;
- Cleanse the tops of culture vials with an appropriate antiseptic if recommended by the vial manufacturer or if their sterility is in question.
- Fill blood culture bottles before filling tubes for other laboratory tests.

Blood culture contamination; Every hospital struggles to minimize false positive blood cultures. When sites are not cleansed properly or are re-contaminated by palpation after being prepared, the results may incorrectly suggest the patient has a blood borne bacterial infection, prompting the physician to treat and/or hospitalise a patient unnecessarily.
Exercise & fist pumping; Outpatients are more likely to have engaged in strenuous activity immediately prior to coming to the draw station for a blood test than inpatients. Exercise can temporarily increase a patient's ACTH, bilirubin, CK, cortisol, creatinine, HDL, LDH, the percentage of neutrophils in a FBC, uric acid, and the WBC count. Therefore, it's best to avoid collecting a blood specimen right after the patient has had a strenuous workout. If unavoidable, make a notation to accompany the results so that the physician can interpret them in the proper context. Likewise, patients should be instructed not to pump their fist prior to specimen collection. Studies show fist pumping can increase a patient's potassium as much as 20%, in addition to ionised calcium.
Posture; Most reference ranges the laboratory includes on test results for physicians to consider as "normal" are established from ambulatory patients. Since most inpatients have their specimens drawn while lying in bed, their results are usually being compared against what is normal for healthy people who are up and walking around. For most tests, that is not critical, but for others, it is.

It's all about haemoconcentration; When your patient goes from lying down to standing up, the body responds by releasing hormones into the bloodstream that increase the blood pressure so that the brain, now elevated, can continue being supplied with oxygenated blood With the increase in blood pressure comes an increase in blood volume, making the capillary beds swell and become increasingly porous. Water and smaller compounds migrate through the capillaries in greater concentrations, leaving large substances like cells, proteins and molecules attached to protein in the bloodstream. This sudden porosity of the capillary beds works like a fishnet, trapping only the larger blood components in the veins. This is what we know as haemoconcentration. Drawing specimens during this change can cause a higher test result than if the patient were drawn while recumbent. When your laboratory's test requirement states the specimen should be drawn while the patient is lying down, posture is critical to accurate results.
Prolonged tourniquet application; As soon as a tourniquet is applied, the blood begins to pool within the veins below the tourniquet. This again causes haemoconcentration. As a result, specimens drawn from haemoconcentrated veins no longer reflect the patient's actual status if tourniquet application is prolonged. Therefore, the vein should be accessed within one minute of tourniquet application. If a vein cannot be located and accessed within one minute, the tourniquet should be released, and then reapplied after two minutes. This allows the blood in the limb to return to a basal state. If it will not jeopardize the draw, the tourniquet should be released as soon as the vein is accessed to minimize the effects of haemoconcentration on the specimen.
Order of Draw; The proper order in which blood collection tubes should be filled is designed to prevent the carryover of additives from one tube to the next, which can lead to the reporting of erroneous
results from patient samples. The order has its origins in the literature as early as 1977 when researchers discovered a potassium level on an asymptomatic patient five times higher than normal. Although there have been various modifications to the order of draw throughout the years, the current Clinical and Laboratory Standards Institute (CLSI) recommendation has been in effect since 2003.
Prompting the revision at the time was the industry-wide substitution of glass collection tubes with plastic. Because a plastic serum tube requires the addition of clot-activating substrates in order for the specimen to clot, CLSI moved its position from before the citrate tube (for coags) to immediately after it. Clearly, clot-activator tubes cannot remain as the first tube in the order of draw preceding sodium citrate tubes, since any carryover may quantitatively affect clotting times.
The order then, established by CLSI to prevent the documented carryover of the additive from one tube into another tube and the effects that carryover can have on test results, is as follows:
First — blood culture tubes or vials;
Second — sodium citrate tubes (e.g., blue tops);
Third — serum tubes with or without clot activator or gel; (e.g., red tops);
Fourth — heparin tubes (e.g., green tops);
Fifth — EDTA tubes (e.g., lavender tops);
Sixth — oxalate/fluoride tubes (e.g., gray tops).
This order is the same regardless of the equipment (e.g., syringe, tube holder, or winged collection set). However, a separate order of draw exists when collecting capillary samples. This is based on the fact that when skin is punctured, platelets are attracted to the site en masse and can exist in the blood specimen being collected in quantities that don't really reflect what's really circulating. Platelets adhere to damaged capillary vessels and clump to each other in order to stop the bleeding, the potential for clumps of platelets to interfere with accurate CBC results increases rapidly after the puncture. In other words, the first few drops from a capillary puncture will more likely reflect platelet concentrations as they exist in the bloodstream than later drops. Therefore, the EDTA tube used for FBCs must be collected first. CLSI established the order of draw for capillary specimens to be as follows:
First — EDTA tubes;
Second — other additive tubes;
Third — non-additive tubes.
Haemolysis; One of the most common and more frustrating pre-analytical errors is haemolysis. Many factors can haemolyse a specimen during the draw including;

- improper needle placement;
- excessive pulling pressure on the plunger of the syringe;
- vigorous mixing;
- small needle size;
- inappropriate blood: anticoagulant ratio due to under-filling
- 'Milking' the site of a capillary puncture.

As a result, the following analytes can be reported falsely higher than their actual concentration in the patient: potassium, LDH, AST, ALT, phosphorous, magnesium, and ammonia. Haematocrits and red blood cell counts will be falsely lower in haemolysed specimens. In addition to these analytes, the dilution affect of haemolysis can potentially alter every test. That's because when a specimen is haemolysed, the

continues on next page. . . .