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| <b>Pneumatic Tube Transport of Clinical Specimens</b> |            |                 |                               |

## Pneumatic Tube Transport of Clinical Specimens

The main hospitals in the Belfast Trust have two pneumatic specimen transport systems in place, the original send and receive pneumatic tube system and the auto-unloading pneumatic transport system (currently being trialled on the RVH site between ED, ICU and Laboratories (if successful to be rolled out further)). The auto-unloading pneumatic transport system automates the receipt, unloading and return of PODS to senders station. The pneumatic tube transport systems transport specimens in PODS (or carriers) from many of the wards to the local on-site laboratory or to a central dispatch point from where specimens are shipped off site by road to another laboratory.

### **RVH:**

- Send & Receive
- Auto unload

### **BCH**

- Send & receive

### **Mater**

- Send & receive

There is also a *cross-site pneumatic link between BCH and RVH*.

- This cross-site system is used for urgent specimens usually by Laboratory reception and Belfast Trust Laboratories e.g. to forward urgent specimens during specific times such as between regular van run times or Out of Hours (OOH) ( Mon to Friday 17:00 – 08:00 & Weekends).
- Use and access of this system is controlled to minimise the risk of backlog resulting in significant delays, due to its low capacity.
- Any specialist unit regularly requiring a rapid transfer of specimens to a Laboratory on the other site can submit a request to the Laboratories for access to use the cross-site link directly.

Not all laboratories and destination stations are manned 24/7. Where a station is closed, the PODS will be re-directed automatically to a 24/7 station where staff will ensure the material is forwarded to the intended destination in the next appropriate taxi or van run.

When using the send and receive pneumatic tube system, care must be taken to correctly key in the destination station code, if a POD is sent to a non-laboratory destination by mistake it could take a significant time for this to be noticed and for the recipient to return the full POD to the original sender.

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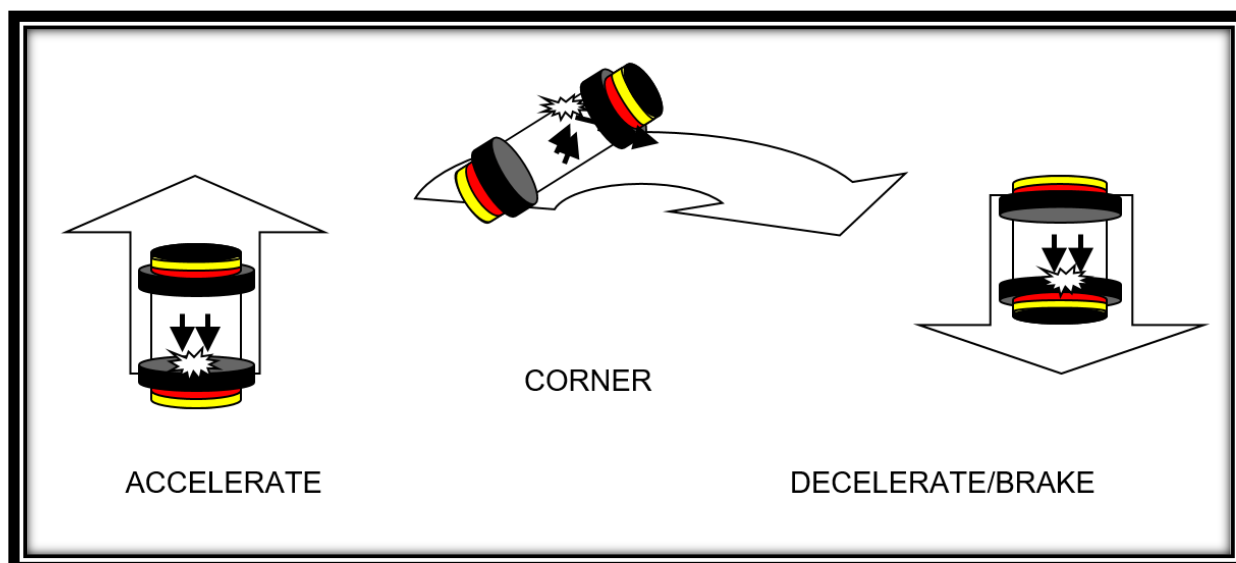
**This document outlines guidance on the operation of Pneumatic Tube Transport Systems and what materials are permitted to be sent by this route.**

The PODS are not leak-proof. **Care must be taken therefore to ensure specimens do not leak or get damaged in transit.**

Specimens transported in PODS by pneumatic tube are subjected to considerable turbulence, more than would be experienced when transported by hand by porters or in vans. If specimens are not well restrained within the POD during transportation via the pneumatic tube system the sample integrity may be compromised.

The manufacture's design specification is for the use of two tightly fitting polystyrene bungs, one in each end of the POD. The polystyrene bungs should be pushed in to constrain the contents from being thrown around during transit. They serve as a cushion for the contents against impact with the hard ends of the POD when the PODS accelerate, corner or brake. The impact to the specimen if not properly restrained during transit is shown in Figure 1.

**Figure 1: The direction of travel and surfaces impacted on unrestrained specimen(s)..**



Pneumatic transportation will exaggerate any effect of improper packaging. If leakage occurs it may result in a major and expensive clean up since it is likely to leak out of the POD into the tube network which will then immediately require decontamination.

### **1.0 Specimen packaging guidance for transportation via pneumatic tube**

When sending specimens via the pneumatic transport system the basic rules of specimen packaging must be followed.

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**Users MUST always:**

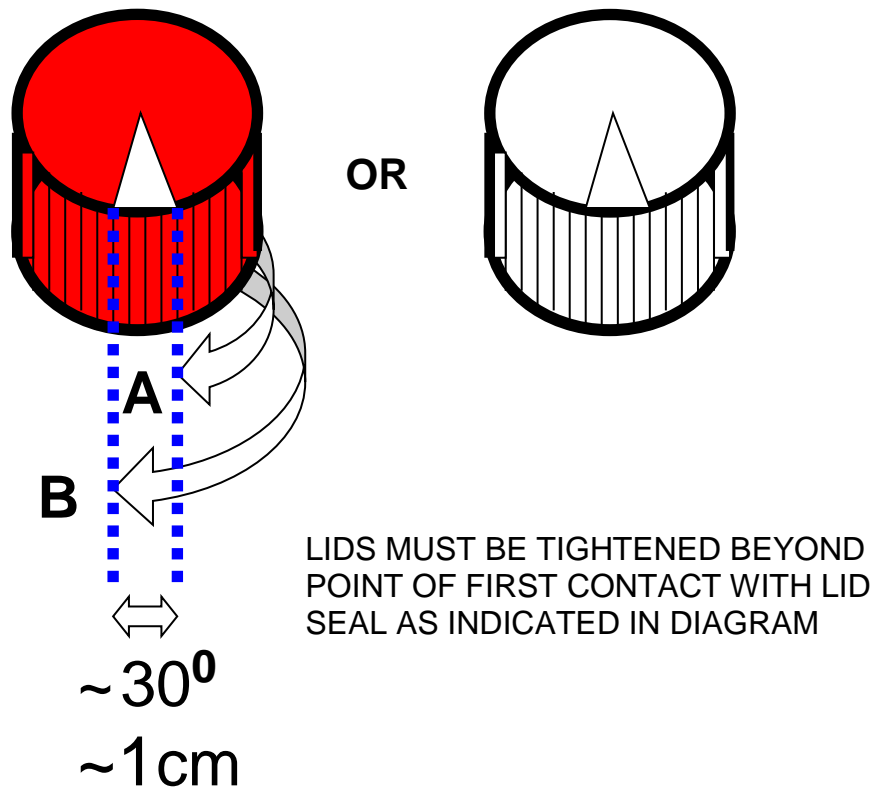
- Use a rigid leak-proof primary specimen container which is CE marked and labelled as:
  - 'In vitro device' 'IVD' or
  - Containers specifically issued by the laboratories for specimens. (Do not use improvised or alternate containers).
- Use the correct container for the specimen type, e.g. faeces should only be sent in faeces containers, with the integral spoons (currently blue lid)
- Securely tighten lids as shown in Figure 2.
- Properly seal primary container in the request form bag.
- Only pack one specimen per request form bag (except swabs where multiples are permitted, provided the bag can be properly sealed)
- When utilising the auto unloading pneumatic tube system, samples must be packaged in accordance with [BS-236 Auto unloading carrier instructions](#) . The request form bag or biohazard bag MUST be placed in to a POD insert transport bag (Only pack one specimen per POD insert bag) and sealed before it is placed in the carrier.
- Damaged or cracked, containers **must not be used**.
- Containers must not be more than  $\frac{3}{4}$  full or filled above indicated fill line, where this is marked.
- When using the original send and receive pneumatic transport system ensure there is adequate padding in the pneumatic POD (a minimum of two polystyrene bungs (one in each end of the POD) pushed down to restrain load). If polystyrene bungs are not available or have been removed use wads of paper to secure the load.

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**Figure 2 : Securing the lids of screw top 30 ml Universal Containers before Transporting**

**A = point at which bottle first touches rubber seal**  
**B = point where lid is securely locked and sealed**

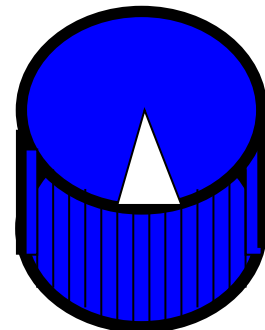
**URINES & BODY FLUIDS**



**FAECES**

Blue lidded faeces containers have a different type of sealing mechanism.

The Distance from first bite point to securely closed is shorter, an angle of 15° or 0.5cm



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## 1.1 Specimen Types

Most routine blood and Microbiology specimens can be sent in the pneumatic system, provided the basic instructions above are strictly adhered to. This includes: swabs, urines, blood cultures, sputum, faeces, and blood in vacuette containers.

**Glass specimen** containers **cannot be sent** via the pneumatic tube system.

Please note blood culture bottles are plastic and therefore can be sent in the pneumatic system.

## 1.2 Specimen Volumes

100ml bottles of body fluids **must not** be sent in the pneumatic system- in most circumstances it is not necessary to send such large volumes. For sample requirements please consult [BHSCCT Laboratories User Manual](#)

A maximum of two 20 ml plastic universal bottles (white top Sterilin type bottles) are sufficient for most situations including Pleural Fluids, CAPD samples and other body fluids.

Body fluids **must not** be sent in 50ml sputum pots.

## 1.3 Damaged PODS

- Do not use PODS with any damage to the lids, body or outside seals
- Damaged PODS should be wrapped in a bag and returned to the laboratory with a note detailing damage
- Returned damaged PODS will be forwarded by the laboratory to the control room for repair
- Repaired PODS will be returned to the ward using its coded chip

Damaged PODS can stick in the system and will shut down sections resulting in significant delay in receipt of other specimens in the system. Any shut down will require specimens to be transported by porter until the system is fixed.

## 1.4 Pharmacy PODS

Pneumatic PODS for Pharmacy use are designated by a green band at each end while those for Laboratory use are designated by a red band at each end.

Laboratory specimens must never be sent in green PODS.

Pharmacy requests and supplies must never be sent in red PODS.

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There is an infection control risk in using the wrong colour PODS. For example laboratory specimens may contain Health Care Associated Infections such as MRSA or *C-difficile*. These could potentially leak unnoticed and contaminate the POD & POD system.

If Pharmacy supplies were then sent in the same contaminated POD supplies could become contaminated. If the contaminated pharmacy supplies are then handled and taken into a clinical area on the presumption of being 'clean' these infections could be spread.

Pharmacy PODS are longer and usually have no installed padding. Consequently laboratory specimens incorrectly sent in these PODS are more frequently damaged or leak in transit.

## 2.0 Restricted and Prohibited Specimens

Users **must not** send specimens where there is a high element of risk. There are two types of risk:

### 2.1 High Value / Fragile Specimens

The pneumatic system is imperfect and can experience outages or at times PODS can become snagged inside the system during an outage.

Where there is a risk of loss, delay, and/or consequent damage to a high value specimen (e.g. CSF, Biopsy, time-critical samples from patients difficult to bleed) that may be difficult to replace or difficult to repeat, it is recommended that these high value samples are hand delivered via porter transfer.

Some Clinical Chemistry tests such as blood gas analysis, which must travel on ice, are unsuitable for the pneumatic system as the turbulence experienced during transit via pneumatic tube system may compromise with the integrity of the results.

### 2.2 Hazardous Specimens

#### 2.2.1 Hazard Group 3

Leakages and breakages occur in any transport system, but leakage in pneumatic systems is much more difficult to clean and decontaminate.

The current PODS in use are not leak-proof, if a specimen from a patient with a Hazard Group 3 (Containment Level 3) organism were to leak, the entire tube system could be contaminated. When noticed this will close down the system for decontamination, if unnoticed it could spread infection.

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Specimens from Hazard Group 3 patients **MUST** be double bagged and **MUST** be labelled as 'Category 3 Risk' with a suitable sticker or Biohazard label so that prompt action can be taken in the event of a leak being noticed on receipt. Examples include: patients with HIV, HTLV, Hep B C E G, Brucella, Typhoid, Dysentery & Verotoxigenic *E.coli* O157, query CJD.

There are no exceptions, if not double bagged and not clearly labelled these specimens are prohibited.

### **2.2.2 Respiratory Hazard Group 3 (including COVID-19, Influenza Mycobacterium tuberculosis (TB) and Hazard Group 4 Organisms**

**Due to the potential for exposure to infectious aerosols or droplets, specimens from suspect or known COVID-19 (SARS-CoV-2), Influenza or Mycobacterium tuberculosis (TB) patients are prohibited from transportation via the pneumatic tube system.**

Examples of respiratory specimens **not to be** transported in the pneumatic tube include:

- Bronchoalveolar lavage (BAL) specimens and sputum
- Nasopharyngeal wash/aspirate or nasal aspirate
- Pleural fluids
- Tracheal and lower respiratory tract aspirates
- Nasopharyngeal (NP), oropharyngeal (OP) and Nasal mid-turbinate (NMT) swabs from patients who are known or suspected to have a **Category 3** respiratory illness (e.g. COVID-19, *Mycobacterium tuberculosis*, Influenza etc).

Please note whilst bacterial blood culture bottles are made of plastic, mycobacterial tuberculosis (TB) blood culture bottles are made of glass therefore they should **NEVER** under any circumstance be transported via pneumatic tube. Mycobacterial tuberculosis (TB) should be packaged following the triple layer packaging system as detailed in the C-84 Transport policy for hand delivery.

Specimens from patients with or suspected to have a Hazard Group 4 organism are also totally prohibited from the pneumatic system. Examples include, rabies, haemorrhagic fevers, SARS, Avian Influenza, Lassa Fever, Ebola virus etc.

Even for portering and road transport these materials require special arrangements, so advice and guidance from the Microbiology/Virology consultants and their Transport Advisors must be sought first (see [Microbiology user manual](#) for contact details).

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### 3.0 Training

- It is strongly emphasized that it is sender's responsibility to be trained in the procedures related to the operation of the pneumatic tube and to keep up to date with subsequent changes in practice.
- Senders should be familiar with and have read any instructions on the transport station and should check regularly in case the instructions have been updated.
- As for any procedure the sender must decide if they are sufficiently trained, competent, and up to date with procedures before carrying out the transportation procedure.
- Before sending a specimen , the sender must make a brief mental risk assessment of what they are about to do, taking account of the guidance above, any update training they have received and considering the possible consequences, they must then decide on the appropriate action to take, if in doubt consult the receiving laboratory first.
- Department / Ward Managers must maintain records of staff training and refresher training in relation to the pneumatic tube. In house, on the ward, training is acceptable but must be evidenced.
- Training must be supported by clear written instructions kept at Ward / Department level and available to all staff using the system.
- Department / Wards must not rely on familiarity with pneumatic systems in other hospitals being directly transferrable to the Belfast Trust system, particularly for recently recruited staff, agency staff and trainee/ placement staff.