

AUSTRALASIAN COLLEGE
FOR EMERGENCY MEDICINE



Guideline

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INTRODUCTION

Pathology tests are a common and important component of patient management in Australian and New Zealand Emergency Departments (ED). For each patient it is important that indicated tests are requested, that specimens are correctly collected and results are reviewed in a timely manner. Similarly it is important to avoid inappropriate testing which may lead to management delays, difficulties around follow-up and increased costs. An aim of this document is to provide guidance on pathology requesting and collecting. The advice should always be used in combination with clinician judgement. In selecting tests and communicating results it is noted that the ED setting needs to be considered as part of the continuum of care which may include admission to hospital or community follow-up.

Clear communication between the ED and the pathology provider is a requirement for good governance of these activities. Senior ED clinicians should meet regularly with senior laboratory staff to identify and monitor the specific needs of the respective services. A service level agreement should be developed that documents the arrangements between the ED and the pathology laboratory at each site. While it is acknowledged that the specific content and format of these agreements will be tailored to the needs and circumstances of each site, every agreement should specify all information as outlined in the *Governance* section of this document.

PATHOLOGY REQUESTING FOR COMMON CLINICAL PRESENTATIONS

Test selection is a key part of patient diagnosis and management. A matrix is provided below on *test selection* which has been developed to provide a summary of the commonly required tests for a range of ED presentations. The matrix is designed as a rapid reference guide for junior medical and nursing staff for the treatment of adult patients attending the ED. The matrix is not exhaustive and is for guidance only, recognising that all patients are different and there may be multiple co-morbidities. It is acknowledged that some tests may not be immediately available on-site in all locations. Senior clinicians should provide education and support to junior doctors and other staff in the ED to assist with appropriate test selection. It is also recognised that there is little empirical evidence for or against the use of any specific pathology tests for a particular condition and so the matrix represents expert opinion from members of ACEM and RCPA.

Some important factors with regard to strategies for pathology requesting that may be useful include:

- Testing should be guided by history and clinical examination - focusing on the urgent problem and any relevant co-morbidity.
- Pathology should generally only be used in those patients where it assists ED management decisions or is critical to the patient's care pathway.
- It is most efficient to order all appropriate tests on a single specimen collected early in the ED visit.
- Add-on tests to samples already in the laboratory may avoid recollection, but are generally less efficient than a correct initial request - both for the laboratory and the ED.
- Repeat collections may be traumatic for patients and are clearly wasteful.
- Test results should be viewed and acted on during the emergency visit when possible.

SPECIMEN COLLECTION TECHNIQUES/METHODS

Blood collection and labelling are a vital component of pathology testing and should not be considered an 'assumed skill set' for medical and nursing staff. Education, orientation and competency assessment or 'credentialing' should be considered for all ED staff. Poor collection techniques and lack of knowledge on this topic can produce specimen quality issues, patient misidentification (i.e. wrong blood in tube) and erroneous results. These may lead to direct patient harm from acting on an incorrect result. In addition, specimen recollection and repeat processing cause significant waste and delays in patient management.

Key components of core pathology education for ED staff are outlined in *Pathology Collection training* below. More detailed requirements relating to specimen collection and labelling will be available from your local pathology laboratory.

GOVERNANCE

Communication

Communication between ED and the pathology provider should include regular, documented meetings and clear lines of communication for addressing urgent or other issues as they arise. These meetings should allow communication of needs of both parties. For example, ED may request a change of service from business hours to 24/7 or wish to introduce point of care testing.

The documented meetings should lead to a *Service Level Agreement* which should include the components listed below as a minimum. While it is acknowledged that the specific content of these agreements may be varied to meet the needs and circumstances of each site, every Agreement should specify all information as outlined in this section. Additional information may be relevant, e.g. detailed information regarding costs of tests and billing arrangements between the ED, the pathology laboratory, the hospital and/or other relationships. The Service Level Agreement should be reviewed and agreed between the directors of the ED and the Pathology service on a regular basis, typically at least annually.

In addition to the service level agreement Procedural Protocols should be developed and documented for common interactions between the services. For example, how pathology alerts the ED to a change in available services such as an instrument failure, or a critical patient result.

Components of a Service Level Agreement between the ED and the Pathology Laboratory

The following information should be agreed and made readily available as indicated:

1. Pathology Information to be available to the ED
 - Opening hours
 - Contact numbers for results and general enquiries
 - Contact names and numbers for senior staff for operational or clinical issues
 - Out of hours testing arrangements
 - A list of the available pathology tests including:

- Availability and expected turnaround times
 - Recommended blood tubes and specimen containers
 - Specific Specimen handling and transport requirements
 - General specimen transport requirements / protocols
 - Protocols for authorisation of unusual tests or urgent testing within or outside usual pathology hours.
 - Mechanisms for timely access to pathology results for clinical staff
e.g. Paper-based, Electronic, Telephone (as appropriate)
 - Protocols and contact number(s) to query unexpected results or requests
 - Protocols and contact number(s) for the addition of tests for samples already collected
 - Mechanism to access:
 - Information sheets for patients
 - Information about tests/diseases
 - Information/instructions for self-collected samples
 - Pathology request forms/processes (e.g. electronic)
2. ED Information to be available to Pathology
- Telephone number / pager for senior medical officer present in the ED to alert urgent service changes
 - Contact names and numbers for senior staff for operational or clinical issues
 - Protocols and contact numbers to notify critical pathology results / requests for recollection to clinical staff
3. Information to be available in both locations
- Protocols for communicating critical or significant test results
 - Protocols regarding the handling of unlabelled or incorrectly labelled samples
 - Protocols for sample identification for patients where the patient's identity is unknown and protocols to update patient's identification when identity becomes known (of particular importance for blood products)
 - Protocols for handling of problematic specimens, e.g. haemolysed, incorrect anticoagulant, missing specimen etc.
 - Protocols for handling outstanding results for tests requested in the ED which are not available at the time of patient discharge or transfer
 - Protocols regarding ordering of pathology tests by non-medical staff (if locally approved)
 - Protocols for computer or instrument down-time
 - Protocols regarding specific requirements relating to requests for blood products for patients in the ED

Other factors regarding communication between ED and Pathology

There should be review of services and issues in a formalised way where possible. The results of these reviews should be shared between ED and pathology. Examples of such reviews may include:

- Mechanisms/protocol for regular audits of ED requests to ensure appropriate testing
- Measurement of routine turnaround times for common tests (e.g. see ACHS Clinical Indicator Program/Report (key performance indicators))
- Measurement and feedback on errors, including collection, labelling, haemolysis and other.

Point of Care Testing (PoCT) Devices

It is highly recommended that all PoCT and pathology instruments in ED should be selected, installed, maintained and quality assured as a joint activity between the ED and Pathology. Such equipment should be subject to pathology accreditation under the NATA/RCPA program. In practice this generally means accreditation under the laboratory's accreditation and oversight under the laboratory's quality management system.

At the operational level there must be documented training and clear protocols to outline responsibilities for specimen collection, use of the device, maintenance, Quality Control and Quality Assurance, and trouble-shooting procedures for any PoCT devices used in the ED. There must also be protocols/mechanisms to ensure accurate recording of results from tests performed on PoCT devices in the patient's medical record, with automated transfer of these results into electronic pathology records where possible.

CORE PATHOLOGY EDUCATION FOR ED STAFF

A training program for clinical staff should be established. Areas to be emphasised in this program include:

- Knowledge of pathology ordering procedures – paper/electronic
- Local test ordering matrix (refer Appendix 1 Matrix) and pathology included in other ED protocols/clinical pathways (e.g. chest pain, stroke)
- Correct and complete information on pathology request form (examples of relevant information include: travel history, medications – e.g. warfarin, etc.)
- Correct blood tubes for requested tests and correct sequence of tubes/'order of draw' to avoid contamination of samples that may affect results (refer Matrix)
- Correct patient identification for specimen collection using direct patient enquiry and patient identification armband
- Correct specimen collection technique
 - Short tourniquet times
 - Sampling by needles preferred to cannulas
 - Sampling from non-drip arm
 - Correct timing – e.g. drug levels for therapeutic drug monitoring at appropriate times from dosing and change of dose, blood cultures prior to antibiotics
 - Correct technique for collection and tube filling to minimise haemolysis
 - Correct aseptic technique for blood culture specimens – Should NOT be collected from intravenous cannula, volume recommended is 20 mL per set for adults where 10 mL is then placed in each bottle. Two sets should be collected from separate venepuncture sites, ideally at different times
- Correct specimen labelling (labelling at the patient's bedside is mandatory) and double checking strategies prior to sending specimens and requests to the laboratory
- Specific requirements relating to requests for blood products for patients in the ED
 - Sample/request requirements for "pretransfusion testing", including special product requirements such as irradiation, and signature of collector on blood tube and request form
 - Protocols for ensuring identification of correct patient and blood product prior to commencing transfusion
 - Mechanisms for notification of urgent transfusion requests
 - Protocols for the supply and use of Group O red cells for emergency transfusion (and RhD negative and preferably Kell negative units for women of childbearing age)
 - Protocols for dealing with massive haemorrhage/transfusion
 - Responsibility for transfusion documentation
 - Awareness of locations of blood product refrigerators, and responsibility for record keeping and maintenance of the blood product refrigerators

More detailed requirements relating to specimen collection and labelling are available from your local pathology laboratory.

Useful Resources

National Coalition of Public Pathology. Encouraging Quality Pathology Ordering in Australia's Public Hospitals, Final Report 2011

[http://www.health.gov.au/internet/main/publishing.nsf/Content/2D6AC97D6665CF42CA257EF30015DB17/\\$File/Qual%20Path%20Ordering%20NCOPP.pdf](http://www.health.gov.au/internet/main/publishing.nsf/Content/2D6AC97D6665CF42CA257EF30015DB17/$File/Qual%20Path%20Ordering%20NCOPP.pdf) (Accessed 12 July 2018)

Sepsis Kills <http://www.cec.health.nsw.gov.au/patient-safety-programs/adult-patient-safety/sepsis-kills> (Accessed 12 July 2018)

Australasian Clinical Indicator Report 18th Edition 2009–2016.

https://www.achs.org.au/media/131898/2017acir_web_version.1.pdf (Accessed 12 July 2018)

Further information is also available on the RCPA and ACEM websites:













www.acem.org.au

www.rcpa.edu.au

www.rcpa.edu.au/Library/Practising-Pathology/RCPA-Manual/Home

RCPA and AACB Guideline: Consensus Statement for the Management and Communication of High Risk Laboratory Results. <https://www.rcpa.edu.au/getattachment/8fb6f3c6-e5cb-4300-b588-cfc489a3c913/Consensus-Statement-for-the-Management-and-Communi.aspx> (Accessed 12 July 2018)

Pathology Requesting for Adult Patients in the Emergency Department - Suggested Tests for Common Conditions

Fill tubes to correct level and identify, label and sign at BEDSIDE as per local protocol. Ensure CORRECT ORDER of draw 	Aseptic collection 	Na Citrate 	Depending on instrument type and chemistry methodology different hospitals will have a local protocol to follow. The following gel tube colours are a guide only CHECK WITH YOUR LOCAL LABORATORY    =white top  = Gold top  =Orange										 K EDTA or 	 Blood Bank EDTA	 Syringe BG	Only send M/C/S if clinical concern UTI	Other Appropriate Investigations
Presentation	BC ¹	Coags ²	UEG ³	LFT	Ca/Phos/Alb	Urate	Troponin	Lipase	hCG ⁴ (female)	CRP	CK	Drug level	FBC	Group/Antibody screen ⁵	Blood Gas ⁶	Dipstick Urinalysis	
Abdominal pain severe (upper/epigastric)	Consider			Plus LDH	Consider		Consider										Consider Lactate
Abdominal pain severe (lower)	Consider				Consider									Female			Consider Lactate
Back pain atraumatic (requiring admission)	Consider				Consider			Consider		Consider							
Cellulitis (requiring admission)	Consider			Consider													M/C/S if infected lesions
Chest pain - suspected Ischaemic Heart Disease				Consider													
Chest pain - suspected Pulmonary Embolism		Consider D-Dimer		Consider			Consider										
Confusion/Syncope	Consider			Consider	Consider		Consider										Consider CSF investigations
Cerebrovascular Accident		Consider															
Diabetic Ketoacidosis	Consider																
Fever for Investigation (include returned travellers)										Consider							Consider malaria, dengue and other illness investigations relevant to Hx
Fractures Neck Of Femur/Major Long Bone																	
Fractures Minor for Theatre >55yo																	
Gastrointestinal Bleed		Consider															
Jaundice For Investigation					Consider												Consider relevant viral serology
Liver Disease					Consider												Consider relevant viral serology
Oncology patients (febrile neutropenia)					Consider									Consider		Plus M/C/S	
Overdose (significant)											Consider	Consider	Consider		Consider		Consider paracetamol
Per Vaginal Bleed - 1st trimester									Quantitative								Consider PCR for chlamydia & gonorrhea
Pneumonia (requiring admission)																	Recommend Sputum M/C/S, respiratory virus PCR and urinary antigen
Pyelonephritis (not simple cystitis)	Consider															Plus M/C/S	
Renal Colic (1st episode)																	
Renal Disease																	
Seizures (1st episode)			Plus bedside glucose		Plus Mg												Consider CSF investigations relevant to Hx
Seizures (recurrent)			Consider									Consider	Consider				
Septic Joint - suspected				Consider		Consider				Consider							Joint Fluid M/C/S
Sepsis																Plus M/C/S	Lactate + other relevant cultures
Snake Bite ⁷				LDH only									Plus film				
Short Of Breath - Asthma (requiring admission)			Consider										Consider		Consider		Nasopharyngeal swab for respiratory virus PCR
Short Of Breath - suspected Acute Pulmonary Oedema															Consider		
Short of Breath - Chronic Obstructive Pulmonary Disease															Consider		Consider Sputum M/C/S
Trauma (Major)																	
Warfarin therapy		INR only	Consider if over anti-coagulated	Consider if over anti-coagulated									Consider	Consider			
Key	This form is a guide for clinical staff initiating pathology tests. Clinical judgment should be exercised. Some patients may not need any tests or have had them performed recently. If in doubt consult with senior ED doctor. Some tests may not be immediately available locally.																
Perform test	1. BC = Blood Cultures. History of immunocompromise, fever and/or clinical syndrome suggesting sepsis is a more important indicator to collect BC than whether the patient is febrile at the time of examination/collection. 2. Coags = Standard Coagulation Panel (includes INR/PT, APTT, fibrinogen). 3. UEG = Urea, creatinine, electrolytes and glucose. 4. hCG is usually required prior to drug treatment and radiological investigations in women of child bearing age 5. There are very specific requirements relating to requests and specimen collection/labelling for transfusion. Please ensure requests and specimens fully comply with local requirements																
Not Generally Indicated	6. Blood gas: Venous blood gas is often acceptable. Arterial sample required for assessment of oxygen status. 7. Snake bite: FBC + film, INR +aPTT, UEG, CK, consider fibrinogen + d-Dimer (false negatives occur with point of care devices), consider LDH																
Consider or Ask Supervisor																	

From 'Guideline on Pathology Testing in the Emergency Department' developed by the Australasian College for Emergency Medicine (ACEM) and the Royal College of Pathologists of Australasia (RCPA) 2018

Please refer to full guideline document for further information



NOTES ON THE USE OF THE COMMON TESTING SCENARIOS MATRIX (SIDE B)

The matrix is designed as a rapid reference guide for junior medical and nursing staff working in EDs. The aim is to assist appropriate pathology requesting for common emergency presentations. It is intended to be used **after clinical assessment** suggests that pathology testing is indicated. Note particularly that many less severe or minor presentations of conditions shown in the matrix may not require any pathology tests. Most importantly it is a **guide only** and will not cover all clinical scenarios - so if in doubt, seek senior advice.

Key for interpretation

- Green colour box without notes indicates that a test is recommended.
- Green colour box with notes: Notes are used throughout to prompt when a test profile may require tailoring for individual cases.
- Yellow colour box with "Consider" where the individual clinical case may require consideration of actual need. Most other notes in the boxes or presentation area are self-explanatory to prompt appropriate testing. The most important message is if in doubt seek senior advice early before tests are ordered.
- White box indicates that a test is not generally recommended.
- Only more severe cases of some conditions (e.g. requiring hospital admission) will require the recommended pathology tests to be performed.
- There is no Australian national standard for blood tube colours. The common colours and variations are indicated by a rectangular coloured symbol representing the tube top colour in the uppermost frames. The colours of tubes used at each site should be confirmed with the local pathology laboratory.
- Correct collection order is important to avoid sample contamination and thus minimise the possibility of artefactual and/or erroneous results and the need for specimen recollections. Blood tubes are listed on the chart in the **correct order of draw from left to right**. Therefore, tubes on the left side of the chart are **always** filled prior to tubes appearing on the right side of the chart.
- Correct patient identification and specimen labelling **are essential** and some tubes (e.g. for pre-transfusion testing) must also document the time and date of collection and signature of the collector.

Abbreviations

Na Citrate = Sodium Citrate

K EDTA = Potassium Ethylenediaminetetra-acetic acid

EDTA = Ethylenediaminetetra-acetic acid

Syringe ABG = Syringe Arterial Blood Gas (May be venous sample where notated)

M/C/S = Microscopy, culture and sensitivity

BC = Blood Culture

Coags = Standard Coagulation Panel (includes INR/PT, APTT, fibrinogen)

UEG = Urea, creatinine, electrolytes and glucose

LFT = Liver Function Test Panel

LDH = Lactate dehydrogenase

Ca/Phos/Alb = Calcium, Phosphate, Albumin

Troponin = Troponin I or T

βhCG = Beta human Chorionic Gonadotropin

CRP = C - reactive protein

CK= Creatine Kinase

Drugs = Various specific drug levels

FBC = Full Blood Count/Examination

UTI = Urinary Tract Infection

Gp/Antibody screen = Blood Group and antibody screen (Add cross-match only where transfusion is indicated)

INR only = Prothrombin Time/International Normalised Ratio only - not full coagulation profile

Plus Mg = add magnesium to other tests

NOTE: The matrix (side A) and notes (side B) can be printed on a single page, laminated, and attached to blood collection trolleys in the ED.