



AUSTRALASIAN COLLEGE
FOR EMERGENCY MEDICINE



GUIDELINE

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GUIDELINE ON PATHOLOGY TESTING IN THE EMERGENCY DEPARTMENT

ACEM Guideline Nr: G125
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**A Guideline developed by the Australasian College for Emergency Medicine (ACEM) and
the Royal College of Pathologists of Australasia (RCPA)**

INTRODUCTION

Pathology tests are commonly requested on patients attending Australasian Emergency Departments (ED) and it is recognised that there has been continued growth in pathology test requests over recent years.

This document will provide guidance on appropriate pathology test requesting in EDs. This guideline is designed to be applicable in the Australasian setting. However, it is acknowledged that local protocols may be developed that are broadly based on this guide, but which cater for local circumstances/resources and individual clinical presentations.

COMMUNICATION

In order to optimise services and meet the needs of both clinical staff and the laboratory, it is essential that there is good communication between the ED and the pathology laboratory. There should be regular meetings between both groups so that all issues can be raised and addressed. These meetings should be held at least annually however more frequent meetings may be beneficial.

SERVICE LEVEL AGREEMENT

It is recommended that the arrangements between the ED and the pathology laboratory be appropriately documented 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 *Appendix 1*.

TEST SELECTION

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

PATHOLOGY REQUESTING FOR COMMON CLINICAL PRESENTATIONS

There are a variety of opinions and a variable evidence base for appropriate test requesting. Expert panel opinion has been sought for current and reasonable practice and these are summarised in *Appendix 2* as a matrix for common emergency 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. 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.

A variety of systems are in place throughout Australasia to help guide appropriate ordering and/or restrict pathology ordering by junior staff, for example 'traffic light systems'.

PATHOLOGY REQUESTING AND SPECIMEN COLLECTION TECHNIQUES/METHODS

Blood collection and labelling should not be considered an 'assumed skill set' for medical and nursing staff. Education, orientation and ideally competency assessment or 'credentialing' should be considered for all ED staff. Poor collection techniques and lack of formal training on this topic lead to specimen quality issues which may necessitate specimen recollection and repeat processing contributing to significant inefficiencies and patient harm. For example false positive blood cultures due to contamination at the time of specimen collection may result in prolongation of hospital admission and inappropriate antibiotic use.

Key components of core pathology education for ED staff are outlined in *Appendix 3*.

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

USEFUL RESOURCES

National Coalition of Public Pathology. Encouraging Quality Pathology Ordering in Australia's Public Hospitals, Final Report February 2012. Available from URL: http://www.ncopp.org.au/site/quality_use.php (Accessed 27 Nov 2012)

Stuart P, Crooks S, Porton M. An intervention program for diagnostic testing in the emergency department. *Med. J. Aust.* 2002; **177**: 131-4. Available from URL: <https://www.mja.com.au/journal/2002/177/3/interventional-program-diagnostic-testing-emergency-department> (Accessed 27 Nov 2012)

Further information is also available on The RCPA and ACEM websites

www.rcpa.edu.au

www.acem.org.au

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This first edition has been created with broad consultation and will be reviewed within 24 months of publication.

History

Approved: March 2013
Reviewed and approved:

APPENDIX 1:

COMPONENTS OF A SERVICE LEVEL AGREEMENT BETWEEN THE ED AND THE PATHOLOGY LABORATORY AT EACH SITE

- Opening hours and contact numbers/names for the laboratory and the ED
- A list of the available pathology tests including
 - Tests performed on-site
 - Tests referred off-site
- Out of hours testing arrangements
- Protocols for authorisation of unusual tests or out of hours urgent tests
- Specimen collection requirements and blood tube types / colours
- Specimen transport requirements / protocols
- Expected turnaround times for common tests
- Mechanisms for timely access to pathology results for clinical staff
 - Paper-based, Electronic, Telephone (as appropriate)
- Mechanisms/Protocols to notify critical pathology results to clinical staff
- Protocols to query unexpected results or requests
- Protocols for the addition of tests for samples already collected
- Protocols on 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 (particular importance for blood products)
- Protocols for handling of problematic specimens, e.g. haemolysed, incorrect anticoagulant, missing sample etc.
- Outstanding results for tests requested in the ED which are not available at the time of patient discharge or transfer must be followed up by an agreed mechanism/protocol.
- Mechanisms/Protocols for ED to contact pathologists and for the laboratory to contact senior staff of the ED
- Protocols regarding ordering of pathology tests by non-medical staff (if locally approved)
- Protocols regarding specific requirements relating to requests for blood products for patients in the ED (see *Appendix 3*)
- Mechanisms/protocol for regular audits of ED requests to ensure appropriate requesting
- Mechanism to access:
 - Information sheets for patients including
 - Information about tests/diseases
 - Information/instructions for self-collected samples
 - Pathology request forms/processes (e.g. electronic)

- **Point of Care Testing (PoCT) Devices**

- It is highly recommended that all PoCT and pathology instruments in ED should be under the umbrella of an accredited pathology service and purchase of any new PoCT devices be done in consultation with and approval of the local pathology service.
 - Protocols to outline responsibilities for ED staff training for specimen collection techniques and use of PoCT devices
 - Protocols/mechanisms to ensure maintenance, Quality Control and Quality Assurance, and trouble-shooting procedures for any PoCT devices used in the ED.
 - Protocols/mechanisms to ensure accurate recording of results from tests performed on PoCT devices in the patient's medical record, and transfer of these results into electronic pathology records where appropriate.
- 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 Appendix.
 - It is acknowledged that some Service Level Agreements may also contain detailed information regarding costs of tests and billing arrangements between the ED, the Pathology Laboratory, the hospital and/or other relationships.
 - This Service Level Agreement should be reviewed and agreed between the directors of the ED and the Pathology service on a regular basis, for example annually.

APPENDIX 2: MATRIX (SIDE A)

Pathology Requesting for Adult Patients in the Emergency Department - Suggested tests for common conditions

| Presentation | 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 | | | | | | | | | | K EDTA or | | Blood Bank EDTA | | Syringe ABG | | Urine Spec if +ve send for M/C/S (or local alternative) | Other Appropriate Microbiology Investigations |
|---|--|--------------------|----------------------------------|----------------------------------|-------------|----------|----------|---------------------|------------------|----------|-----------|------------|-----------------|------------------------------------|------------------|-----------------|--|---|
| | BC ¹ | Coags ² | UEG ³ | LFT | Ca/Phos/Alb | Urate | Troponin | Lipase | βCG ⁴ | CRP | CK | Drug level | FBC | Group/Antibody screen ⁵ | ABG | Ward test Urine | | |
| Abdominal pain severe (upper/epigastric) | Consider | | | Plus LDH | Consider | | Consider | | Female | | | | | | Consider Lactate | | | |
| Abdominal pain severe (lower) | Consider | | | | Consider | | | | Female | | | | | Female | Consider Lactate | | | |
| Back pain atraumatic (requiring admission) | Consider | | | | Consider | | | Consider | | Consider | | | | | | | | |
| Cellulitis (requiring admission) | Consider | | | Consider | | | | | | | | | | | | | Swab of any vesicles/blisters | |
| Chest pain - suspected Ischaemic Heart Disease | | | | Consider | | | | | | | | | | | | | | |
| Chest pain - suspected Pulmonary Embolism | | Consider D-Dimer | | Consider | | | Consider | | | | | | | | | | | |
| Confusion/Syncope | | | | Consider | Consider | | Consider | | | | | | | | | | Consider CSF investigations | |
| Cerebrovascular Accident | | Consider | | | | | | | | | | | | | | | | |
| Diabetic Ketoacidosis | Consider | | | | | | | | | | | | | | Venous | | | |
| Fever for Investigation | | | | | | | | | Consider | | | | | | | | | |
| Fever for Investigation with significant travel history | | | | | | | | | Consider | | | | | | | | Consider malaria and serology investigations relevant to history | |
| Fractures Neck Of Femur/Major Long Bone | | | | | | | | | | | | | | | | | | |
| Fractures Minor for Theatre >55yo | | | | | | | | | | | | | | | | | | |
| Gastrointestinal Bleed | | Consider | | | | | | | | | | | | | | | | |
| Jaundice For Investigation | | | | | Consider | | | | | | | | | | | | Consider serology investigations relevant to history | |
| Liver Disease | | | | | Consider | | | | | | | | | | | | Consider serology investigations relevant to history | |
| Oncology patients (febrile neutropenia) | | | | | Consider | | | | | | | | Consider | | Plus M/C/S | | | |
| Other Medical Admits | | | | Consider | Consider | | | | | | | | | | | | | |
| Overdose (significant) | | | Ask | Ask | | | | | | Consider | Ask | Ask | | | Ask | | | |
| Per Vaginal Bleed - 1st trimester | | | | | | | | Female Quantitative | | | | | | | | | Consider PCR for chlamydia & gonorrhoea | |
| Pneumonia (requiring admission) | | | | | | | | | | | | | | | | | Consider Sputum M/C/S, respiratory virus PCR and serology | |
| Pyelonephritis (not simple cystitis) | | | | | | | | Female | | | | | | | | Plus M/C/S | | |
| Renal Colic (1st episode) | | | | | | | | Female | | | | | | | | | | |
| Renal Disease | | | | | | | | | | | | | | | | | | |
| Seizures (1st episode) | | | Plus bedside glucose | | Plus Mg | | | | | | | | | | | | Consider CSF investigations relevant to history | |
| Seizures (recurrent) | | | Ask | | | | | | | | | Ask | Ask | | | | | |
| Septic Joint - suspected | | | | Consider | | Consider | | | Consider | | | | | | | | Joint Fluid M/C/S | |
| Severe Sepsis or Shock | | | | | | | Consider | Consider | Female | | | | | | Lactate | | | |
| Snake Bite ⁶ | | | | 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) | | | | | | | | Female | | | | | | | | | | |
| Trauma (Minor) | | | | | | | | | | | | | | | | Consider | | |
| 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 fever and/or clinical syndrome suggesting sepsis is a more important indicator to collect blood cultures than whether the patient is febrile at the time of examination/collection. Two sets are required

Not Generally Indicated 2: Coags = Standard Coagulation Panel (includes INR/PT, APTT, fibrinogen)

Consider or Ask Supervisor 3: UEG = Urea, creatinine, electrolytes and glucose

4: HCG is required prior to drug treatment and radiological investigations

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

6: Snake bite: FBC + film, INR +aPTT, UEG, CK, consider fibrinogen + d-Dimer (false negatives occur with point of care devices), consider LDH



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) 2013



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 or "Ask" indicating input from senior staff if that test is required or not. 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.
- Red 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 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

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 and notes (sides A & B) can be printed on a single page, laminated, and attached to blood collection trolleys in the ED

APPENDIX 3:

KEY COMPONENTS OF CORE PATHOLOGY EDUCATION FOR ED STAFF

Areas to be emphasised include:

- Knowledge of pathology order form/system requirements
- Local test ordering matrix (refer *Appendix 2*) 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 in *Appendix 2*)
- 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
 - Use correct aseptic technique for blood culture specimens – Should NOT be collected from intravenous cannula, volume recommended is 20mL per set for adults where 10mL 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 side is mandatory)
- 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 etc. will be available from your local pathology laboratory.