GP Forum 2015

www.heftpathology.com

Overview

- **Biochemistry:** Managing acute kidney injury alerts in primary care
- **Immunology:** New paraproteins and SFLC
- **Microbiology:** Rejection of clinical specimens in microbiology
- **Haematology:** Iron deficiency anaemia
- Q&As session

Managing Acute Kidney Injury Alerts in Primary Care

Dr. Emma Evans
Senior Clinical Scientist

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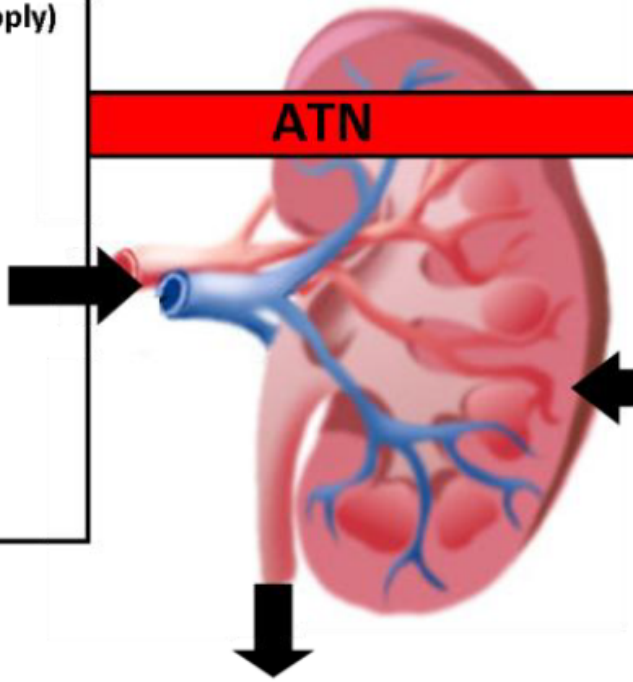
www.heftpathology.com

Acute Kidney Injury

→ An ‘abrupt and sustained’ decrease in kidney function over hours/days

Pre-renal (inadequate blood supply)
- Hypovolaemia
  - Haemorrhage
  - Diuresis
  - GI fluid loss
  - Burns
  - Dehydration
- Reduced cardiac output
  - Heart failure
- Other
  - Sepsis
  - Vasodilatory drugs
  - ACEi

ATN



Intrinsic (tissue damage)
- Glomerular
  - Glomerularnephritisis
  - ANCA vasculitis
  - SLE
  - Cryoglobulinaemia
- Tubular
  - Nephrotoxins (ACEi, NSAIDS, antibiotics, amphotericin)
  - Sarcoidosis
  - Ischaemia
  - Infection
- Contrast media
- Poisoning
- Rhabdomyolysis
- Hepatorenal syndrome

Post renal (urinary obstruction)
- Stones
- Bladder carcinoma
- Urethral stricture
- Prostate carcinoma
- Benign prostrate hypertrophy

KDIGO AKI diagnostic criteria

AKI Stage	Serum creatinine
1	1.5-1.9 times baseline **OR** ≥26.5µmol/L increase within 48 hours
2	2.0-2.9 times baseline
3	≥3.0 times baseline **OR** Initiation of renal replacement therapy

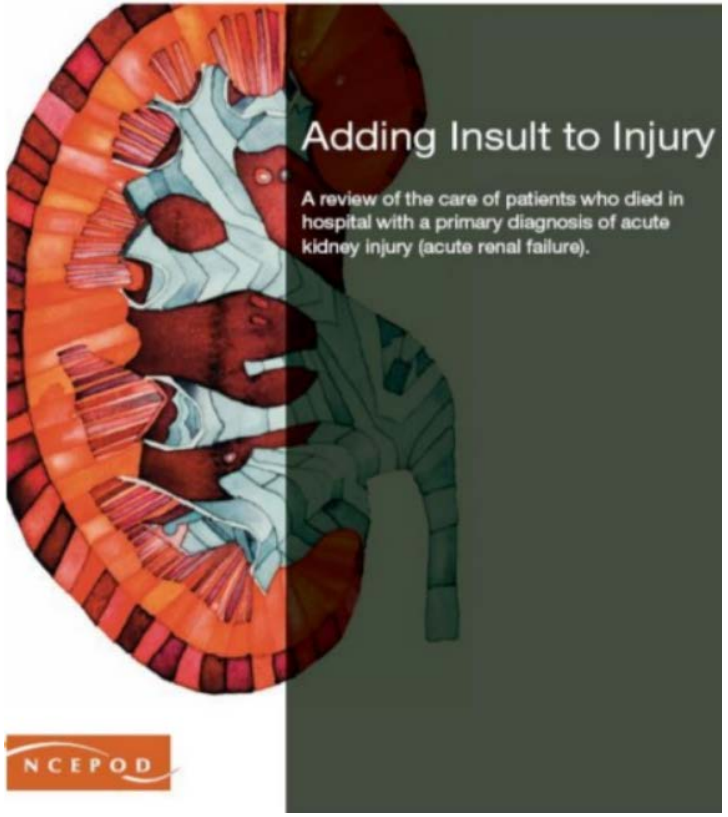
NICE Guidelines

Clinical guideline 169
Prevention, detection and management of acute kidney injury up to the point of renal replacement therapy
Issued: August 2013

Kidney Disease: Improving Global Outcomes (KDIGO) Acute Kidney Injury Work Group. KDIGO Clinical Practice Guideline for Acute Kidney Injury. Kidney inter., Suppl. 2012; 2: 1–138.

NCEPOD report published in 2009

- Poor assessment of risk factors for AKI and acute illness
- **Delays in recognising AKI**
- Most patients with AKI are not cared for by nephrologists
- Post admission AKI avoidable in 21%
- Good care in <50% of cases



Patient Safety Alert

Stage Three: Directive

Standardising the early identification of Acute Kidney Injury

9 June 2014

Alert reference number: NHS/PSA/D/2014/010

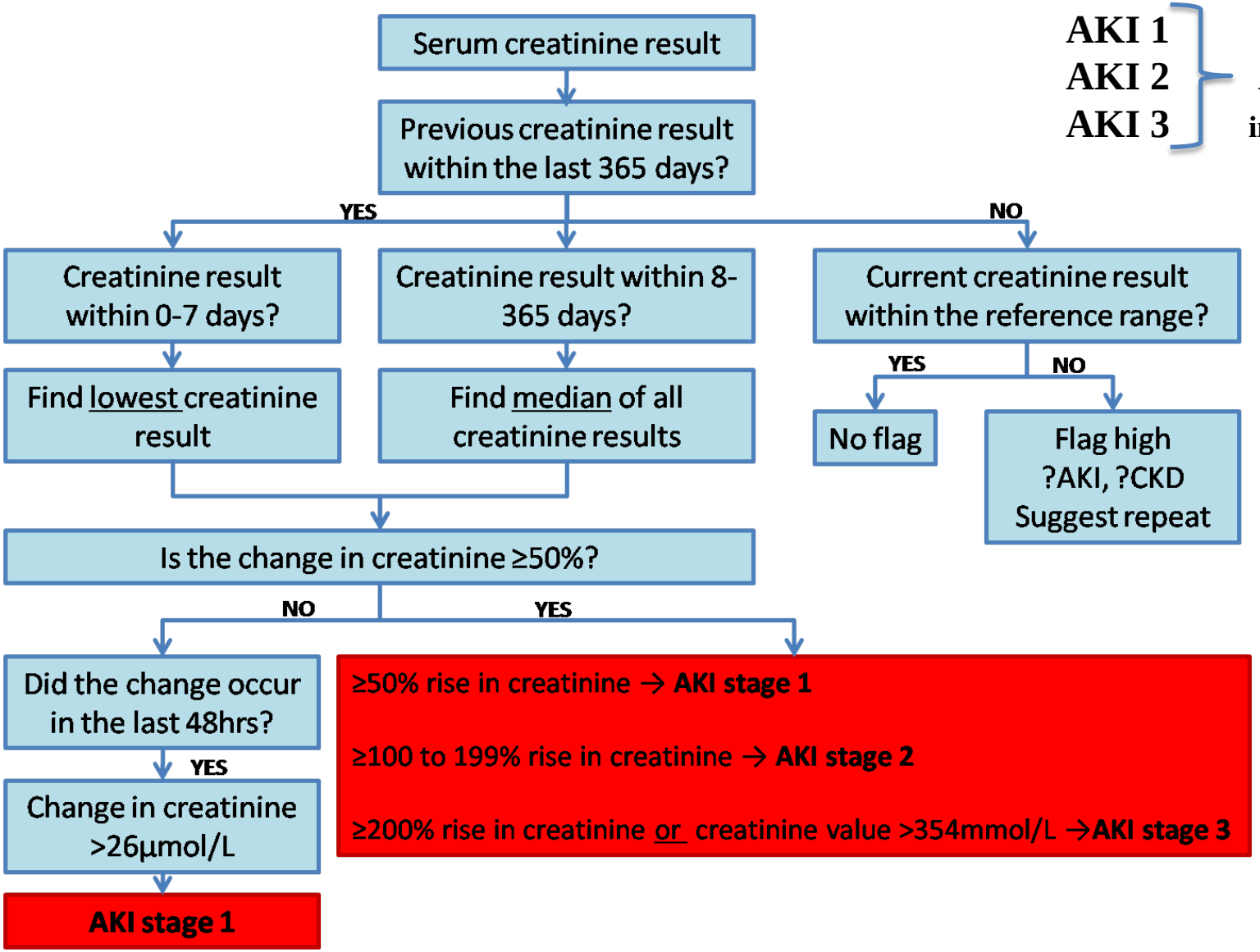
Alert stage: Three - Directive

Electronic AKI alerting in primary care

- AKI alerts introduced to HEFT (inpatients) in August 2014
- AKI algorithm identifies a significant rise in creatinine compared to a previous known creatinine result and grades the severity of AKI

AKI 0 — No AKI

AKI 1, **AKI 2**, **AKI 3** — AKI with increasing severity

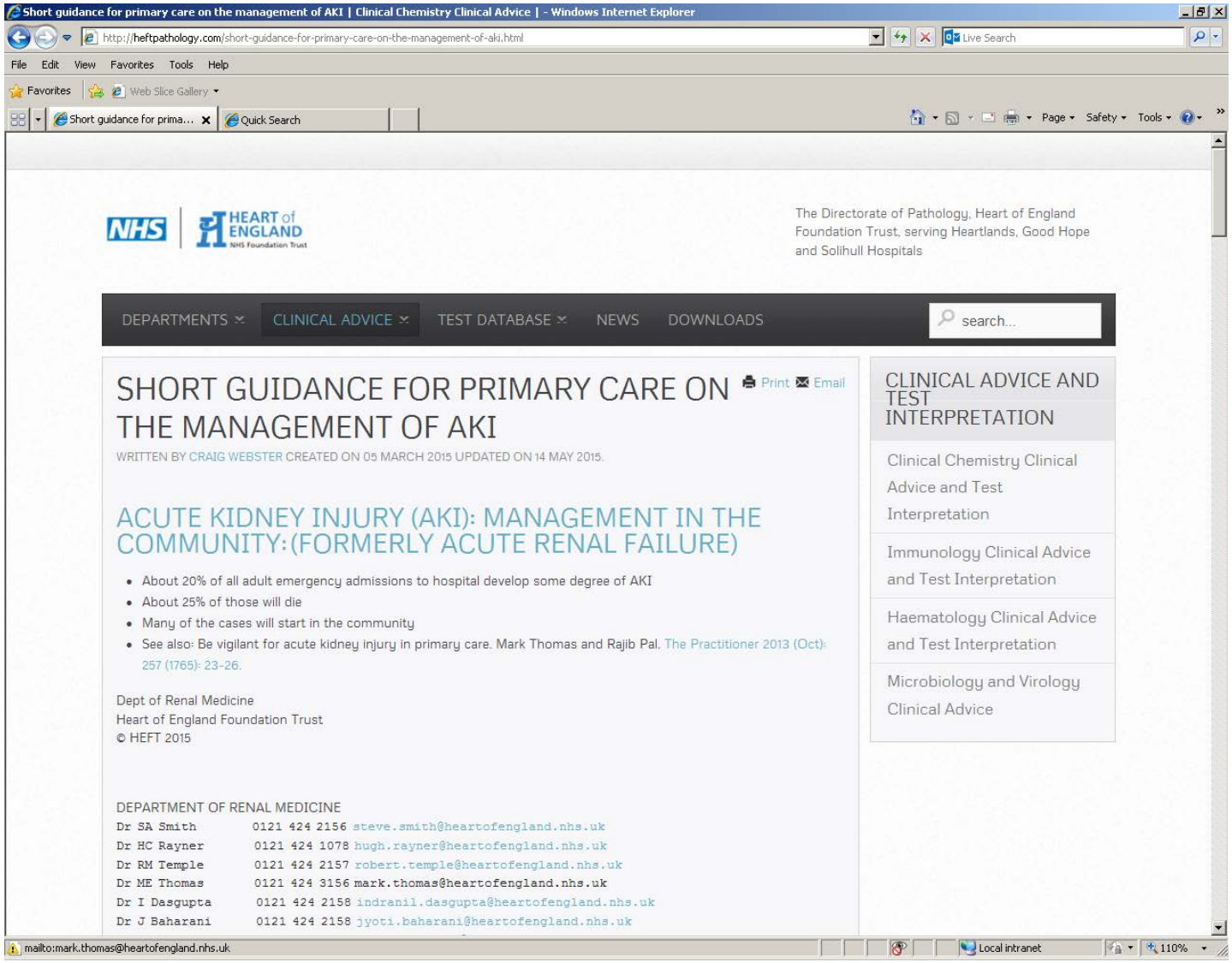


What do I do with an AKI alert?

Comment on report

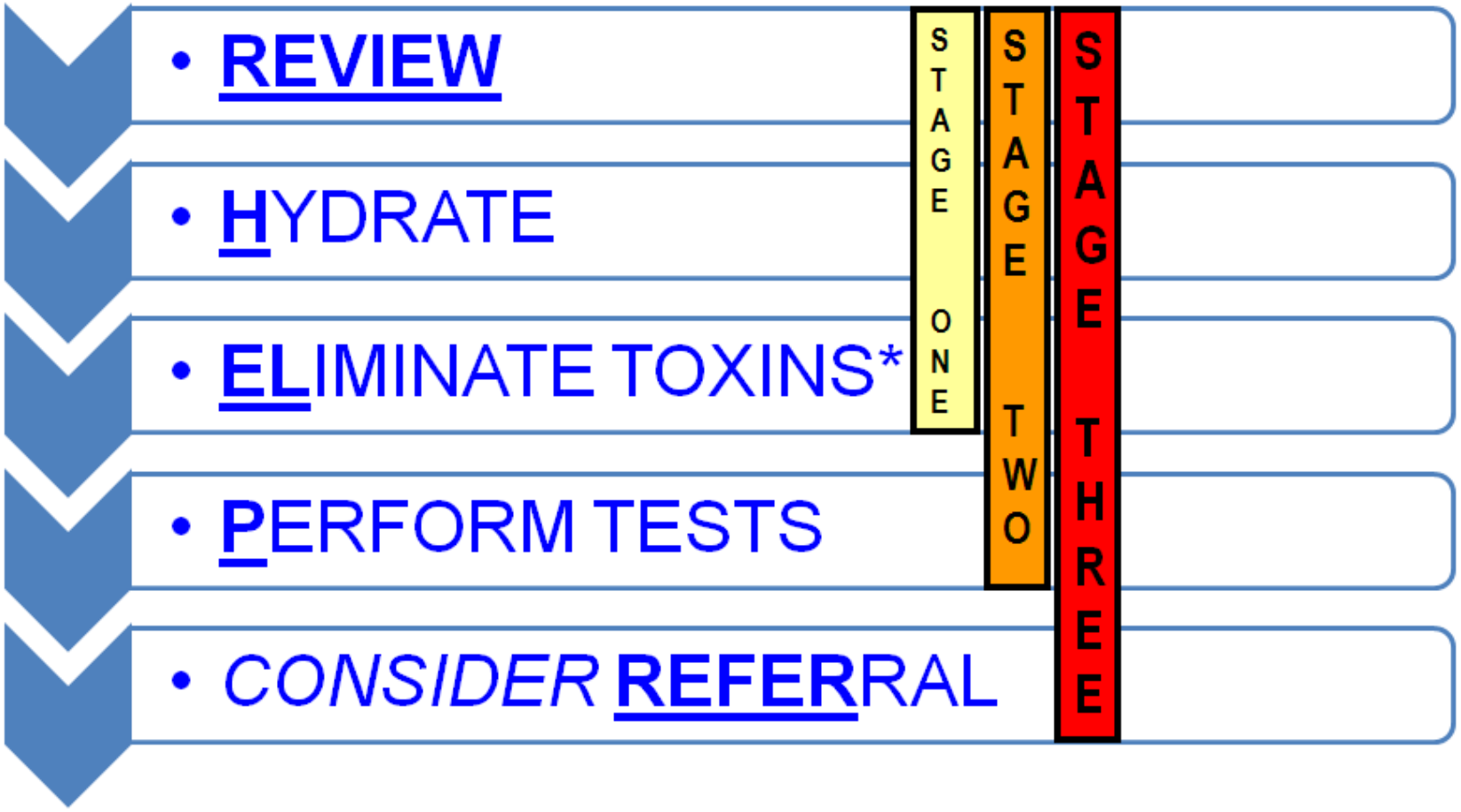
Urea & Electrolytes: Possible AKI stage 3 - see guidance http://heftpathology.com/3a8

Guidance on the HEFT pathology website



Stage based management

Remember: REVIEW – HELP – REFER?



Stage 1 - Possible virtual management

≥26 µmol rise in 48h or 50-100% rise in Creatinine

- **REVIEW THE PATIENT**
  - Review – Medical background
  - Review – Why were they having blood tests? Recent symptoms?
  - Usually call the patient, especially if no known cause - ?review

- **HELP THE PATIENT**
  - **H**ydrate: If D/V/nausea ensure drinking and tolerating 1.5 L/day
  - **EL**iminate: Suspend nephrotoxins* and consider for diuretics
  - **P**erform "tests": Consider U&E in 0-5 days depending on frailty

* Suspend these (typically for 2 – 7 days until better):
ACEi, ARB, NSAID, Diuretics if relative hypovolaemia,
NSAID gels, Aciclovir, "non essential" Aspirin
Trimethoprim elevates Creatinine without AKI

Stage 2 – 'extra' care with stage 2 in red

100 – 199% rise in Creatinine

- **REVIEW**
  - Review – medical background
  - Review – why were they having blood tests? Recent symptoms?
  - **Usually recall to surgery – they may be sicker than thought**

- **HELP**
  - **H**ydrate: If D / V / nausea ensure drinking and tolerating 1.5 L/day
  - **EL**iminate: Suspend nephrotoxins* and consider for diuretics
  - **P**erform "tests":
    - **Check lying and standing HR and BP , oedema**
    - **Urine dipstick**
    - **Consider U&E recheck in 0-2 days – including Saturday if needed**

- **REFER?** ⇒ Note question mark – admission not mandatory
  - **May need admission**

* Suspend these (typically for 2 – 7 days until better):
ACEi, ARB, NSAID, Diuretics if relative hypovolaemia,
NSAID gels, Aciclovir, "non essential" Aspirin
Trimethoprim elevates Creatinine without AKI

Consider relative hypovolaemia if:
- HR rise on standing ≥ 30 bpm [2]
- SBP <110 mm Hg over 65 years [3]
- SBP fall of ≥ 20 mm Hg from usual level

Stage 3 – ‘extra’ care with stage 3 in red

≥200% rise or smaller rise with CKD

- **REVIEW**
  - review – medical background
  - review – why were they having blood tests? Recent symptoms?
  - **Recall to surgery – they are sick**

- **HELP**
  - **H**ydrate: If D/V/nausea ensure drinking and tolerating 1.5 L/day
  - **EL**iminate: Suspend nephrotoxins* and consider for diuretics
  - **P**erform “tests”:
    - Check lying and standing HR and BP , oedema
    - Urine dipstick
    - **Consider U&E recheck in 0-1 days**

- **REFER?**
  - **Likely to need admission**

* Suspend these (typically for 2 – 7 days until better):
ACEi, ARB, NSAID, Diuretics if relative volume depletion,
NSAID gels, Aciclovir, “non essential” Aspirin
Trimethoprim elevates Creatinine without AKI

Consider relative hypovolaemia if:

- HR rise on standing ≥ 30 bpm [2]
- SBP <110 mm Hg over 65 years [3]
- SBP fall of ≥ 20 mm Hg from usual level [4]

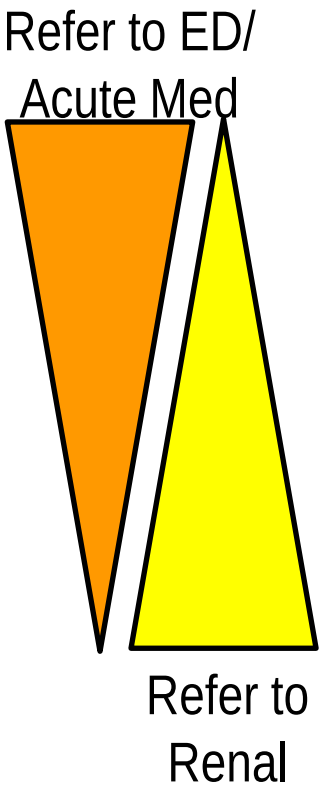
Referral Criteria in AKI or ACKD

Taken from the NICE guidelines 2013

ACKD Acute on Chronic Kidney disease

- Refer these patients:
  - ✓ stage 3 acute kidney injury
  - ✓ acute kidney injury with no clear cause
  - ✓ inadequate response to treatment
  - ✓ a possible diagnosis that may need specialist treatment (glomerulonephritis, vasculitis, interstitial nephritis, myeloma)
  - ✓ complications: hyperkalaemia, fluid overload, uraemia
  - ✓ prior chronic kidney disease stage 4 or 5 + added AKI (ACKD)
  - ✓ a renal transplant with any AKI

LIKELY BEST PATHWAY



Who to contact for advice

Duty Biochemist 0121 424 2198 (Bleep 2506)

Department of Renal Medicine

Dr SA Smith	0121 424 2156	steve.smith@heartofengland.nhs.uk
Dr HC Rayner	0121 424 1078	hugh.rayner@heartofengland.nhs.uk
Dr RM Temple	0121 424 2157	robert.temple@heartofengland.nhs.uk
Dr ME Thomas	0121 424 3156	mark.thomas@heartofengland.nhs.uk
Dr I Dasgupta	0121 424 2158	indranil.dasgupta@heartofengland.nhs.uk
Dr J Baharani	0121 424 2158	jyoti.baharani@heartofengland.nhs.uk
Dr V Suresh	0121 424 2157	vijayan.suresh@heartofengland.nhs.uk
Dr H Rasheed	0121 424 2156	husham.rasheed@heartofengland.nhs.uk
Fax	0121 424 1159	

HEFT SWITCHBOARD 0121 424 2000

Any comments please contact –Dr Mark Thomas

If you have a case of AKI you want to discuss – Pleasecontact us!

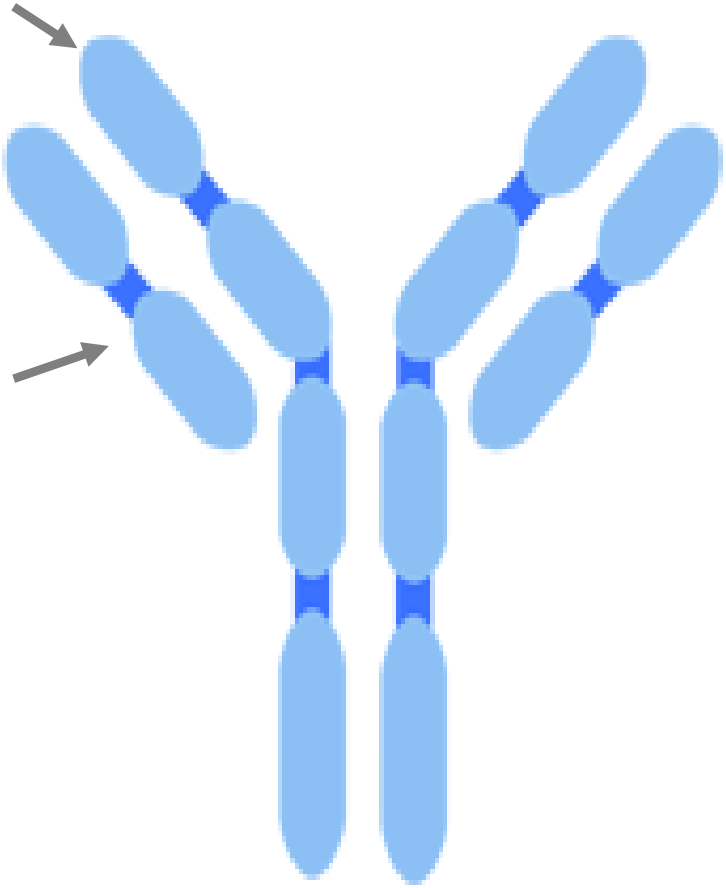
New Paraproteins and SFLC

Dr Aarn Huissoon
Consultant Immunologist

http://immunlogy.heartofengland.nhs.uk
www.heftpathology.com
aarn.huissoon@nhs.net

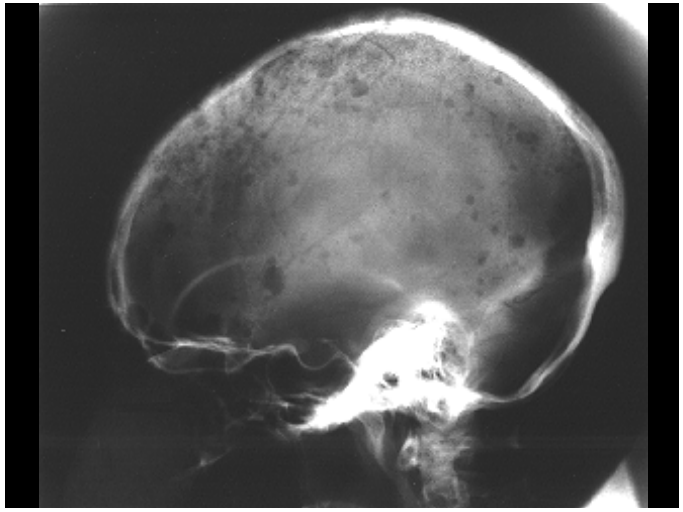
Immunoglobulin

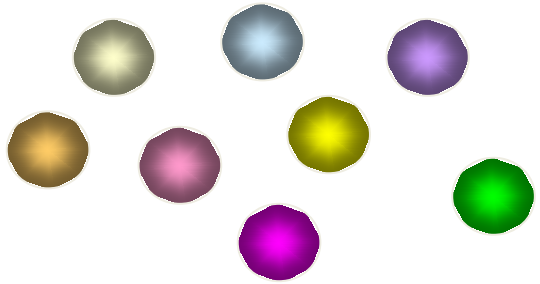
Heavy Chain



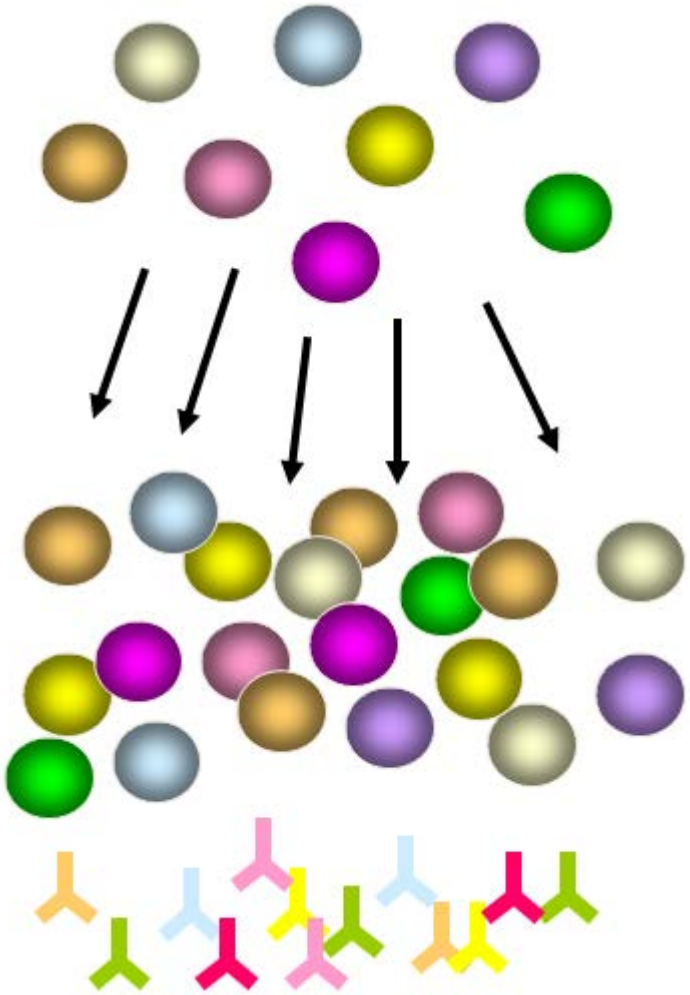
Light Chain
(κ or λ)

"Pepperpot" Skull –
Lytic lesions caused
by myeloma deposits

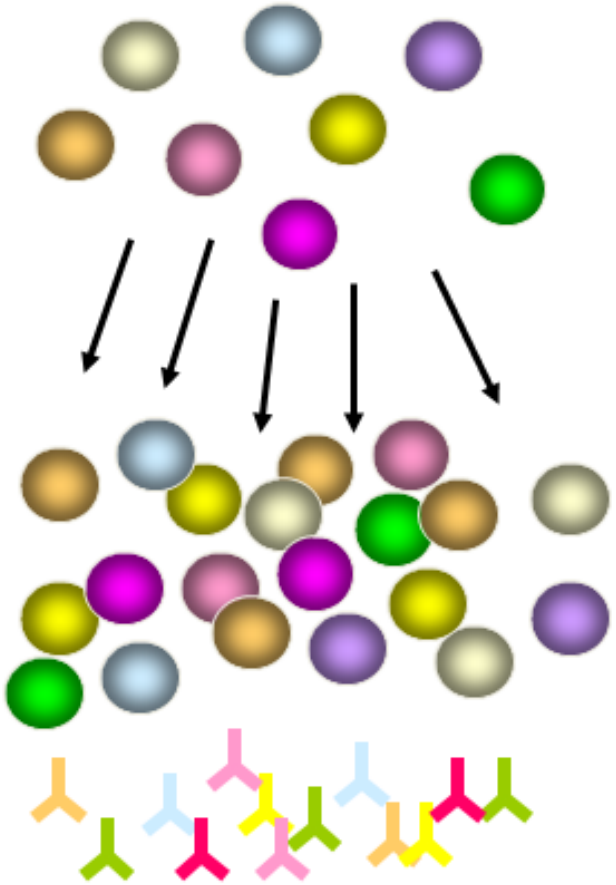


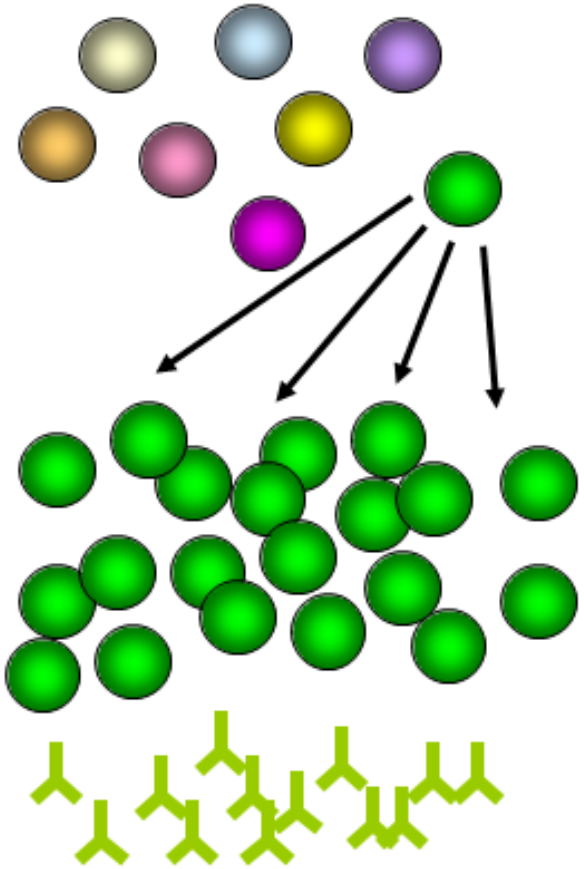


Normal mature B lymphocytes



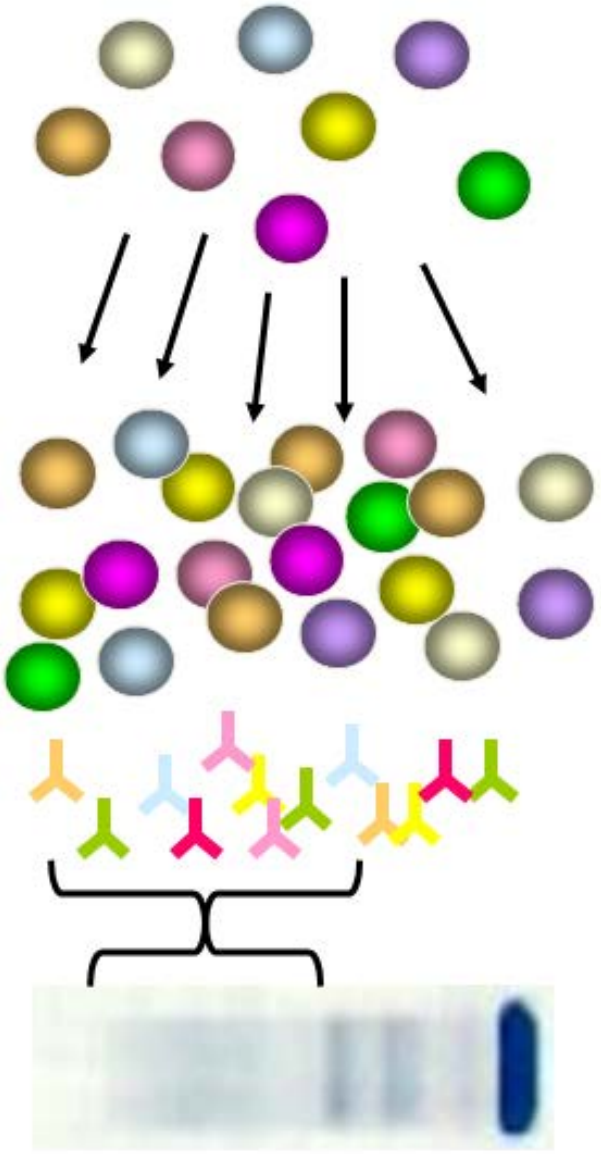
- Normal B cell activation:
  - B cells proliferate & become plasma cells
  - Multiple clones, hence *polyclonal* immunoglobulin in blood.

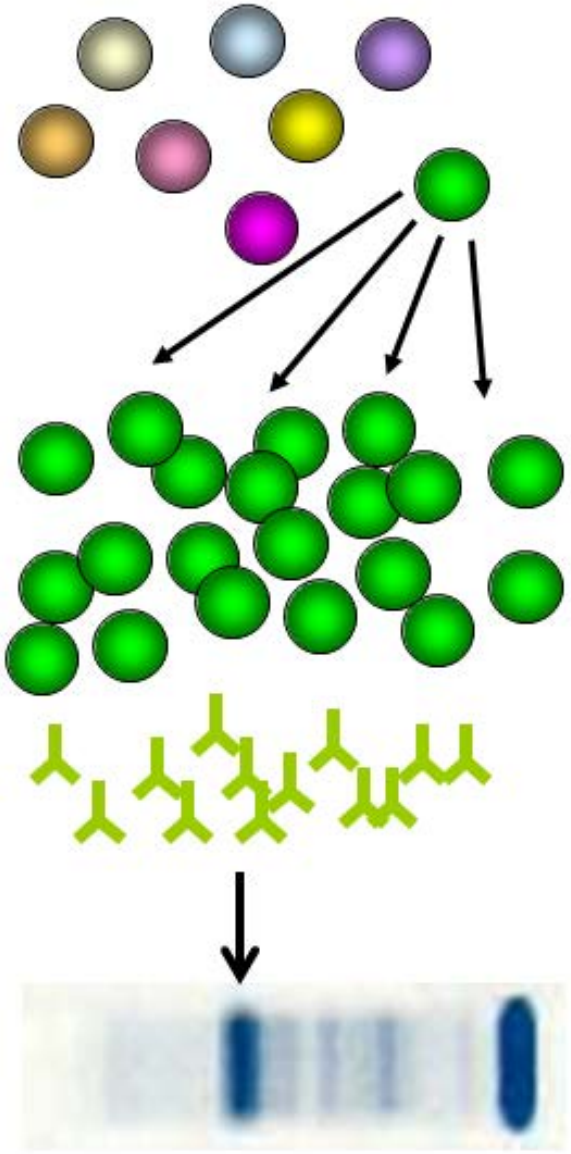




- Clonal B cell proliferation:
  - lymphoma or leukaemia.
- Plasma cell clone:
  - Myeloma / plasmacytoma

Both can produce monoclonal immunoglobulin (whole or fragments)



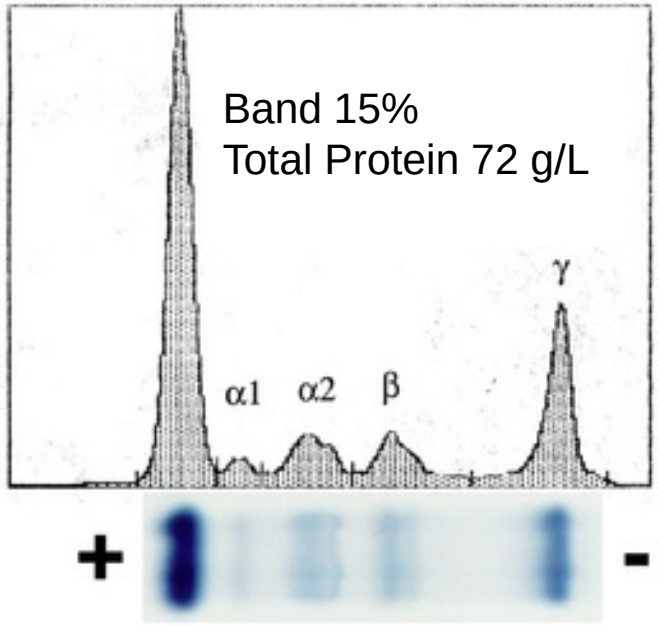


Serum Protein Electrophoresis → Paraprotein

New Paraprotein

- IgG kappa, 10.8 g/L

- What else will you look for?
  - **C**alcium (hypercalaemia)
  - **R**enal impairment
  - **A**naemia
  - **B**one pain / lytic lesions



- If all normal, then probably MGUS
  (monoclonal gammopathy of undetermined significance)

New Paraprotein

- Large paraprotein (>25 g/L)
- Any IgE, IgD paraprotein
- Free light chain paraprotein

  → Probably myeloma; refer urgently to haematology

- Any paraprotein with CRAB
- Medium paraprotein (15-25 g/L), no CRAB

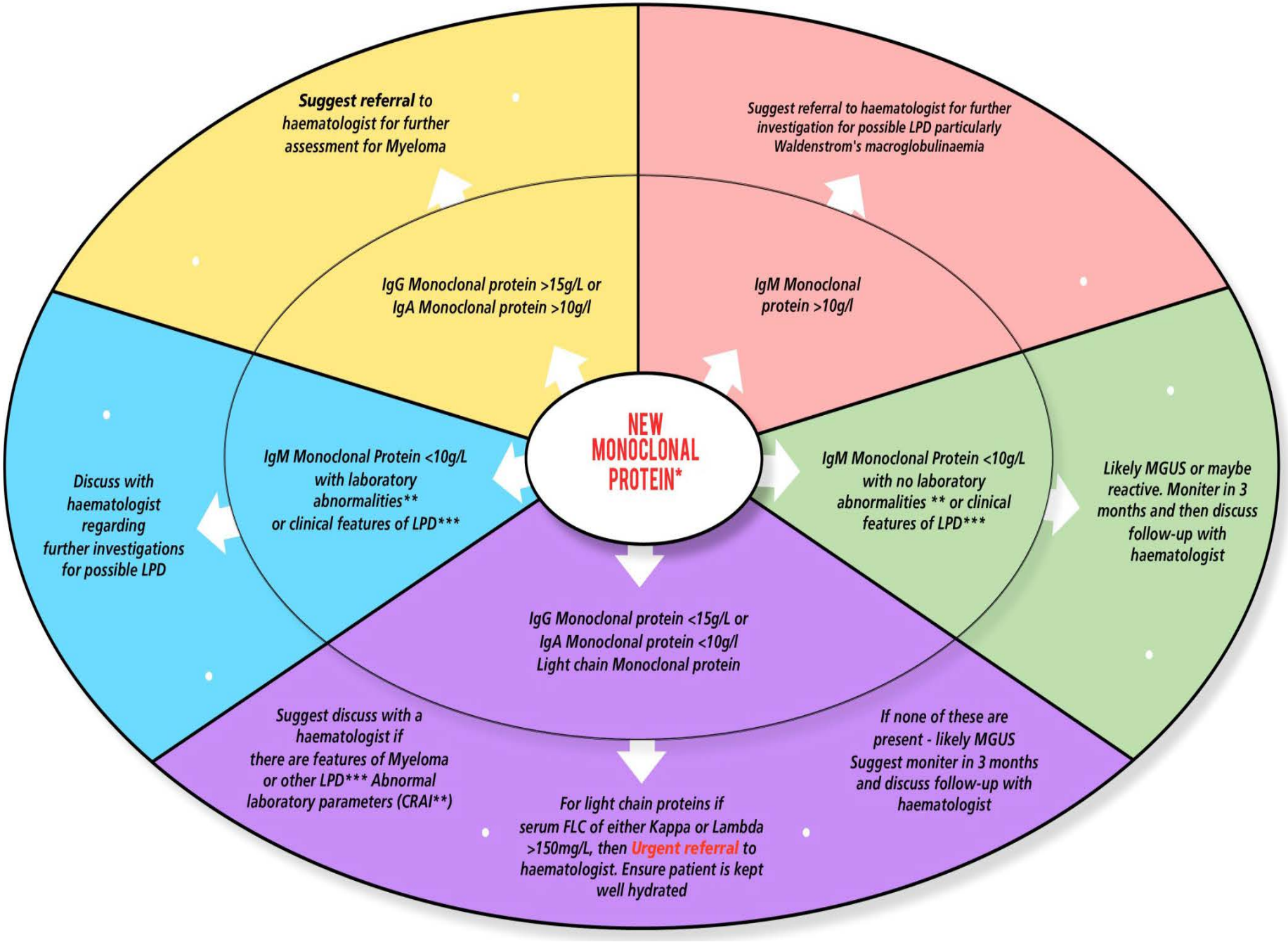
  → Refer to haematology for investigation

- Small paraprotein (IgG <15, IgA <10), no CRAB

  → Check urine BJP / SFLC, monitor 3-6 monthly

- IgM paraprotein
  - Small (<10 g/L) Often reactive, but ?lymphoma
  - Large (>10 g/L) Waldenstrom's and hyperviscosity syndrome

  → Haematology referral



www.heftpathology.com **Immunology Clinical Advice**

Risk stratification of MGUS

3 important predictive factors

Serum paraprotein >15gm/L

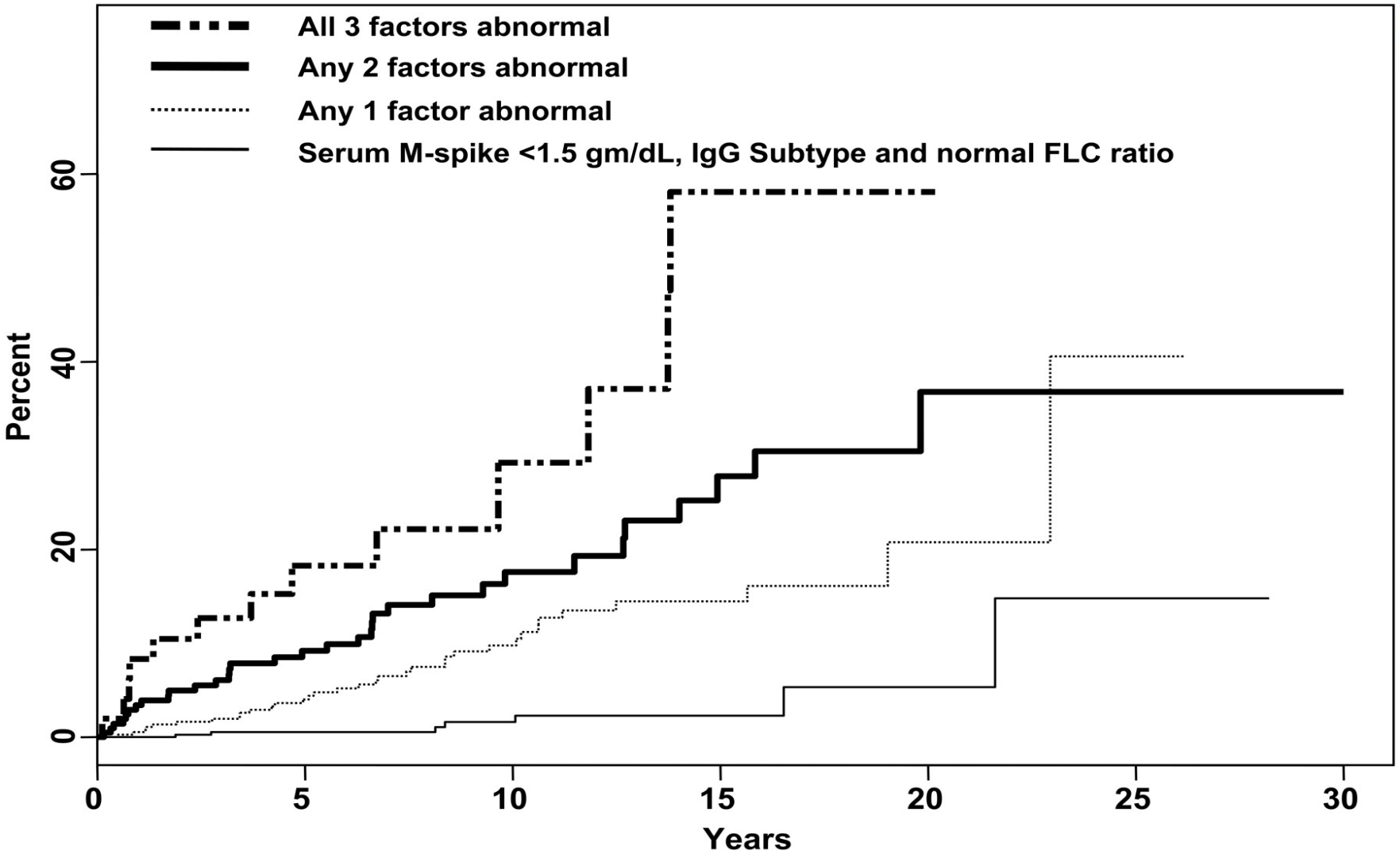
Non-IgG subtype

Abnormal FLC ratio

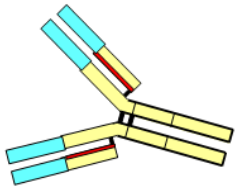
Risk Group	No of risk factors	No. of patients	Relative risk	Risk of progression at 20 years
Low-risk	0	449	1	5
Low-intermediate-risk	1	420	5.4	21%
High-intermediate-risk	2	226	10.1	37%
High-risk	3	53	20.8	58%

*Blood 2005: **106**: 812-817*

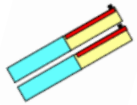
MGUS progression to myeloma

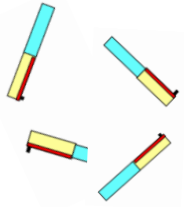


Reasons to request Serum Free Light Chains (SFLC)



- Direct
  - Diagnosis and monitoring of myeloma
    - Does not replace Immunoglobulin / BJP
    - Not part of “routine” screen
  - Diagnosis and monitoring of amyloid





- Reflex (by lab)
  - All new paraproteins
    - Help to prognosticate MGUS and myeloma
  - All new low immunoglobulins?

Public Health England

NHS HEART of ENGLAND NHS Foundation Trust

Rejection of Clinical Specimens in Microbiology

Karen Reynolds, Public Health Services Manager
Andrea Audley, Biomedical Scientist

Introduction

- Currently we are unable to test approximately 6% of all the samples received in the laboratory.

- This equates to approximately **40,000 samples per year.**

- The purpose of this presentation is to give help to reduce the number of samples rejected by providing guidance and instructions regarding samples and request forms to ensure they meet the laboratory requirements to be accepted for processing and reduce the number of rejected samples and thus the impact on the patient**.**

Public Health England

Rejection policy

- It is not always appropriate for us to examine specimens, depending on their condition on arrival at the laboratory due to the likelihood of getting an incorrect result.

- Certain samples are impossible to repeat, usually because an invasive procedure is required to obtain them or because an antibiotic treatment will have been started immediately after sampling. We endeavour to process these samples wherever possible.

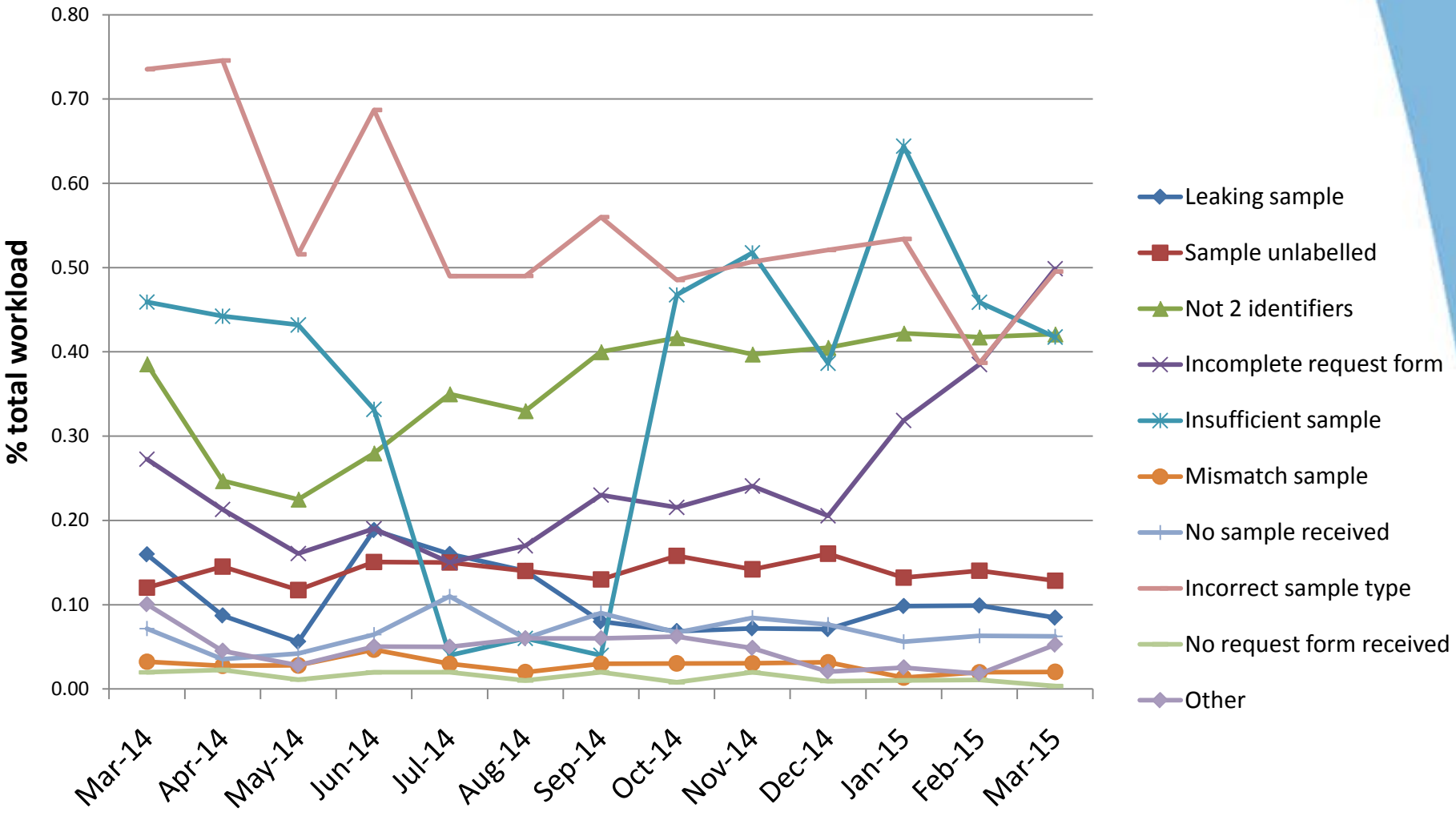
- We try to minimise the discomfort and/or inconvenience to the patient when considering whether to reject a sample.

- We adhere to guidelines published by the Royal College of Pathologists when considering our rejection policy.

Specimen rejection criteria

- Leaking/damaged samples
- Insufficient information to correctly identify patient on sample and/or request form
- Unlabelled sample
- Incomplete patient details on request form
- Swab with no sample site stated on request form
- Sample received without request form
- Request form received with no sample
- Patient details on sample and request form do not match i.e. mismatch
- Unsuitable sample type
- Unsuitable sample container

Rejected samples from Primary Care



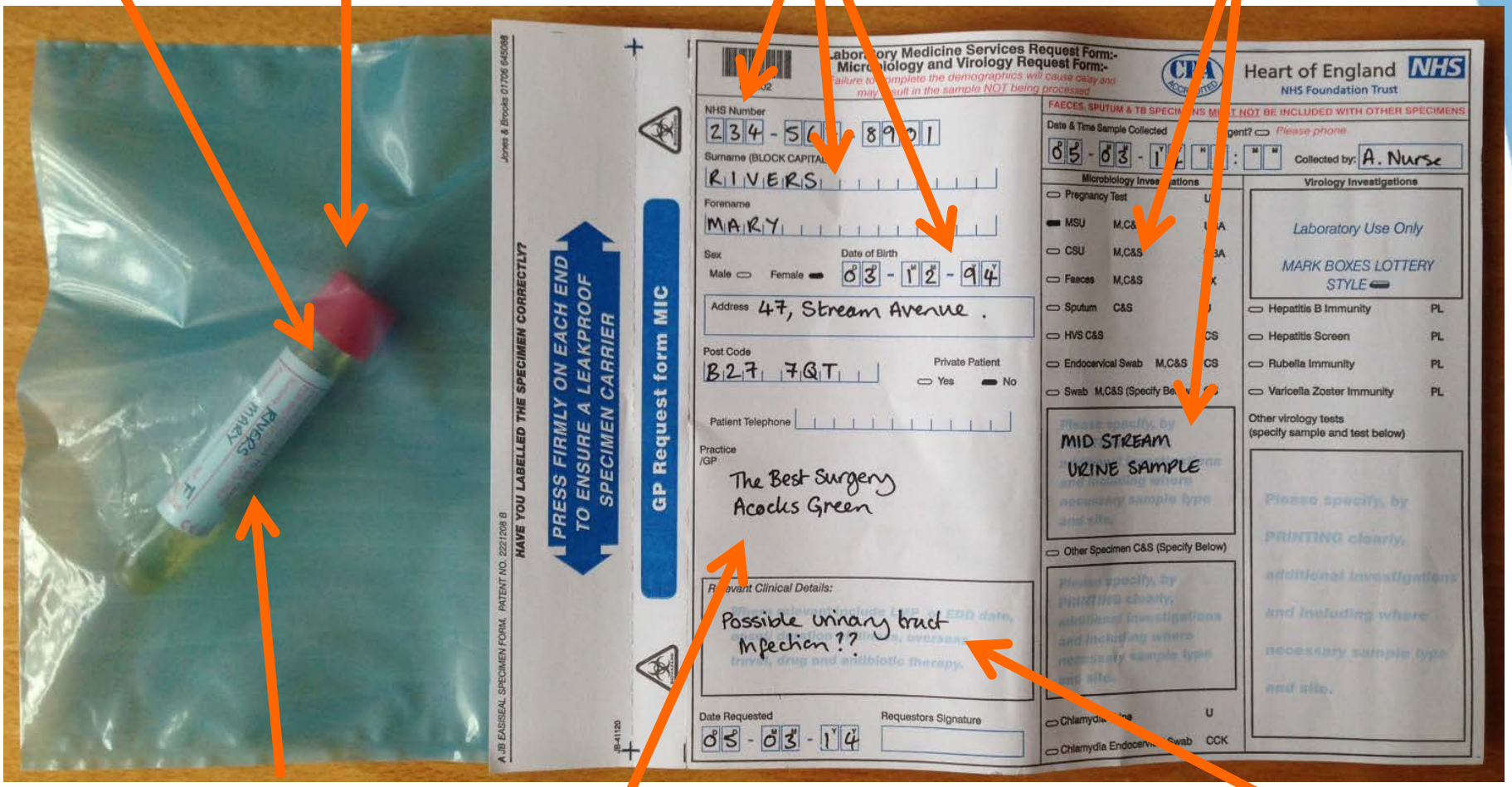
Sending the Perfect Sample

Secure Lid

At least 2X PID on Form (matching bottle)

Specimen Type and Test Requested

Filled Bottle

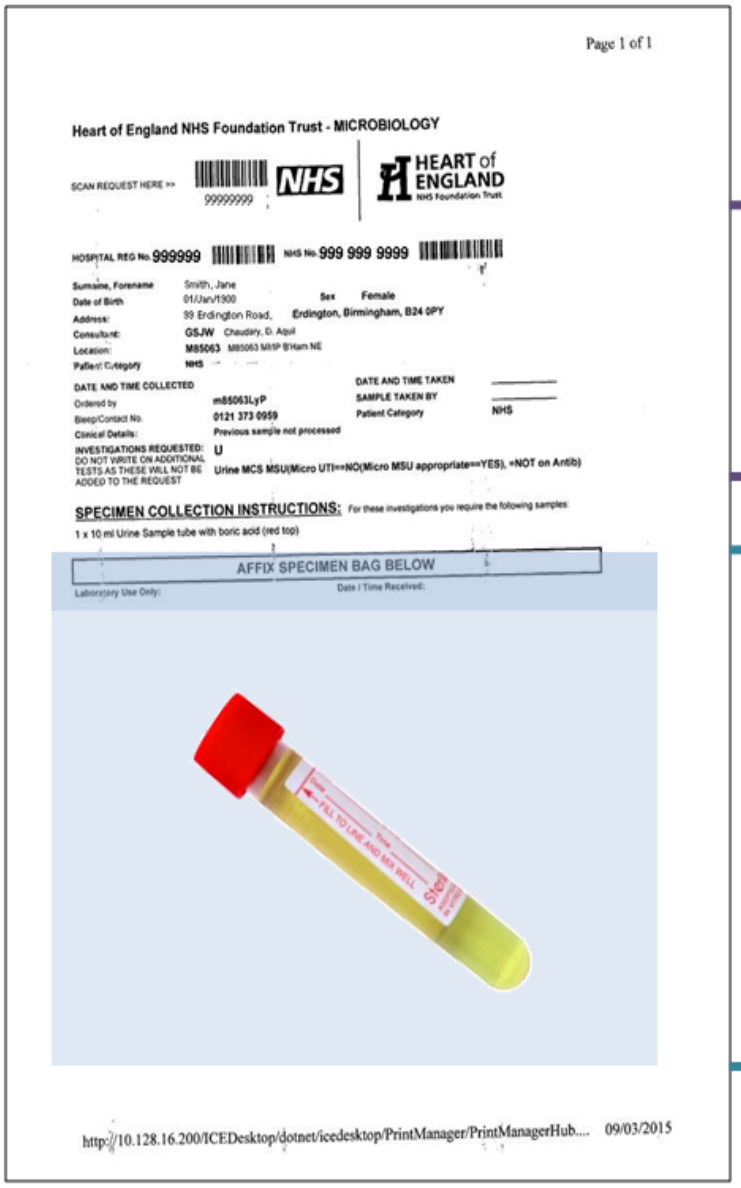


2X PID on Bottle (matching form)

Location/Doctor to send report to

Clinical Details

Sending the Perfect Sample



Page 1 of 1

Heart of England NHS Foundation Trust - MICROBIOLOGY

SCAN REQUEST HERE >> 99999999

HOSPITAL REG No 999999 NHS No 999 999 9999

Surname, Forename: Smith, Jane
Date of Birth: 01/Jan/1900 Sex: Female
Address: 99 Erdington Road, Erdington, Birmingham, B24 0PY
Consultant: GSJW Chaudary, D. Aquil
Location: M85063 M85063 M/SP B'Ham NE
Patient Category: NHS

DATE AND TIME COLLECTED
Ordered by: m85063LyP
Bleep/Contact No.: 0121 373 0959
Clinical Details: Previous sample not processed
DATE AND TIME TAKEN
SAMPLE TAKEN BY
Patient Category: NHS

INVESTIGATIONS REQUESTED: U
DO NOT WRITE ON ADDITIONAL TESTS AS THESE WILL NOT BE ADDED TO THE REQUEST
Urine MCS MSU(Micro UTI==NO(Micro MSU appropriate==YES), =NOT on Antib)

SPECIMEN COLLECTION INSTRUCTIONS: For these investigations you require the following samples:
1 x 10 ml Urine Sample tube with boric acid (red top)

AFFIX SPECIMEN BAG BELOW
Laboratory Use Only: Date / Time Received:

http://10.128.16.200/ICEDesktop/dotnet/icedesktop/PrintManager/PrintManagerHub.... 09/03/2015

Form:

- Complete and accurate patient information
- Person requesting test
- GP location
- Sample type
- Test needed
- Relevant Clinical Details

Sample:

- Two forms of patient identification matching on tube and form
- Correct sample container used
- Adequately filled
- Lid screwed on tight (no leaks)
- Sample in bag
- Bag attached to form
- DO NOT put form inside bag

Sending the Perfect Sample

Leaking or damaged specimens

- Will only be examined if there is an overriding clinical indication such as antibiotic treatment given post sample collection
- Will only be applicable if the degree of damage or leakage is not severe and does not compromise laboratory staff safety
- This decision is normally taken by the duty microbiologist
- If the sample is rejected the reason for rejection is reported
- If the request form is contaminated, a new form must be written out in the laboratory

Insufficient information to correctly identify patient on specimen &/or request form

Minimum data set required

The minimum information on a form **and** specimen for acceptance are **2** patient identifiers which can include two of the following:

- Full patient name
- Anonymous clinic number (Sexual Health clinics)
- Hospital/PID number
- Date of birth
- NHS number

–NB: the sample should always have the patient name/anonymous clinic number plus one other identifier

Swab with no specimen site stated

- If a swab is received and the site from where the sample was taken is not stated, then the sample will be rejected

- It is important to know where the sample is from in order to ensure the correct investigations are carried out and to assist with the interpretation of results

- Examples: “cervical” is that neck of head or neck of womb?

- “Cheek swab” is that external cheek (skin and soft tissue pathogens) or internal cheek (oral thrush etc).

Public Health England

Specimen received without a request form

- The specimen will be kept until the end of the day, if no form appears then the specimen will be rejected
- If there are no patient details on the sample then it is not possible to enter the details onto the computer system
- The rejected samples are stored for 1 week. This allows a requesting Clinician to forward a request form and for the sample to be processed before it becomes unfit for testing.

Request form received without a specimen

- The request form will be kept until the end of the day
- If the specimen does not appear, the form will be labelled and rejected
- Occasionally forms arrive without a specimen because the laboratory already has a specimen that has had other tests carried out. This should only occur via prior arrangement and the form should state this and/or have laboratory number recorded on it

Patient details on sample and request form do not match i.e. mismatch

- If the patient details on the sample do not match those on the request form, the sample will be rejected

- It is not possible to determine whether one of the two has been incorrectly labelled or whether the sample is from another patient and has been put into the incorrect specimen bag

Unsuitable sample type/container

- Many investigations/tests have set sample requirements
- If the samples are collected into the incorrect specimen container they cannot be processed
- Details on sample containers can be found on the Microbiology pages of the Laboratory medicine website (www.heftpathology.com)
- Unsterile sample containers, e.g. Empty medicine bottles, are unsuitable for Microbiology testing therefore will be rejected.

Public Health England

Microbiology Sample Containers: A General Practice Field Guide

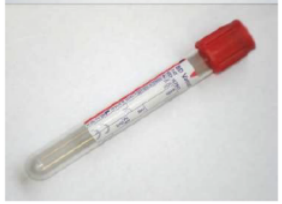
20ml Sterile Universal
Fluids and aspirates
Sputum
Mycology samples
Urines for pregnancy test or legionella / pneumococcal antigens

20ml Blue Top with Spoon
All faeces samples
(3ml min)

Liquid eSwab
General M,C&S for bacteria including wounds and HVS

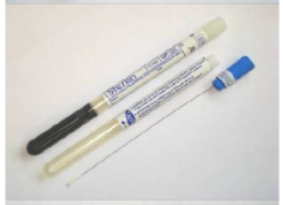
Semen Pot
Andrology seminal analysis (not for M,C&S)

APTIMA Swab
Chlamydia and gonorrhoea molecular test



Red Top Blood Tube for Serum
All serology tests

10ml Urine Tubes
Urines for M,C&S
Use boric red top if possible *(fill to line)*



Pernasal Swab
Pertussis culture

Viral Transport Medium
All virology swabs including nose and throat swabs for respiratory viruses (e.g. flu), vesicle and genital swabs

Mycology Paper Packets
Nails, hair and skin for mycology

APTIMA Urine Tube
Chlamydia and gonorrhoea molecular test
(fill to between lines)

Purple Top EDTA Blood Tube
All molecular (DNA and RNA) microbiology and virology blood tests

Please remember that all samples need to be labelled with two patient identifiers that match with those on the request form, sufficiently filled and tightly capped. Tests required and relevant clinical history should be clearly stated on the request form.

For more information visit www.heftpathology.com or call the Public Health Laboratory Birmingham on 0121 424 3111

November 2013

Insufficient specimen

- For some sample types, e.g. Stool samples and blood samples for multiple tests, there is a minimum volume required for accurate testing. Volume requirements can also be found on the website.

- If it is deemed to be insufficient for examination, or the container is empty, a repeat sample will be requested, giving guidance as to what quantity is required

- Where very small amounts of material are obtained from a patient, please contact the laboratory for advice it may be possible for us to prioritise certain tests.

Rejected sample monitoring

- Rejected samples are monitored on a monthly basis and reviewed regularly
- These reviews help to determine whether further input is required to reduce the number of rejected samples
- The reject data can also be used for other purposes as and when required, e.g. when a service user requires information on their samples

Iron Deficiency Anaemia

Dr C Kartsios

Haematology Consultant

Iron Deficiency Anaemia

- Common medical problem
- Most common cause of anaemia
- Iron deficiency anaemia is the last step ;
  - Iron depletion: absent or decreased iron stores
  - Iron deficiency: depletion of stores + low serum iron and ferritin
  - Iron deficiency anemia: Anaemia developing in an iron deficient patient

Total amount of body iron: 3-5 g

Iron Metabolism

- Iron is located at the centre of Haem molecules of Hb (amount:1.5-2 gr) and it is also;
- Part of myoglobin
- Takes place in the tissue enzymes
- Storage forms are (1gr in men,0.5gr in women):
  - Ferritin
  - Hemosiderin
  - Location: Bone Marrow, Liver, Spleen
- Transport iron is about 7 mg and bound to transferrin.
- Absorption + recycling provides the constant iron supply of 20 mg/day (up to 35 mg) necessary for Hb synthesis

Iron Metabolism

- Total iron binding capacity and iron
  - Transferrin is measured by quantifying the iron binding sites available
  - This is also called “Total iron binding capacity”
  - TIBC is 1/3 saturated under normal conditions

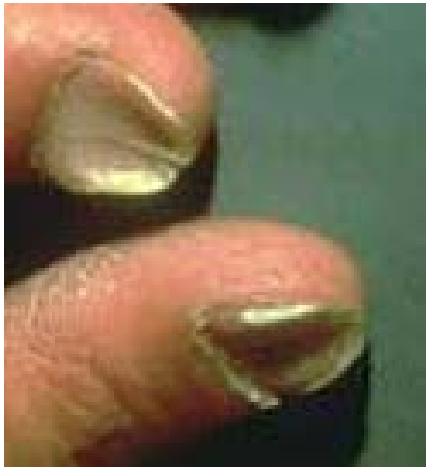
- Serum iron: 11.6-31.3 µmol/L (Males)
  9.0-30.4 µmol/L (Females)

Causes of iron deficiency

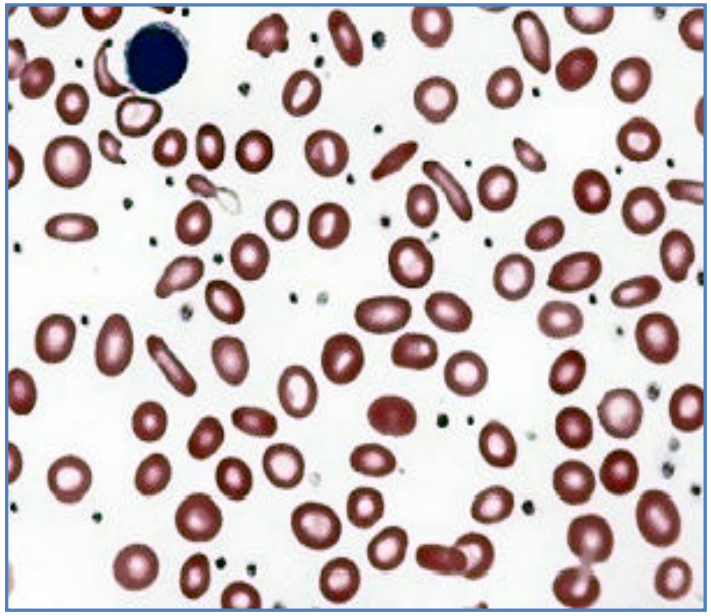
- Chronic blood loss
- Increased demand
- Malabsorption
- Inadequate iron intake
- Intravascular hemolysis and hemoglobinuria-hemosiderinuria
- Combinations

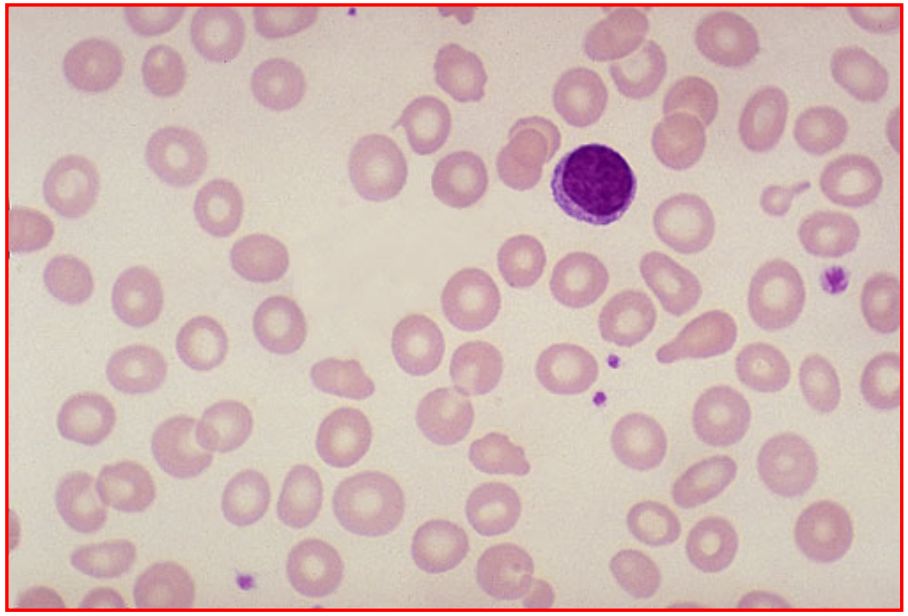
Clinical features

- General symptoms of anaemia
- Fatigue may be disproportional to the degree of anaemia
- Chlorosis
- Glossitis
- Angular stomatitis, hair loss, nail changes
- Paterson-Kelly (Plummer Vinson) syndrome
- (oesephageal web leading to disphagia)
- Immune deficiency
- Splenomegaly



Findings	Normal	Prelatent period	Latent period	Iron def. anaemia	
				Early	Late
Hb g/dl	N	N	N	8-14	<8
MCV fl	N	N	N	N, ↓	↓
S. Ferr.	N	↓	<12	<12	<12
T. Sat.	N	N	<15	<15	<15
BM iron	N	↓	-	-	-
Symptoms	-	-	-	+	+

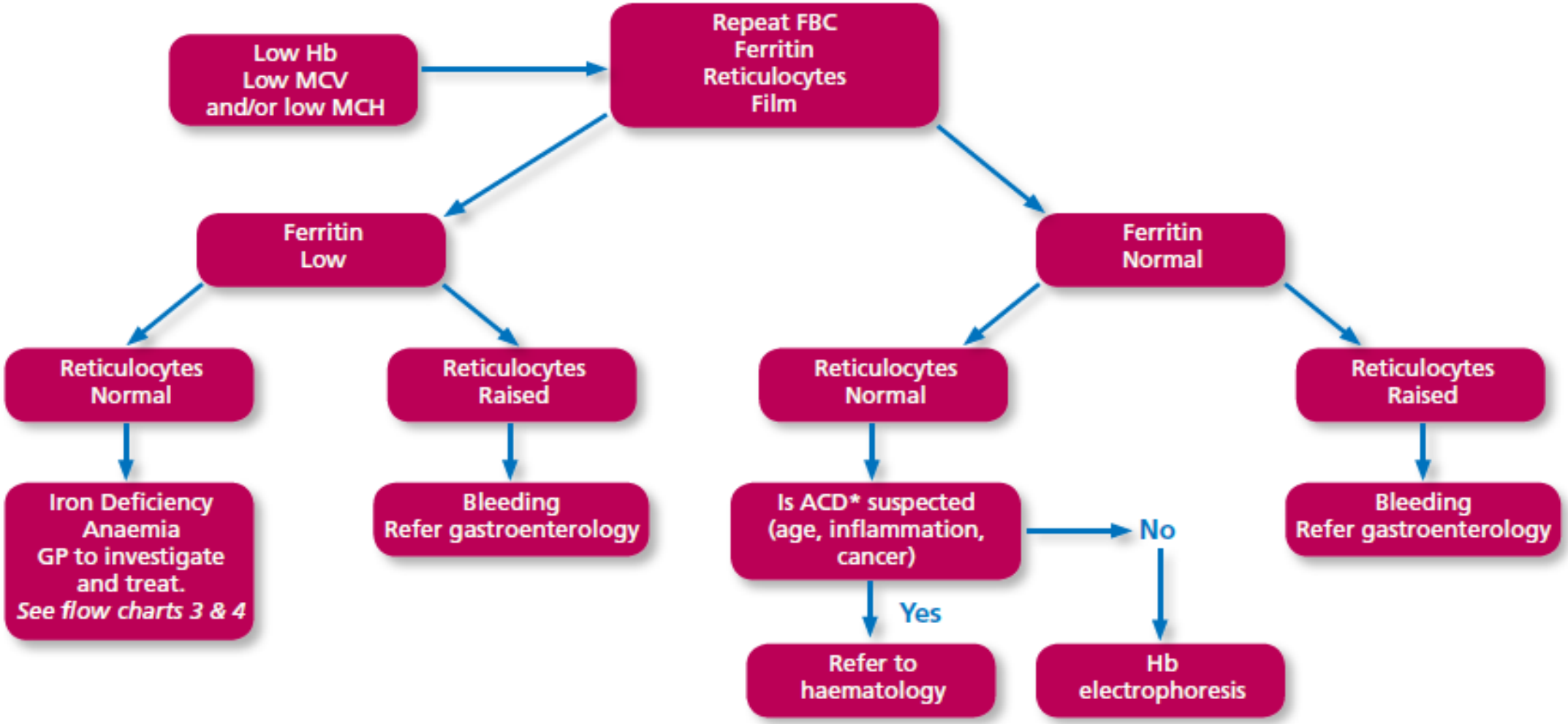




Differential diagnosis

- Microcytic anaemias
  - Thalassaemia ,HbC,HbE etc
  - Sideroblastic anaemia
  - Lead poisoning
  - Anaemia of chronic disease

Investigation and Referral Pathway for Microcytic and/or Hypochromic Anaemia

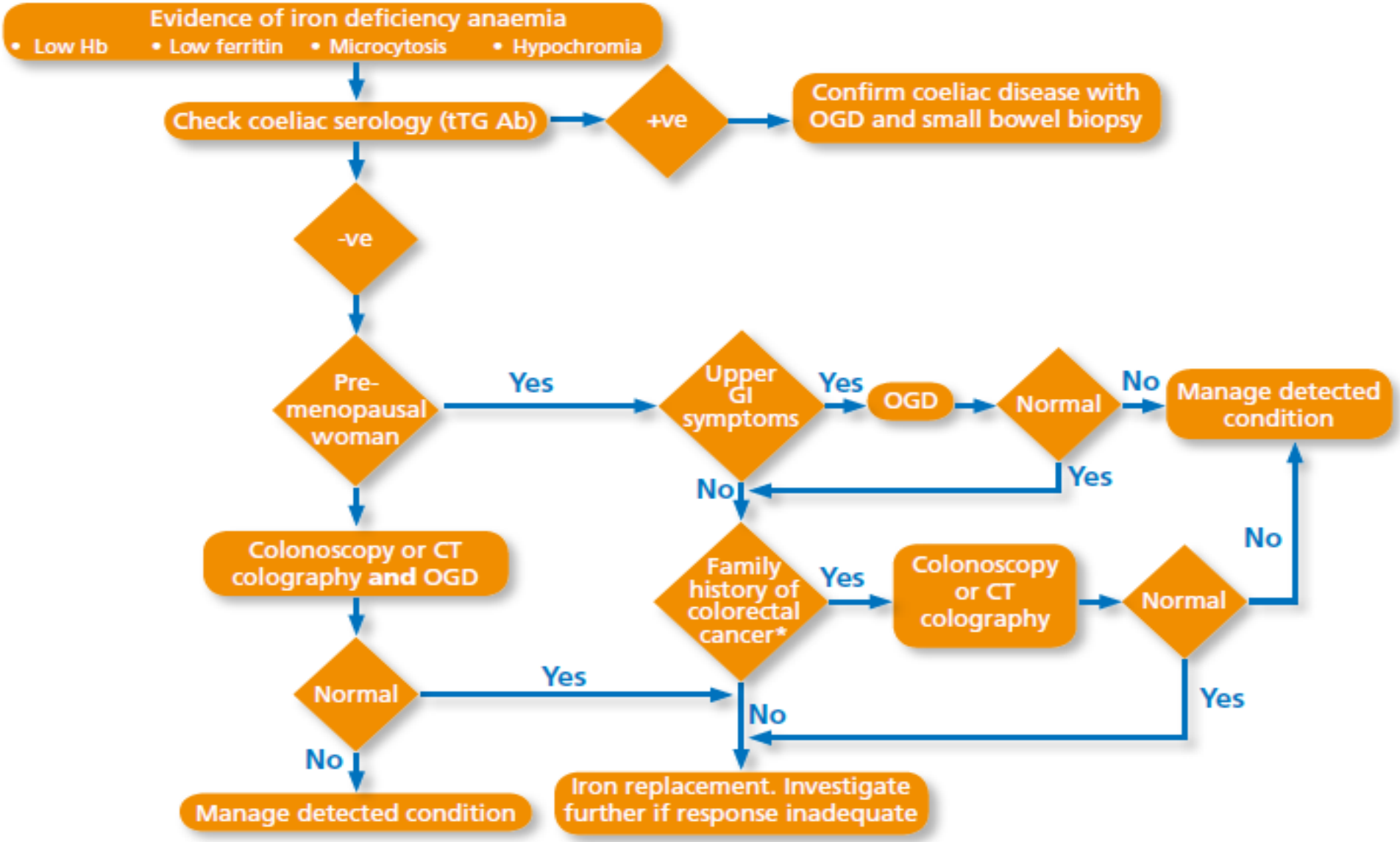


Southern Derbyshire Shared Care Pathology Guideline:
Anaemia: Active Date 22.12.2011 Review Date December 2013
Dr Angela McKernan

*Anaemia of Chronic Disorder

Investigation of iron deficiency anaemia

GI, gastrointestinal; Hb, haemoglobin; OGD, oesophagogastroduodenoscopy; tTG Ab, tissue transglutaminase antibody.
*Two affected first-degree relatives or just one first-degree relative affected before the age of 50 years.



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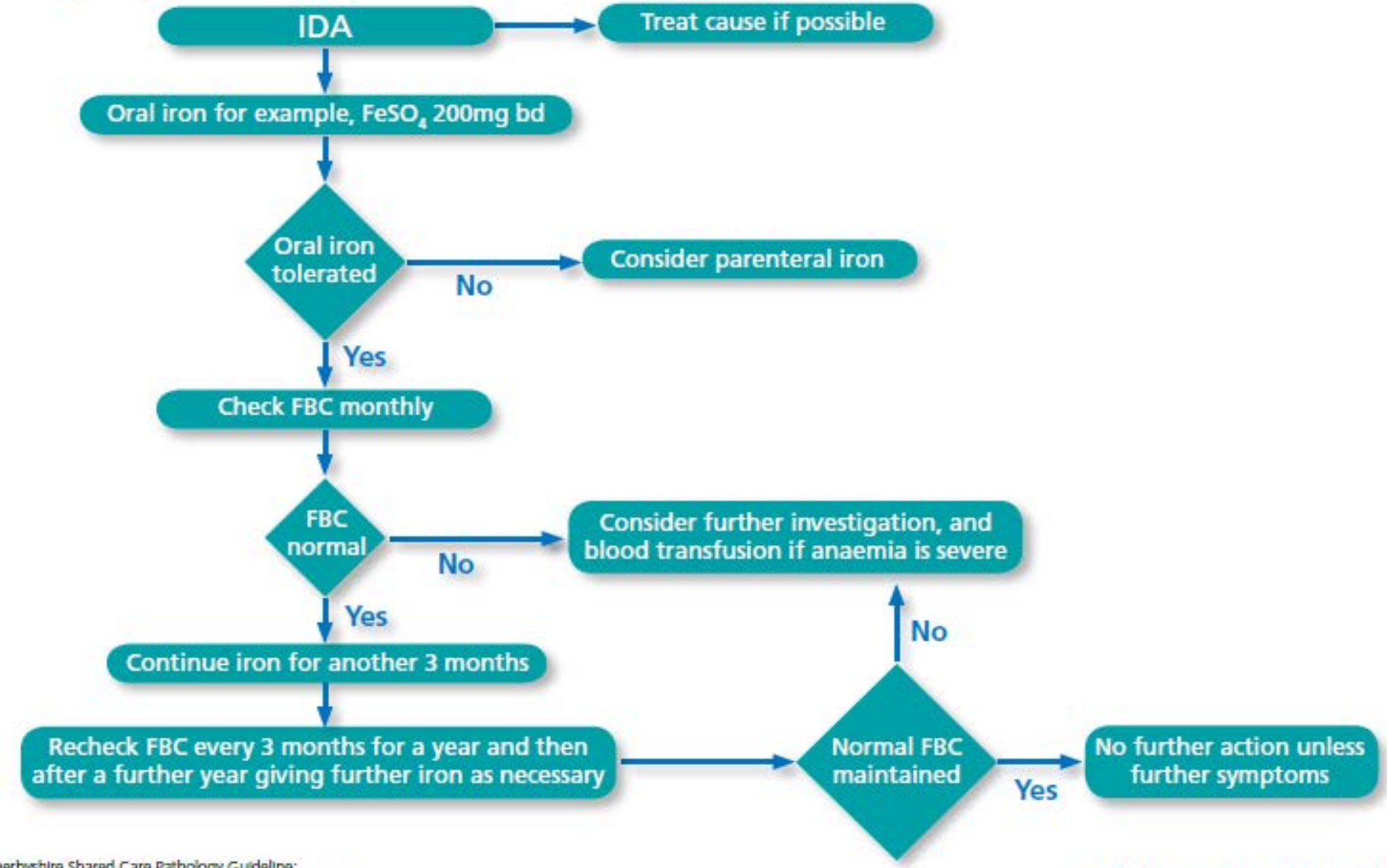
Goddard AF, James MW, McIntyre AS, et al. Gut (2011).
doi:10.1136/gut.2010.228874

Treatment of iron deficiency anaemia (IDA)

bd, twice a day; FBC, full blood count.



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Q&As session

- **Biochemistry**
  - Craig Webster, Consultant Clinical Biochemist and Clinical Service Lead in Clinical Chemistry, Immunology and Toxicology
  - Dr Ummu M Mayana, Honorary Consultant Chemical Pathologist
  - Dr Emma Evans, Senior Clinical Scientist

- **Immunology**
  - Dr Aarn Huissoon, Consultant Immunologist

- **Microbiology**
  - Dr Abid Hussain, Consultant Microbiologist
  - Karen Reynolds, Public Health Services Manager
  - Andrea Audley, Biomedical Scientist in Microbiology

- **Haematology**
  - Dr Charalampos Kartsios, Consultant Haematologist
  - Mark Hill, Head Biomedical Scientist in Haematology