Monoclonal Gammopathy Lab Tool

This tool will help order recommendations for the improvement of myeloma screening in a diagnostic laboratory. These recommendations have been broken down into the three main phases of testing; pre-analytical, analytical, and post-analytical.

Primary recommendation

The testing laboratory should collaborate with Clinical Haematology to create effective, shared patient flow pathways for new monoclonal gammopathy patients.

● Essential
●● Desired
●●● Optimal

1. Pre-analytical phase: ordering of tests

●	1.1	Myeloma screening is accessible for both primary and secondary care teams
	1.2	A myeloma screen includes serum electrophoresis **and** total immunoglobulin measurements as the core test
	1.3	A second assay is included in a myeloma screen – this should be either urine electrophoresis or serum free light chains
	1.4	Serum free light chains are a part of the testing repertoire of the laboratory (either in-house or as a referred test)
●●	1.5	Myeloma screening is available on electronic patient requesting platforms – both primary and secondary care
	1.6	Calcium levels, serum creatinine and a full blood count are also requested at the time of the myeloma screen
●●●	1.7	Ordering is available on electronic patient requesting as a batch test, to allow comprehensive testing to be performed
	1.8	Appropriate minimum repeat test intervals are installed into the testing laboratory LIMS system to reduce burden of unnecessary testing for total immunoglobulins, urine electrophoresis and serum free light chains

2. Analytical phase: analytical testing of samples

●	2.1	The laboratory must have UKAS accreditation (ISO15189) for all assays involved in the myeloma screen
	2.2	The laboratory successfully participates in ISO17043 accredited EQA programmes for their myeloma screen analytes
	2.3	All abnormal serum electrophoresis results in new patients are followed up with either immunosubtraction or immunofixation
	2.4	All abnormal urine electrophoresis results are followed up with urine immunofixation
	2.5	All newly identified free light chain monoclonal proteins via serum immunofixation have IgD/IgE immunofixation performed
	2.6	All new abnormal serum free light chain ratio results are evaluated and if monoclonality suspected, confirmed by immunofixation
	2.7	The laboratory has a robust protocol for reporting significant new monoclonal gammopathy patients
	2.8	The laboratory has a reflex protocol to add on serum free light chains on initial serum electrophoresis/immunoglobulin results of concern
●●	2.9	The turnaround time for serum electrophoresis/total immunoglobulins is 3 days or less
	2.10	The laboratory has a consistent protocol for reporting the size of the paraprotein
●●●	2.11	The laboratory has a safety-net protocol for ensuring that a full myeloma screen is performed on all suitable samples

3. Post-analytical phase: interpretation and reporting of results

●	3.1	The laboratory issues interpretive guidance to clinical users for serum electrophoresis/total immunoglobulin, serum free light chain and urine electrophoresis results
●●	3.2	The laboratory and Clinical Haematology collaborate to risk stratify all new monoclonal proteins, to determine the most appropriate management pathway for the patient
	3.3	The laboratory contributes to the monitoring process of low-risk MGUS patients, providing interpretation of monitoring bloods

Case Study: Basingstoke Hospital

Hampshire hospitals (HHFT) operate their myeloma screening service within a large biochemistry department led by a Consultant Scientist in Biochemistry. The service population for this pathway is 500,000. The service operates at two separate sites (Basingstoke and Winchester) and, at the time of writing, does not have a fully automated core laboratory structure.

Primary Recommendation		1 recommendation
Recommendation	**Compliance**	**How does the service meet this recommendation?**
Laboratory collaborates with Clinical Haematology to create effective, shared patient flow pathways for new monoclonal gammopathy patients.	Yes	Clear joined-up working between the Biochemistry/ Immunology laboratory team, scientist authorising team and the myeloma haematology lead. Meetings held periodically to discuss the overall investigation pathway and daily/weekly correspondence on specific cases entering the pathway.

Pre-analytical Phase		8 recommendations
Recommendation	**Compliance**	**How does the service meet this recommendation?**
1.1 Myeloma screening is accessible for both primary and secondary care teams.	Yes	Immunoglobulins/electrophoresis, urine electrophoresis and serum free light chains are all requestable to primary and secondary care users.
1.2 A myeloma screen includes serum electrophoresis **and** total immunoglobulin measurements as the core test.	Yes	Electrophoresis cannot be tested without immunoglobulins. Immunoglobulins can be requested without electrophoresis, but this is not allowed for myeloma screening.
1.3 A second assay is included in a myeloma screen – either urine electrophoresis or serum free light chains.	Yes	All samples that are tested for serum electrophoresis and immunoglobulins are checked for urine electrophoresis **or** serum free light chain results. If this is missing, serum free light chains are added.
1.4 Serum free light chains are part of the laboratory testing repertoire.	Yes	Serum free light chains part of the testing repertoire for the service.
1.5 Myeloma screening is available on electronic patient requesting platforms, both for primary and secondary care.	Yes	EPR systems are in use for both primary and secondary care, these both contain the full repertoire of tests.
1.6 Haemoglobin levels, creatinine levels and adjusted calcium levels are requested alongside a myeloma screen to aid in possible risk stratification.	Partial	Ability to order these via GP EPR and they are structured in a way that groups them together in the screen, but this is not a single click batch of tests.
1.7 Myeloma screening is available on EPR as a batch request test – to allow a comprehensive screen to be requested with one click.	Yes	
1.8 Appropriate minimum repeat test intervals are installed into laboratory protocol for all relevant assays.	No	Minimum retest intervals are planned to be implemented in the coming months.

Case Study: Basingstoke Hospital (continued)

Analytical Phase		11 recommendations
Recommendation	**Compliance**	**How does the service meet this recommendation?**
2.1 Laboratory holds ISO15189 accreditation, which includes myeloma screening assays in this repertoire	Yes	Full accreditation held for all assays.
2.2 Laboratory successfully participates in ISO17043 accredited EQA programmes for their myeloma screen analytes	Yes	Use NEQAS EQA schemes for all analytes.
2.3 All abnormal electrophoresis results are followed up by either immunosubtraction or immunofixation	Yes	Decisions for follow-up made at authorising after scrutiny of initial CZE trace. Decision of immunosubtraction vs immunofixation determined on size of suspect peak on trace and its location in spectra. Unclear immunosubtraction results are further tested by immunofixation.
2.4 All abnormal urine electrophoresis results are followed up with urine immunofixation	Yes	Urine immunofixation is the first line testing that is completed.
2.5 New free light chain monoclonal proteins identified in serum have IgD/IgE immunofixation performed	Yes	Newly identified free light chain monoclonal proteins in serum are referred to the Oxford Immunology Laboratory for IgD/IgE serum immunofixation. Serum free light chain analysis is performed simultaneously on site to help with determining if the result is critical, requiring action before the return of the IgD/IgE immunofixation result.
2.6 All abnormal screening serum free light chain ratio results are evaluated for further investigation	Yes	Samples producing abnormal serum free light chain ratios are not auto-authorised. Authorisers review the significance of the serum free light chain profile and request urine electrophoresis and/or serum immunofixation depending on this.
2.7 Laboratory has a standardised protocol for reporting significant new monoclonal proteins	Yes	Authorisers determine the significance of the new monoclonal protein according to a standardised departmental protocol, co-created with the haematology myeloma lead. New significant results are flagged for the attention of the myeloma lead within LIMS so that they can review promptly and take actions as necessary.
2.8 Laboratory has a protocol for reflex testing serum free light chains on initial screening results of concern	Yes	Serum free light chains are requested on samples that are indicative for myeloma screening, or who show initial concerning results from the immunoglobulins and serum electrophoresis.
2.9 The core myeloma screen test is performed within 3 days of laboratory receipt	Yes	Initial data shows >98% of samples are tested within 24 hours.
2.10 Laboratory has a consistent protocol for reporting paraprotein size	No	To be worked on in the coming year.
2.11 Laboratory has a safety-net protocol for double testing – ensuring that all myeloma screen requests have 2 assays performed	Partial	Some results that are generated from immunoglobulins and electrophoresis will flag to trigger a serum free light chain assay to be performed in the absence of an existing urine electrophoresis request. This algorithm does not have 100% coverage of all samples that have the core myeloma testing performed, with other samples having a prompt comment given to users to ask for a urine sample to be sent in.

Case Study: Basingstoke Hospital (continued)

Post-analytical Phase		3 recommendations
Recommendation	**Compliance**	**How does the service meet this recommendation?**
3.1 Laboratory supplies interpretive guidance on all aspects of a myeloma screen	Yes	Standardised interpretive comments issued with results on all assays as required and depending on the combination of results generated. These comments have been co-created in collaboration with the myeloma lead in Haematology.
3.2 Laboratory should risk stratify all new monoclonal proteins to guide most appropriate management	Yes	All new monoclonals are reviewed by the myeloma lead via a set LIMS authorising queue. As stated earlier, critically significant results are expedited.
3.3 Laboratory should contribute to the monitoring process of MGUS patients and provide interpretation of monitoring bloods	Yes	Standardised approach to review of 'known paraprotein' patients performed by the authorising team. If there is evidence of progression with the monoclonal protein in the patient, the patient is highlighted to the myeloma lead via the specific LIMS authorising queue.

Total Compliance	**20** / 23

Glossary

CZE: capillary zone electrophoresis

EQA: external quality assessment

GP EPR: general practice electronic patient record

LIMS: laboratory information management system

MGUS: monoclonal gammopathy of undetermined significance

NEQAS: National External Quality Assessment Service

UKAS: United Kingdom Accreditation Service

ISO15189: Medical laboratories – Requirements for quality and competence

ISO17043: Conformity assessment – General requirements for proficiency testing

For any queries or additional resources for healthcare professionals on myeloma and related conditions, please visit **academy.myeloma.org.uk** or email us at **earlydiagnosis@myeloma.org.uk**

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