Audit of Myeloma Screen Requesting in North Glasgow Primary Care

Introduction/Background

Myeloma patients experience some of the longest delays in diagnosis of all cancer patients (median 163 days)[1]. The commonest symptoms of myeloma (back pain, fatigue, recurrent infections) are non-specific, resulting in over 50% of patients visiting their GP at least 3 times prior to a referral to secondary care[2]. Over 30% of myeloma patients are diagnosed through an emergency route[3].

Early diagnosis via GP referral is associated with improved overall survival (1yr survival 88% vs 62% for those diagnosed via emergency route)[4], thus where there is a suspicion of myeloma, it is essential that all appropriate laboratory investigations are requested by primary care.

The critical hallmark of myeloma is evidence of a monoclonal protein (paraprotein) on electrophoresis of serum and/or urine. Around 20% of patients have light chain myeloma, in which the myeloma cells produce only light chains and no whole immunoglobulins. These are often not visible on serum protein electrophoresis and are only detected in the urine as Bence Jones protein (BJP), i.e. urine free light chains.

In order to exclude the presence of a paraprotein therefore, analysis of both serum and urine protein electrophoresis must be performed[5,6]. Often only serum is received by the North Glasgow Biochemistry Laboratory, prompting a comment to be added to the report recommending a urine sample be sent for (BJP), however it is unclear whether this is effective in altering requesting practice.

Aims

The aims of this audit were:

1. To determine the percentage of myeloma screens received in the department of Clinical Biochemistry which are complete (ie. both serum and urine analysis requested).
2. To assess the effectiveness of laboratory report comments recommending that the missing test be requested (where the initial request was incomplete).

Method

All serum and urine protein electrophoresis requests received by North Glasgow Biochemistry from primary care over a 4 week period (3rd to 30th October 2022) were reviewed. Clinical details were noted where these had been provided. Data from the laboratory computer system (Telepath) was used to establish whether both serum and urine requests had been received on each patient.

Where a paired sample had not been received, the Biochemistry report was reviewed to determine whether a comment requesting the missing test had been made, and whether the omitted sample had been received subsequently.

Results

Over a 4 week period, North Glasgow Biochemistry received a total of 491 samples for protein electrophoresis (324 serum and 167 urine) on 395 patients from primary care.

Aim 1: Completeness of myeloma screen requests

Of the 324 serum samples received, there were:

- 11 requests for monitoring patients known to have serum paraproteins
- 2 repeat requests due to haemolysis of the previous sample
- 3 unnecessary repeat requests

In addition, 5 serum samples had been sent to complete a previous "myeloma screen" (in which only urine BJP had been requested originally). The remaining 303 serum requests were considered to form part of a new "myeloma screen".

Of the 167 urine samples received, there were:

- 12 repeat requests on EMU sample due to initial sample being too dilute*
- 1 unnecessary repeat request

In addition, 33 urine samples had been sent to complete a previous "myeloma screen" (in which only serum electrophoresis had been requested originally). The remaining 121 urine requests were considered to form part of a new "myeloma screen"

[* Note: To ensure an adequately concentrated sample, an early morning urine sample is preferred.]

Overall a total of 303 serum and 121 urine samples were received on 328 patients for investigation of possible myeloma during the audit period. Of these, paired samples were received on 96 patients ie. only 29% of all "myeloma screens" were complete (figure 1).

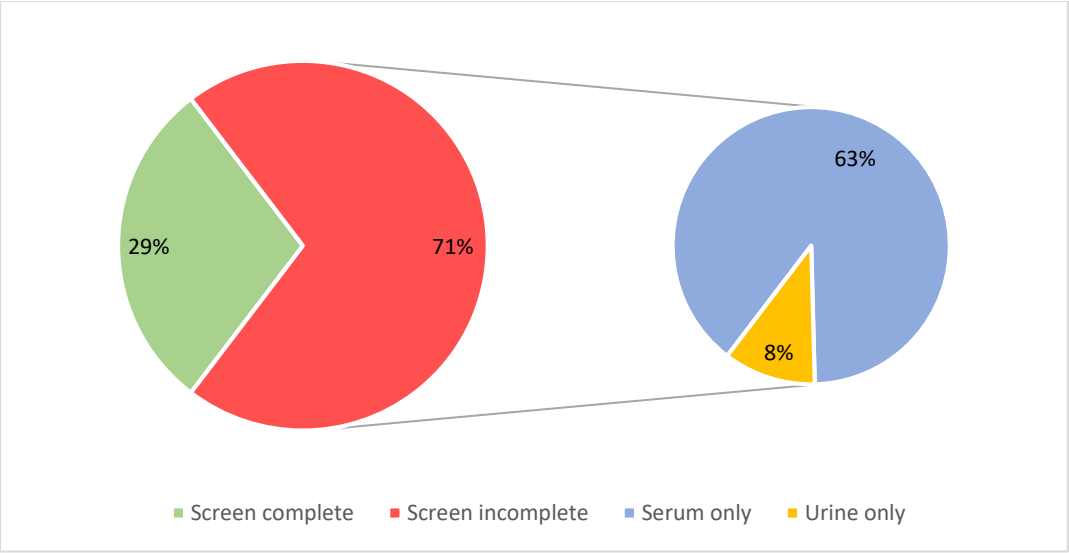

Figure 1. Percentage of complete myeloma screens received from primary care

Aim 2: Effectiveness of report comments

Of the incomplete screens received, 188 (91%) serum reports were issued with a comment prompting a urine BJP request. Subsequently 41 urine samples were received, although clinical details suggest that 14 of these have been influenced by abnormal immunoglobulin concentrations and/or presence of a paraprotein in the serum, rather than the report comment.

All 25 urine reports had a comment recommending serum protein electrophoresis be requested, with 13 serum samples being received subsequently.

Overall, report comments elicited a poor response (25%) suggesting this is an ineffective means of triggering a further sample.

Discussion

Requesting

Screening for myeloma requires both serum and urine electrophoresis as first line investigations. Despite this 71% of myeloma screen requests were incomplete, meaning the presence of a paraprotein cannot be excluded in these patients.

A "Myeloma Screen" button is available under the "Collections" tab in GP ICE (figure 2). This collection includes both serum and urine protein electrophoresis (urine BJP), in addition to other biochemistry and haematology tests relevant to the investigation of myeloma and its potential complications.

To assist the laboratory in improving the investigation of myeloma, please provide relevant clinical details with each request. This can greatly assist the duty biochemist in determining the clinical significance of abnormal results. Advice on patient follow up is provided on all protein electrophoresis reports.

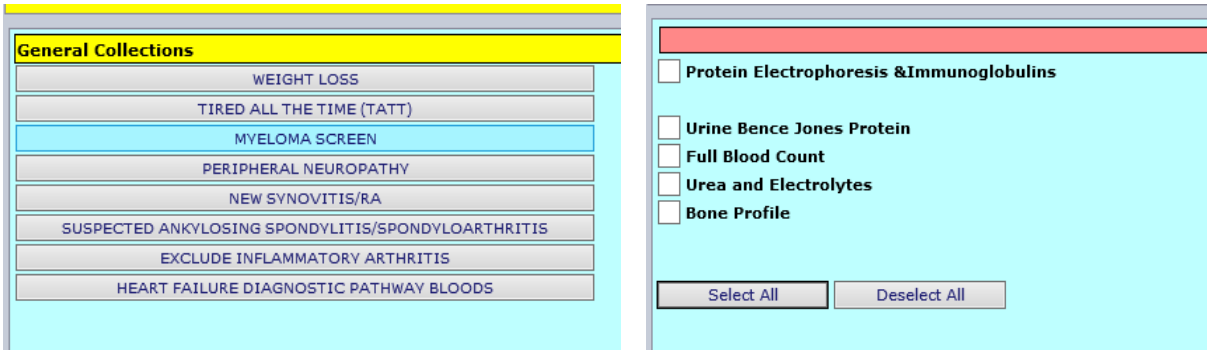

Figure 2. Myeloma screen collection in GP ICE

Report comments

The addition of a comment on the biochemistry report recommending the omitted test failed to elicit a significant improvement, only increasing the total percentage of patients having complete myeloma screens from 29% to 46%.

NB. In addition to these prompts for further investigation, clinical interpretation of results and advice on appropriate follow up is provided on all protein electrophoresis reports. If further advice or discussion is required, please contact the duty biochemist.

Clinical details and other findings

Clinical details: "liver screen"

Clinical details on a number serum protein electrophoresis requests suggested the test was being requested for investigation of abnormal liver function. Protein electrophoresis is not clinically indicated for this purpose. Please note if monitoring of immunoglobulins is required, these can be requested separately (figure 3).

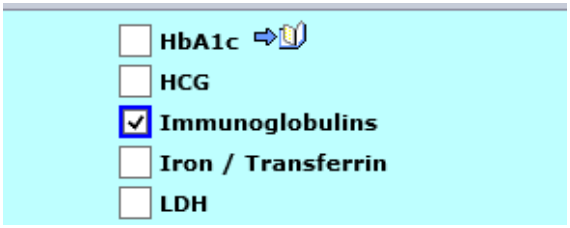

Figure 3. Immunoglobulins test item in GP ICE

Clinical details: "Peripheral Neuropathy"

A small number of serum protein electrophoresis requests were made via the "Peripheral Neuropathy" collection in GP ICE, however it was noted during the audit that this collection only includes serum, rather than both serum & urine requests.

Clinical details: "Secondary care request"

A number of requests suggested the serum protein electrophoresis was requested on the advice of secondary care. Review of a selection of associated clinic letters in Clinical Portal, revealed that these often suggest checking serum protein electrophoresis +/- immunoglobulins without mentioning urine BJP.

GP handbook

On review of the information provided to primary care users of the Biochemistry service, it was noted that the section on "Investigation of Suspected Myeloma" in the Biochemistry Handbook for Primary Care Users is out of date.

Summary of main findings

- 29% of myeloma screens were complete
- There was a poor response to advisory comments provided on biochemistry reports
- There was some inappropriate requesting (eg. "liver screen", duplicate requesting)
- The "Peripheral Neuropathy" collection in GP ICE is incomplete
- Information on the investigation of myeloma in the GP handbook is out of date

Actions

- Publish audit report and disseminate findings to users
- Highlight the availability of the "Myeloma Screen" collection in the GP ICE system
- Remind users of the importance of comments provided on protein electrophoresis reports
- Update the "Peripheral Neuropathy" collection in GP ICE to include urine BJP
- Contact the relevant secondary care users regarding advice on laboratory testing
- Update and re-issue the Biochemistry Handbook for Primary Care Users

Future audit

- Re-audit following introduction of measures above
- Audit of secondary care requesting

References

1. Howell DA, Smith AG, Jack A, *et al.* Time-to-diagnosis and symptoms of myeloma, lymphomas and leukaemias: a report from the Haematological Malignancy Research Network. *BMC Hematology* 2013; 13:9.

2. Lyratzopoulos G, Neal RD, Barbiere JM, Rubin GP, Abel GA. Variation in number of general practitioner consultations before hospital referral for cancer: findings from the 2010 National Cancer Patient Experience Survey in England. *Lancet Oncol* 2012; 13: 353-365.

3. Zhou Y, Abel GA, Hamilton W, Pritchard-Jones K, Gross CP, Walter FM, *et al*. Diagnosis of cancer as an emergency: a critical review of current evidence. *Nat Rev Clin Oncol* 2017; 14: 45-56.

4. National Cancer Intelligence Network. Routes to Diagnosis 2006–2016 workbook (a). http://www.ncin.org.uk/publications/routes_to_diagnosis

5. GP Myeloma Diagnostic Tool. Myeloma UK, published Nov 2020, updated Mar 2022. https://academy.myeloma.org.uk/resources/gp-myeloma-diagnostic-tool/

6. Laboratory Best Practice Tool. Myeloma UK, published Feb 2023. https://academy.myeloma.org.uk/resources/laboratory-best-practice-tool/