National Audit of Tumour Markers

A presentation for LabMed National Audit Day

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and
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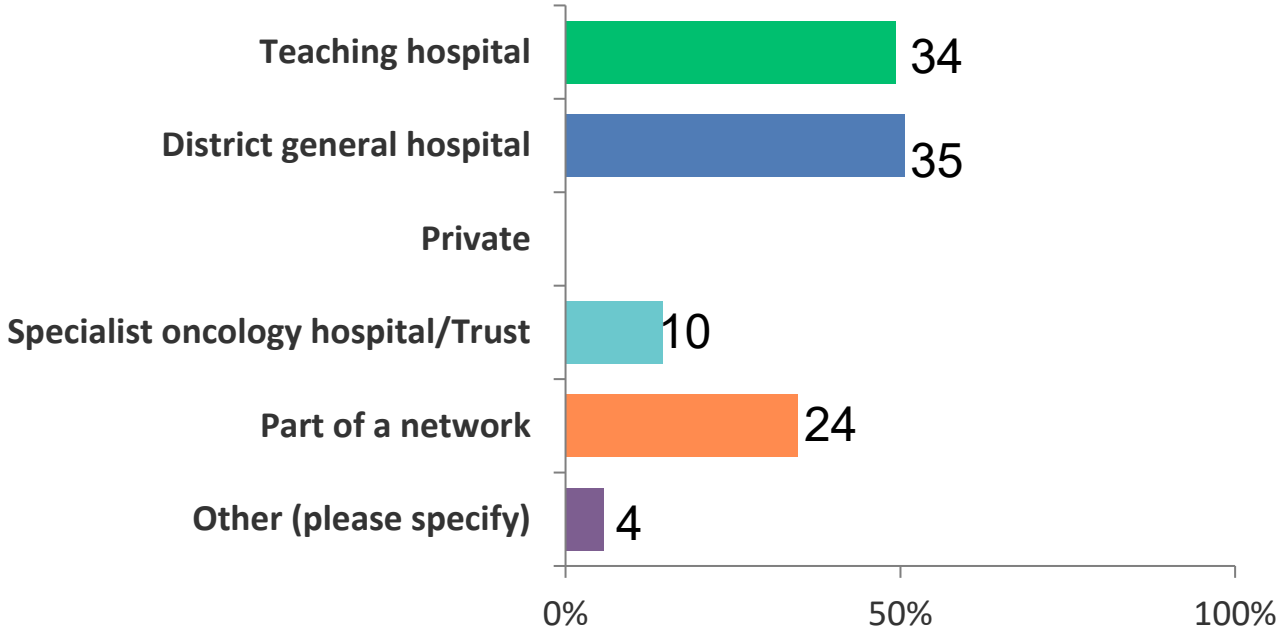
28th November 2025

Is your hospital a....

Answered: 69 Skipped: 1



None of the four respondents who listed Other did specify

The following tumour markers were investigated

PSA, Free PSA, CEA, CA 125, CA 15-3, CA 19-9

AFP, HCG, LDH

Serum Protein Electrophoresis, Urine Bence Jones Protein, Serum Free Light Chains

Thyroglobulin, Thyroglobulin antibodies, Calcitonin

Plasma Metanephrines, Urine VMA/Creatinine ratio, Random and 24-hour Urine Catecholamines and Metanephrines, Insulin, 24-hour Urine 5HIAA, Chromogranin A and B, other Gut Hormones

Any Circulating Tumour DNA Test, FIT, cytokeratin 19 fragment antigen (CYFRA 21-1), Neurone Specific Enolase (NSE), Squamous Cell Carcinoma Antigen (SCCA), CA 72-4 Inhibin B, ACTH, S100

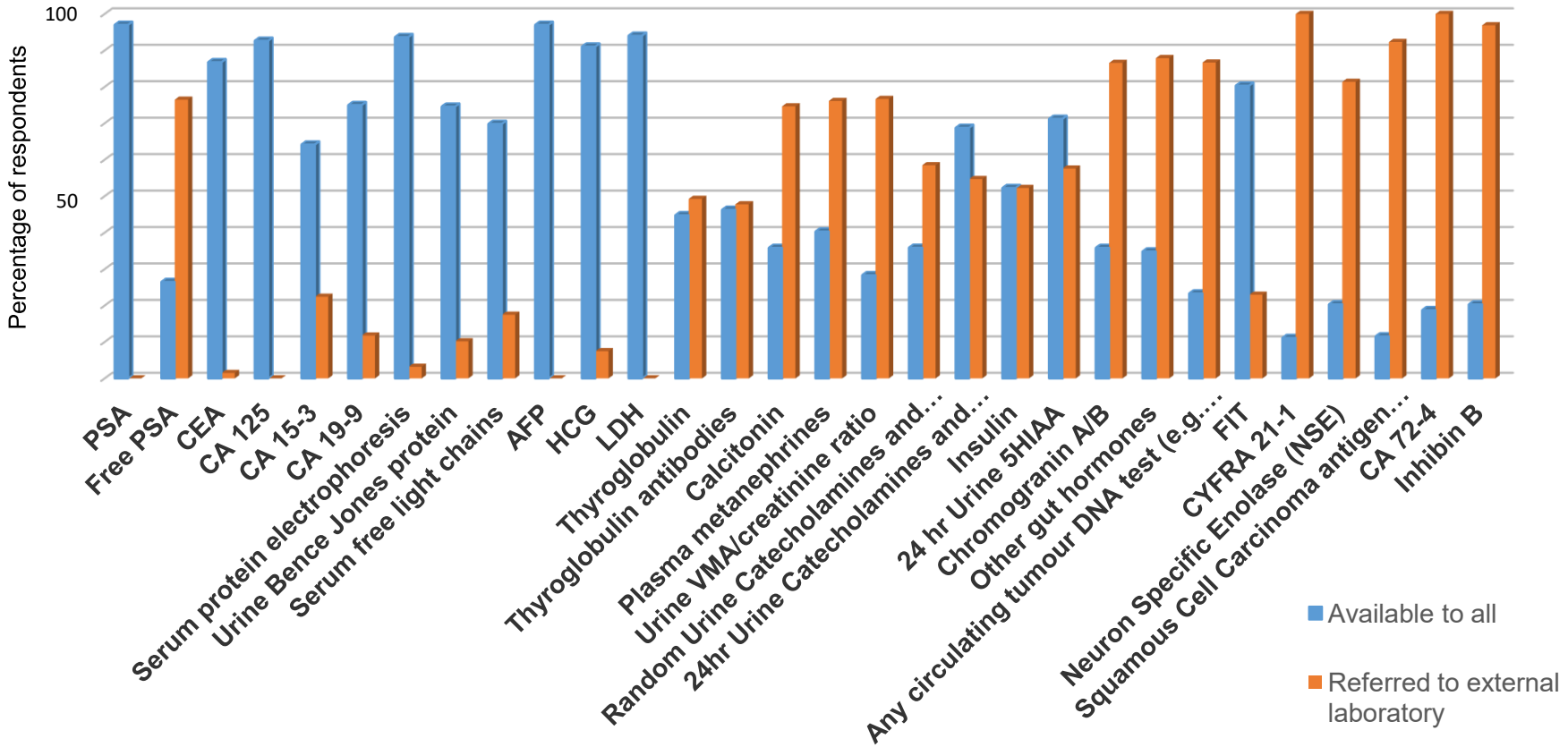
Which tumour markers are provided to users and where are they analysed?

- Answered: 68-63; except only 30 for molecular test question

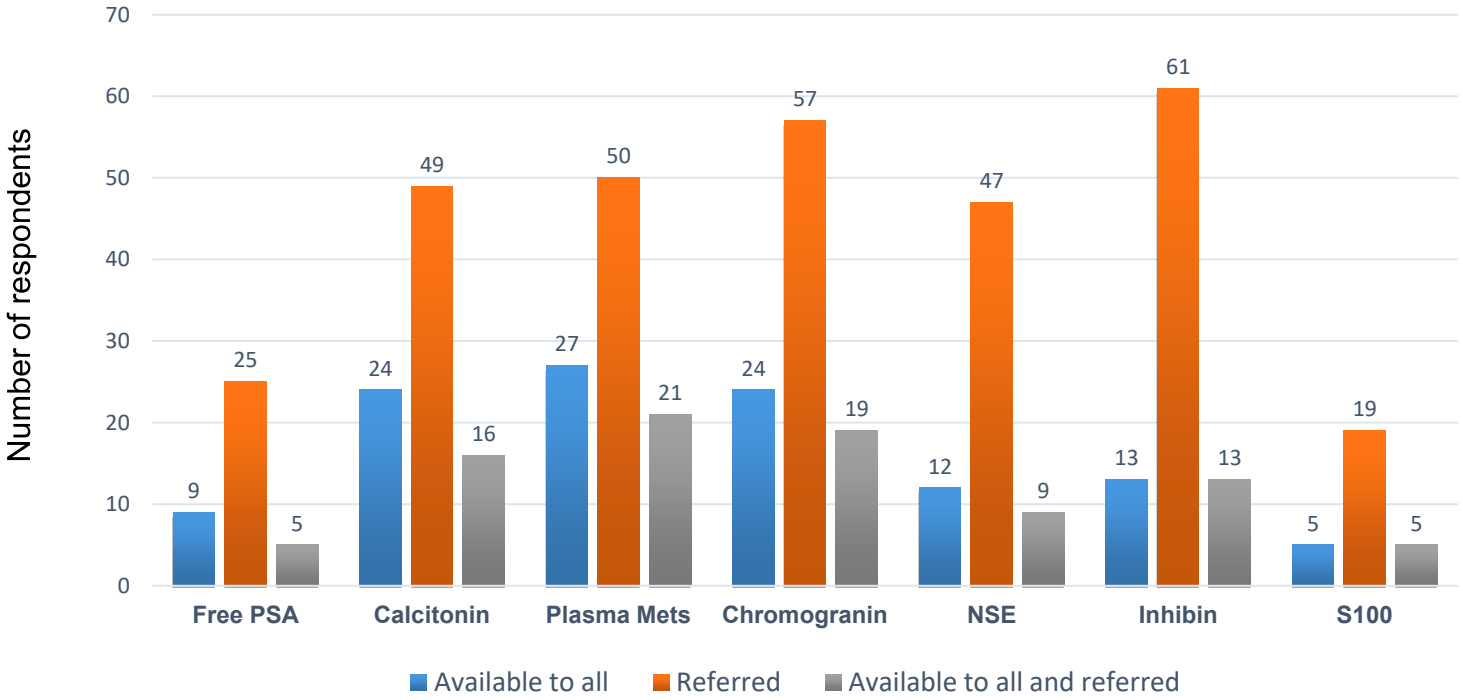
Who are allowed the tumour markers?	Summary of responses
Available to all	All tumour markers were available (highest: >60 respondents PSA, CA 125, AFP, HCG, LDH)
Available to all secondary or tertiary care	More likely for the referred tests (highest: 19 respondents ACTH)
Provided for certain specialties, requestors on a case-by-case basis	More likely for the referred tests (highest: 32 respondents NSE)
Where are the tumour markers analysed?	**Summary of responses**
Analysed in house	Most common tumour markers (highest: 57 respondents LDH)
Analysed within the network	More likely for the specialist tests (highest: 12 respondents serum free light chains)
Referred to external laboratory	More likely for the specialist tests (highest: 62 respondents Inhibin B)

Proportion of tumour markers available to all requestors and which are referred for analysis

- Answered: 68-63; except only 30 for molecular test question



Selection of commonly referred tumour markers that were available to all and referred for analysis

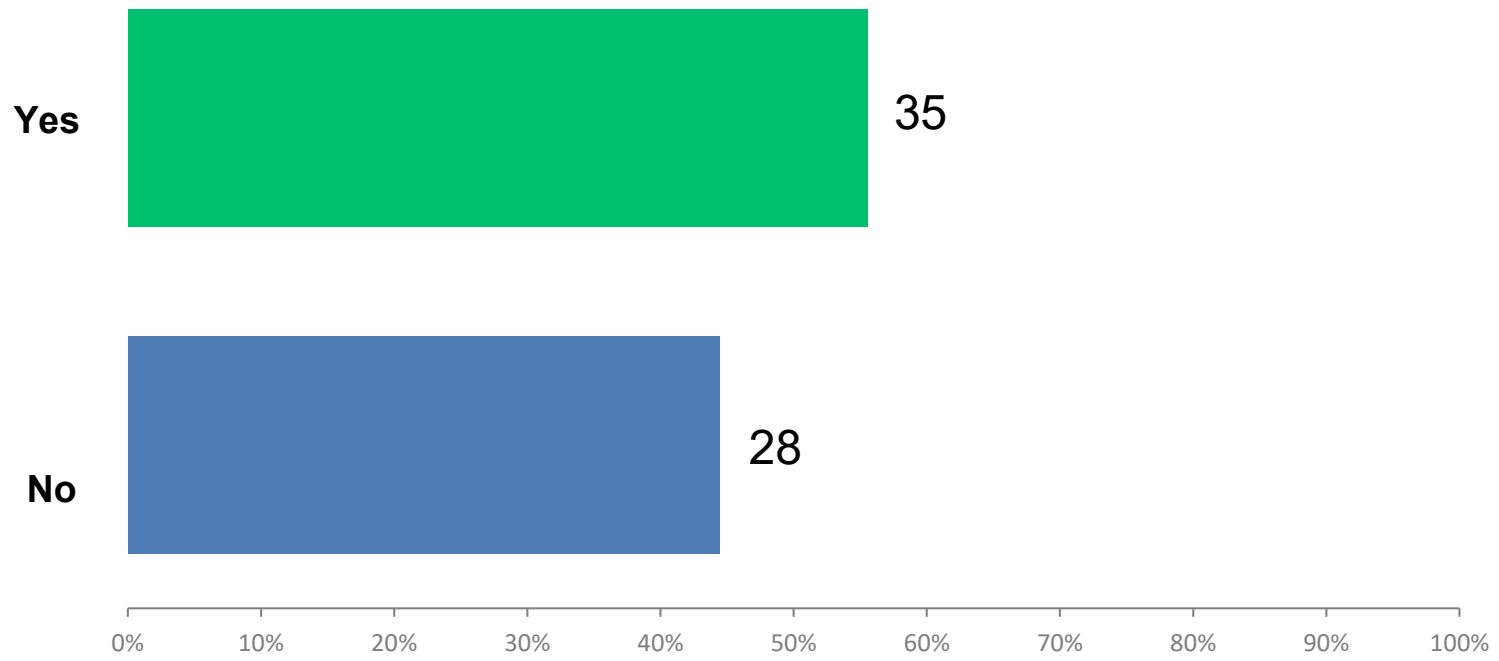


Summary

1. The most common tumour markers were analysed in-house.
2. The more specialised tumour markers were referred to an external laboratory.

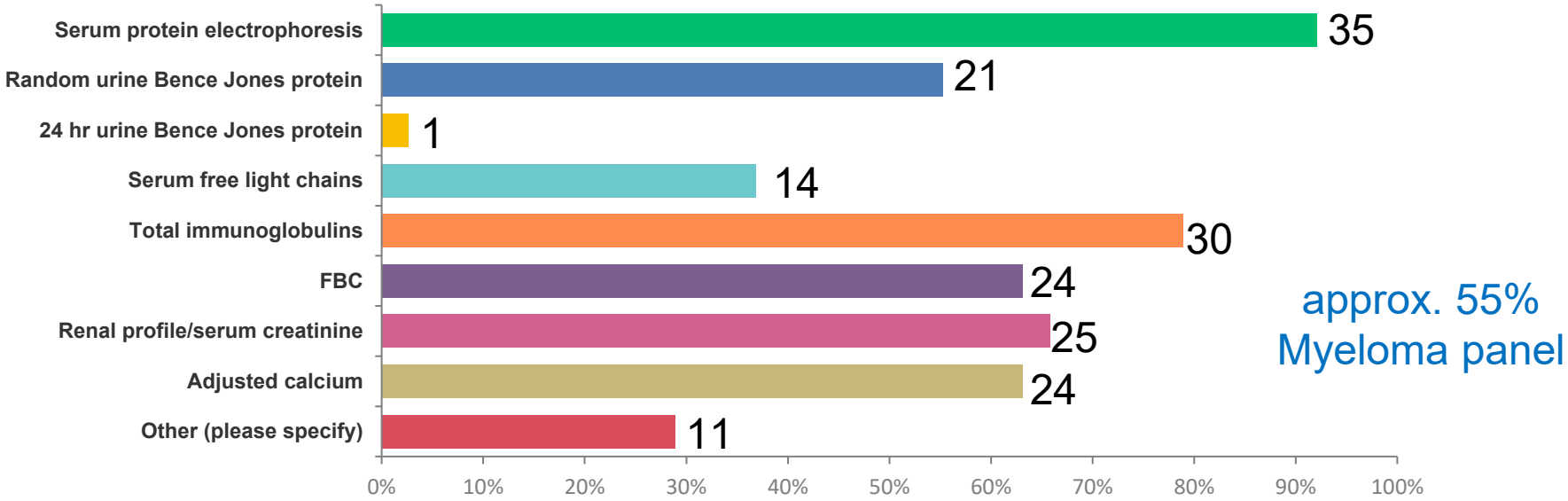
Do you have a diagnostic myeloma panel available to GPs?

Answered: 63 Skipped: 7



If yes, please list the tests included in your diagnostic myeloma panel

Answered: 38 Skipped: 32

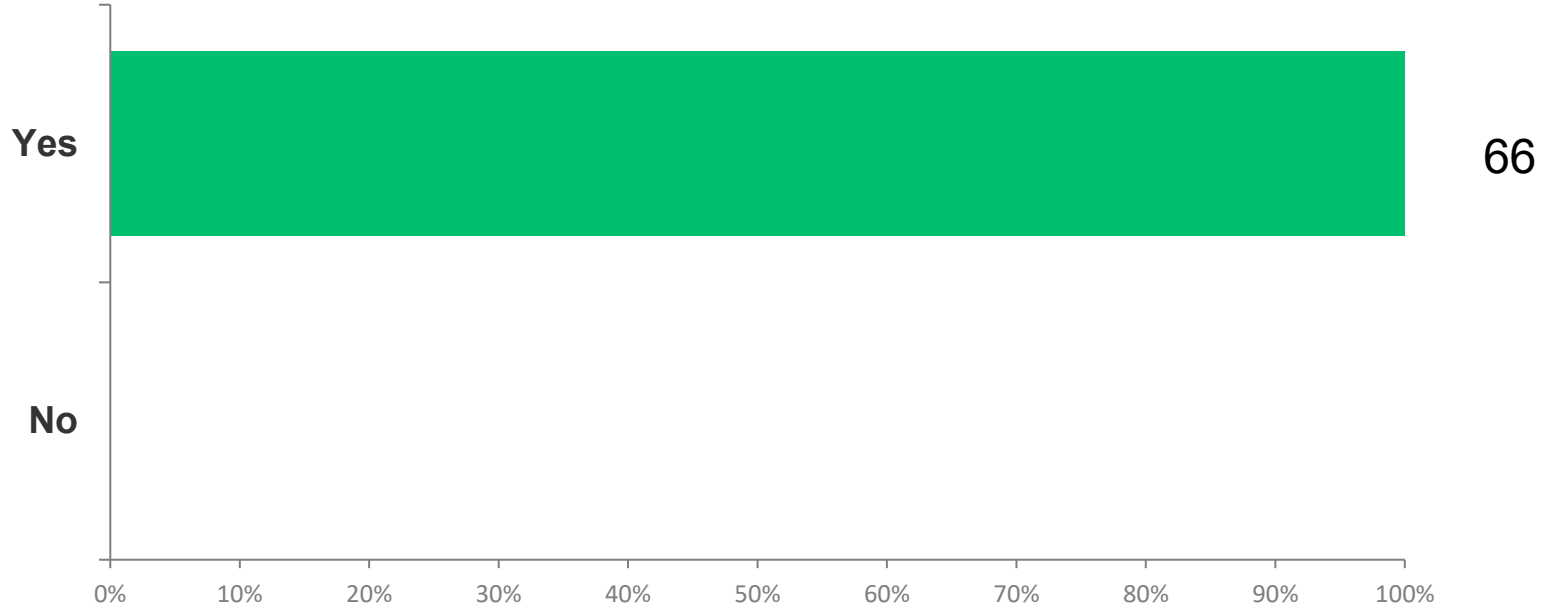


approx. 55%
Myeloma panel

Other: 2 x all tests available separately except UBJP; 3 x CRP; ESR; Bone Profile; 2 x LFT; Total Protein; 2 x Albumin; LDH; Urate; U&E; Beta 2 Microglobulin and Plasma Viscosity

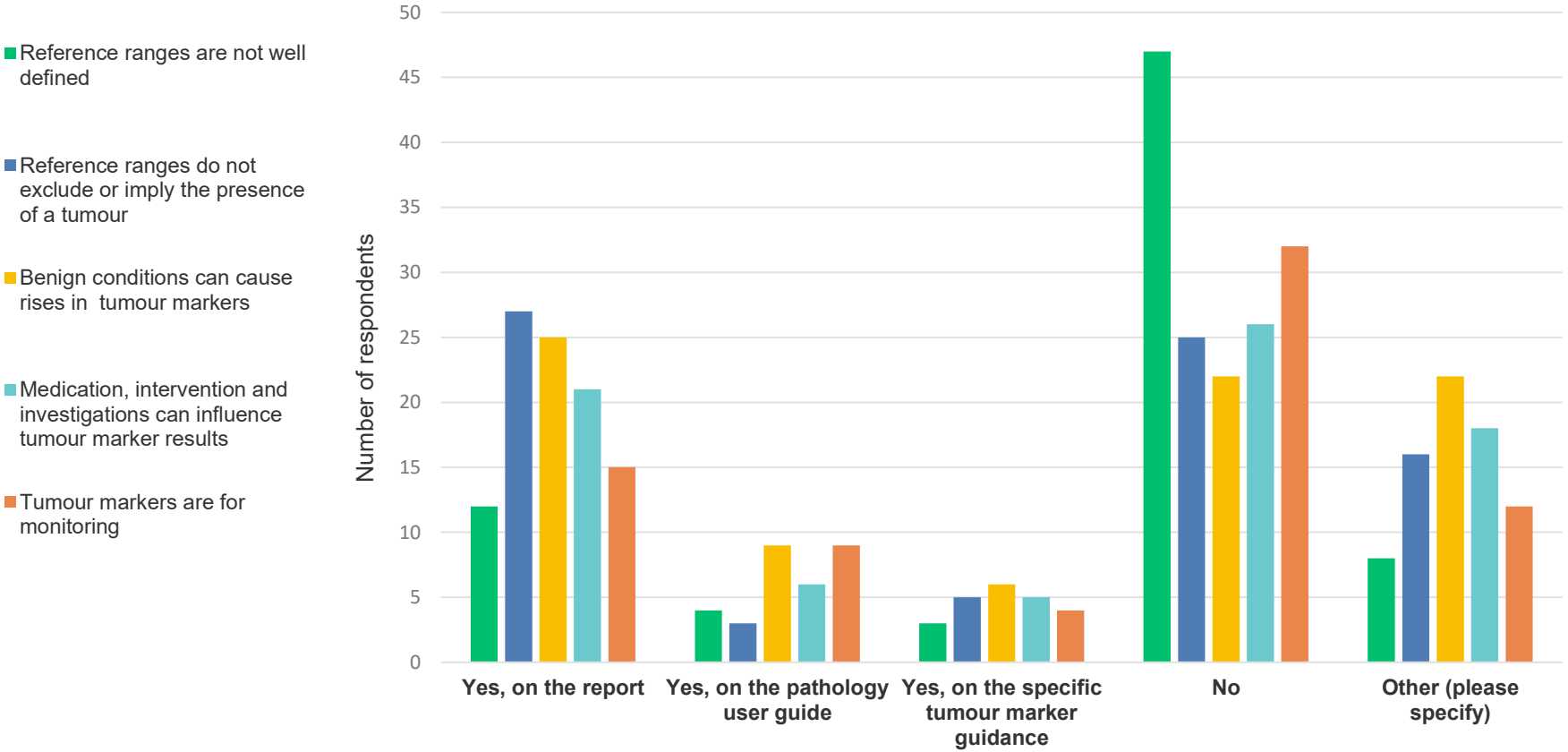
For tumour markers provided in-house do you state the relevant reference range for tumour markers on the report?

Answered: 66 Skipped: 4



Statements about tumour markers provided in-house

Answered: 66 Skipped: 4



How do you convey this information about tumour markers (other responses)?

Reference ranges are not well defined	**Depends on the TM.** Tertiary Oncology Centre-Clinicians are experienced oncologists. Not for all analytes, variable approach depending on the specific marker, HCG, CA 15-3 and CA125
Reference ranges do not exclude or imply the presence of a tumour	**All reports state that low level of TM does not exclude malignancy.** More information given for PSA; Comments on CA125 and PSA; Dependent on specific tumour marker; Comments for HCG and CA15-3; PSA, Plasma and Urine Mets, PSA only; Comments added as clinically indicated by Duty Biochemist; Comment appended to report with link to relevant NICE guidelines; **Comments added to reports for Primary Care.**
Benign conditions can cause rises in tumour markers	**Comments added on at discretion of Duty Biochemist**; Mostly for PSA; For CA125 and PSA; Added depending on clinical context; Variable approach depending on specific marker; Coded comments added manually to some requests when appropriate; For CEA,CA125 and Urine 5HIAA; For CA125; **Comment appended to report with link to relevant NICE guidelines**; **Comments to this effect are added to reports going to Primary Care**
Medication, intervention and investigation can influence tumour marker results	**Added at discretion of Duty Biochemist**; For PSA; Comment amended to Chromogranin results; For PSA,CA125 and SFLC; User guide has most information; For PSA that urinary infection and retention may cause elevated levels; For PSA and Plasma Mets this is stated on reports; Depending on the marker; Only for PSA; For PSA; Urine and Plasma Mets; On a case by case basis depending on clinical information provided; **Comment appended to report with link to relevant NICE guideline**; Urine Mets-medication and 5HIAA; Biochemist may do this if relevant clinical information provided; **Comments added to reports going to Primary Care**
Tumour markers are for monitoring	Only on CEA,HCG and CA125; **Comment added on at discretion of Duty Biochemist**; HCG and AFP; Variable approach dependent on the specific marker; For CA125; Sometimes; This information is on the SCBN bookmark; **In Path Harm Bookmark**; Requesting clinicians are informed that TM are not diagnostic and are most used in monitoring treatment and detection of relapse (upon requesting CEA and CA125 only).

Do you provide guidance regarding sample timing for PSA measurement with respect to the following?

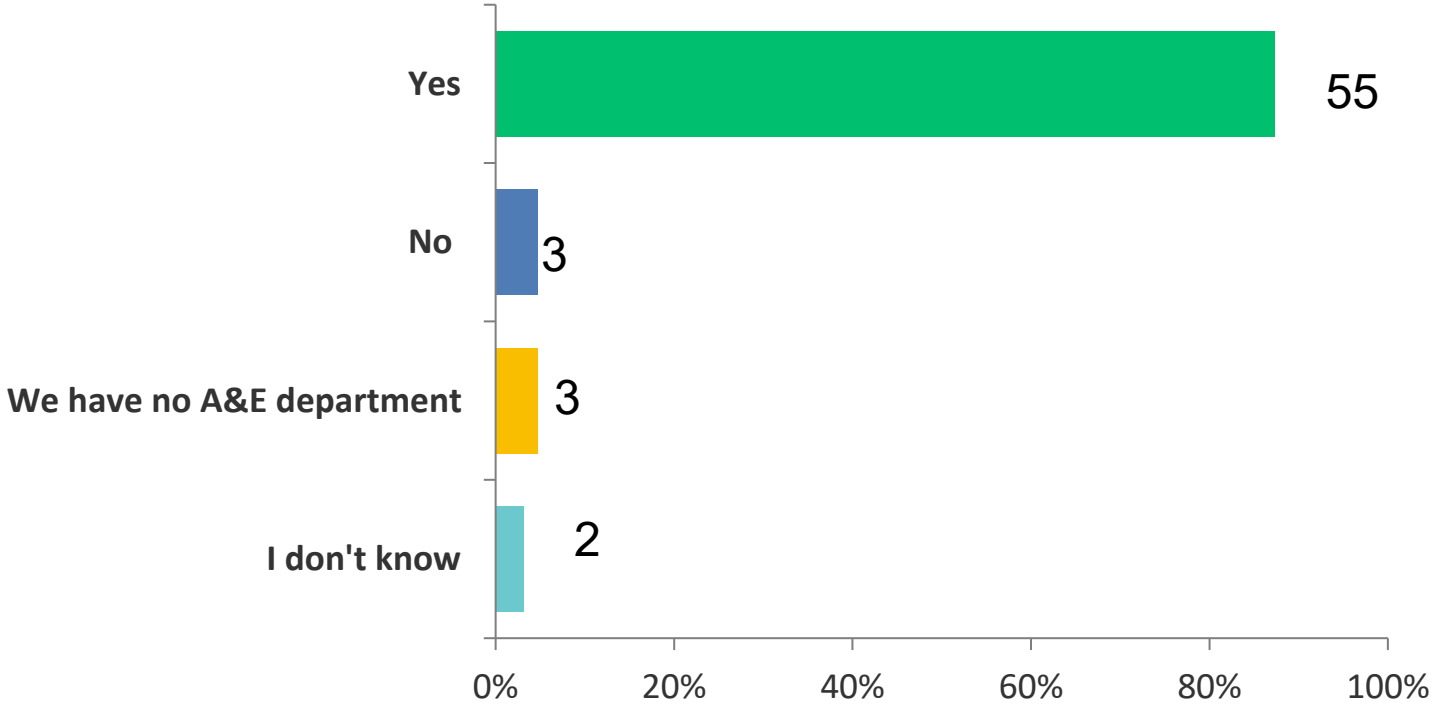
Procedure	Yes	No	Don't Know	Total
Digital Rectal Examination	20(32.79%)	**40(65.57%)**	1(1.64%)	61
Ejaculation	13(21.67%)	**46(76.67%)**	1(1.67%)	60
Rigid Cystoscopy	11(18.97%)	**46(79.31%)**	1(1.72%)	58
Prostate biopsy	13(21.67%)	**46(76.67%)**	1(1.67%)	60
Prostatectomy	8(13.56%)	**50(84.75%)**	1(1.69%)	59
Transurethral Ultrasound	5(8.47%)	**53(89.83%)**	1(1.69%)	59
Transurethral resection	11(18.64%)	**47(79.66%)**	1(1.69%)	59
UTI and prostatitis	25(40.32%)	**36(58.06%)**	1(1.61%)	62
Finesteride, Dutesteride and 5 Alpha Reducatase inhibitors	14(23.33%)	**46(76.67%)**	0	60

Summary

1. Approximately 55% of laboratories had a myeloma panel.
2. Most myeloma panels included serum protein electrophoresis and total immunoglobulins.
3. All laboratories stated the relevant tumour marker reference ranges.
4. The majority did not state that the reference ranges were not well defined or that tumour markers are mostly used for monitoring.
5. The majority of laboratories did not provide guidance regarding sampling time for PSA measurement with regard to a number of different procedures.

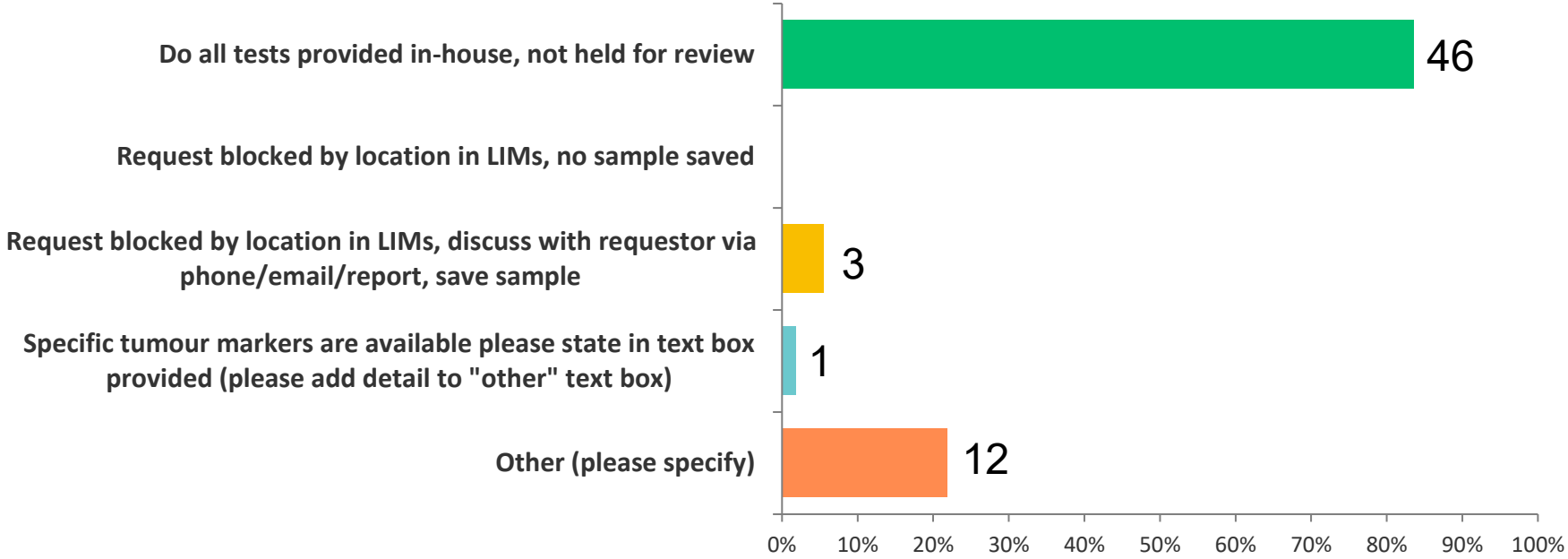
Does your laboratory receive requests for tumours markers from Accident and Emergency?

Answered: 63 Skipped: 7



If you receive A&E tumour marker requests, how do you respond at the point of booking in?

Answered: 55 Skipped: 15



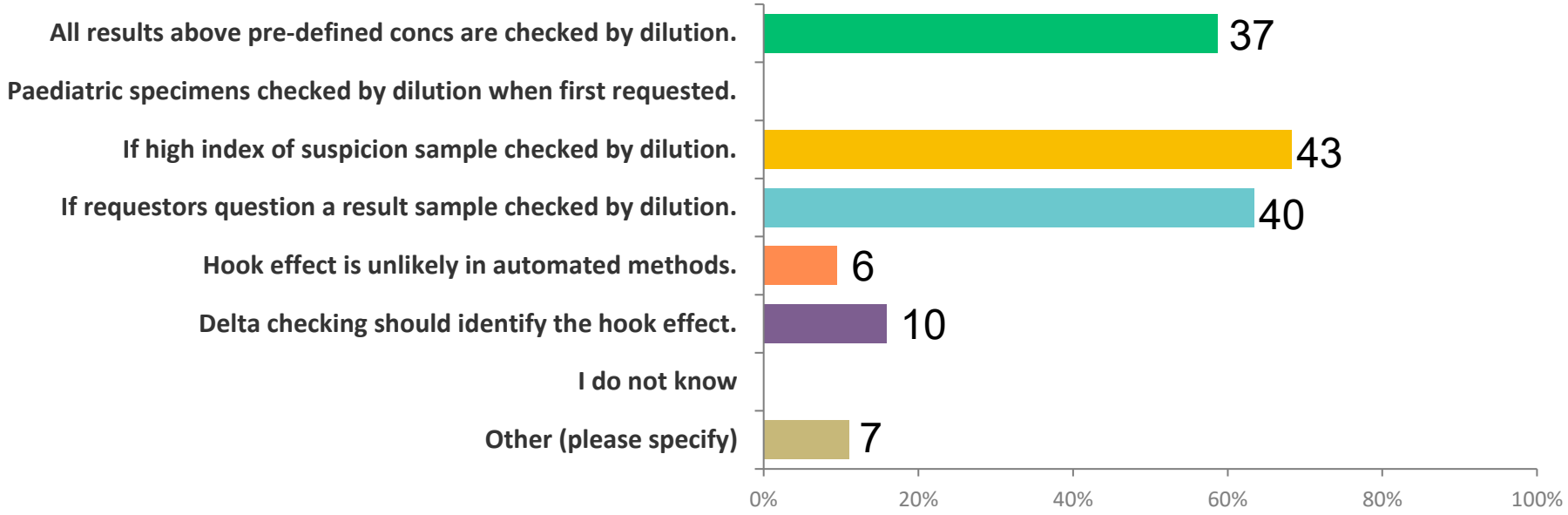
No automatic rejection in place but all referral TMs reviewed; A&E requests not treated differently; All in house TMs done and not held for review other than thyroglobulin; Thyroglobulin and thyroglobulin Abs and referral tests vetted; "Fishing" is picked up at vetting & blocked & sample saved

Summary

1. Most laboratories received requests for tumour markers from Accident and Emergency and did all tests provided in house without review.

In-house process for possible ‘hook effect’

Answered: 63 Skipped: 7



All new requests for HCG, AFP and PSA; AFP-slightly raised all trapped for dilution; Samples sent to referral lab if in house checks are inconclusive; Some assays undergo auto dilution if above certain concentration; All TMs currently held on authorisation queue for manual checking by DB so dilution carried out when deemed necessary; Analyser flags help to detect Hook effect; High TMs held at clinical validation and checked if hook effect suspected.

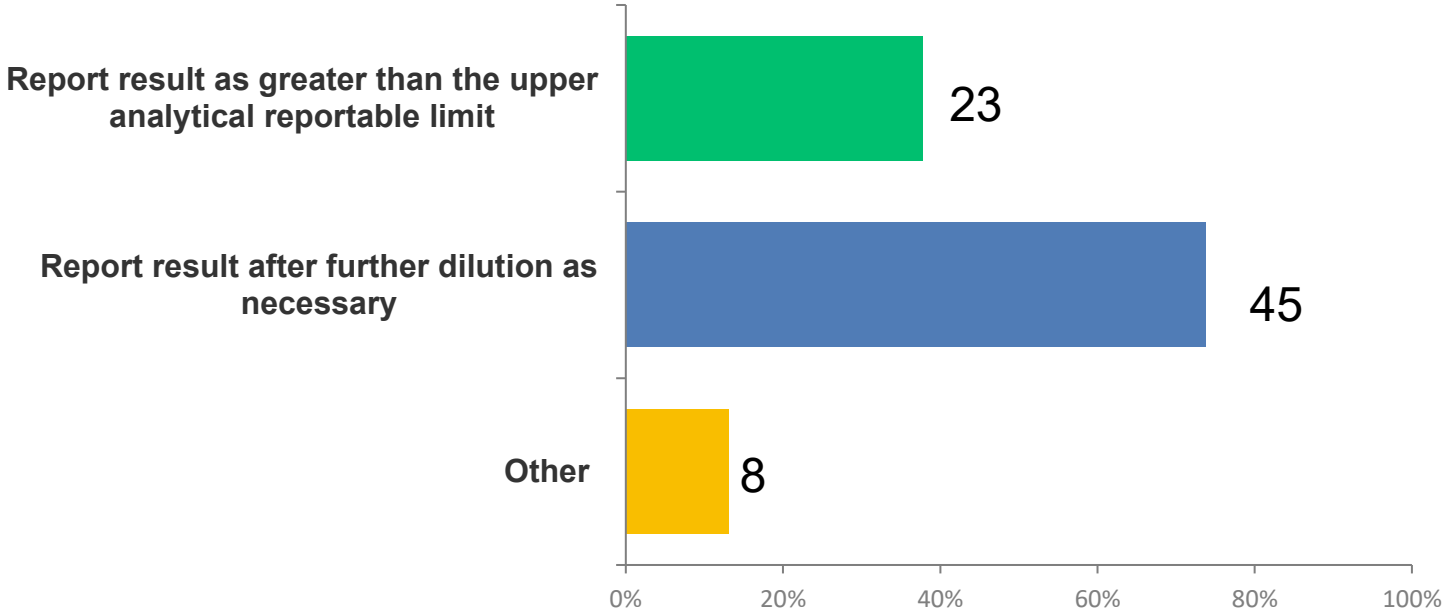
PSA, HCG and AFP: state the manufacturer & concentration above which the hook effect is possible

Manufacturer	PSA	HCG	AFP
Siemens	100 ng/ml(2) 15,000 ng/ml(1) 17,000 ng/ml(4) 2500 ug/l(2)	1000 IU/l(2) 400,000 IU/l(1) 75,000 mIU/l(3) 750,000 mIU/l(3)	830 IU/l(1) 100,000 IU/ml(1) 381,800 IU/ml(1) 1,000000 IU/ml(4) 1000 ng/ml(1) 200,000 ng/ml(1)
Abbott	17,000 ng/ml(5) 48,000 ng/ml(5) 50,000 ng/ml(1) 170,000 ng/ml(1) 2500 ug/l(1)	75,000 mIU/l(2) 750,000 mIU/l(3) 1,000000 mIU/l(1) 15,000 U/l(2) 400,000 IU/l(1)	500,000 ng/ml(1) 10,000000 ng/ml(6) 1,000000 IU/ml(6)
Roche	1700 ng/ml(2) 17,000 ng/ml(12) 48,000 ng/ml(5) 50,000 ng/ml(2) 1700,000 ng/ml(1) 100 ug/l(2) 2500 ug/l(5)	750,000 mIU/l(17) 1,000000 mIU/l(2) 14,500,000 mIU/l(1) 15,000 IU/l(3) 400,000 IU/l(5)	500 IU/ml(1) 1,000000 IU/ml(11) 8,300,000 IU/ml(1) 500,000 ng/ml(2) 10,000000 ng/ml(5) 460,000 ug/l(3) 1.2000000 ng/l(4) 381,800 kU/l(3)
Beckman	17,000 ng/ml(2) 50,000 ng/ml(1)	750,000 mIU/l(2)	500,000 ng/ml(1) 1.2000000 ng/ml(1) 1,000000 kU/l(1)
Ortho	2500 ng/ml(1)	400,000 IU/l(1)	381,800 IU/ml(1)

One laboratory mentioned Vitros Immunodiagnostics with a PSA value of 17,000 ng/ml

When the result of a tumour marker, provided in house, exceeds the analytical reportable limit (analyser says the result is > XX), how does the laboratory respond?

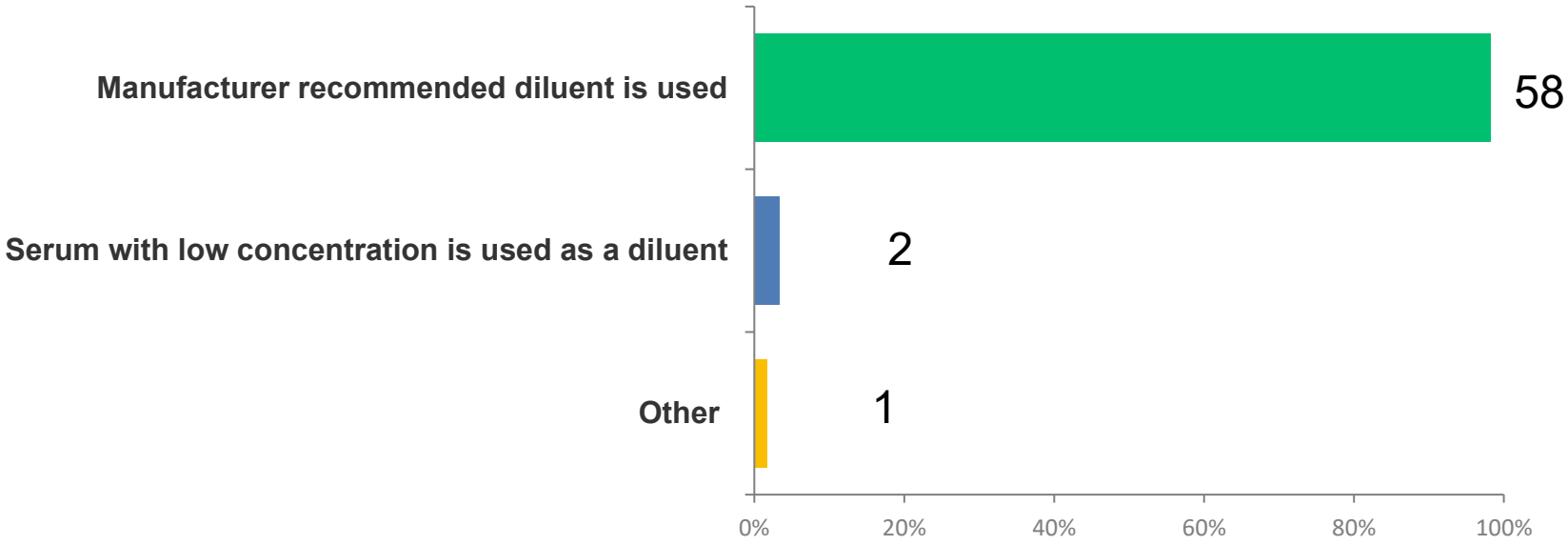
Answered: 61 Skipped: 9



Will dilute further if discussed and agreed with requesting clinician; A comment added stating result obtained via dilution and to interpret with caution; Case by case basis-sometimes diluted; Auto dilution protocol as suggested by manufacturer; Diluted on request if justified by requestor; Depends on tumour marker and clinical scenario

If you are diluting high tumour marker results, what diluent is used?

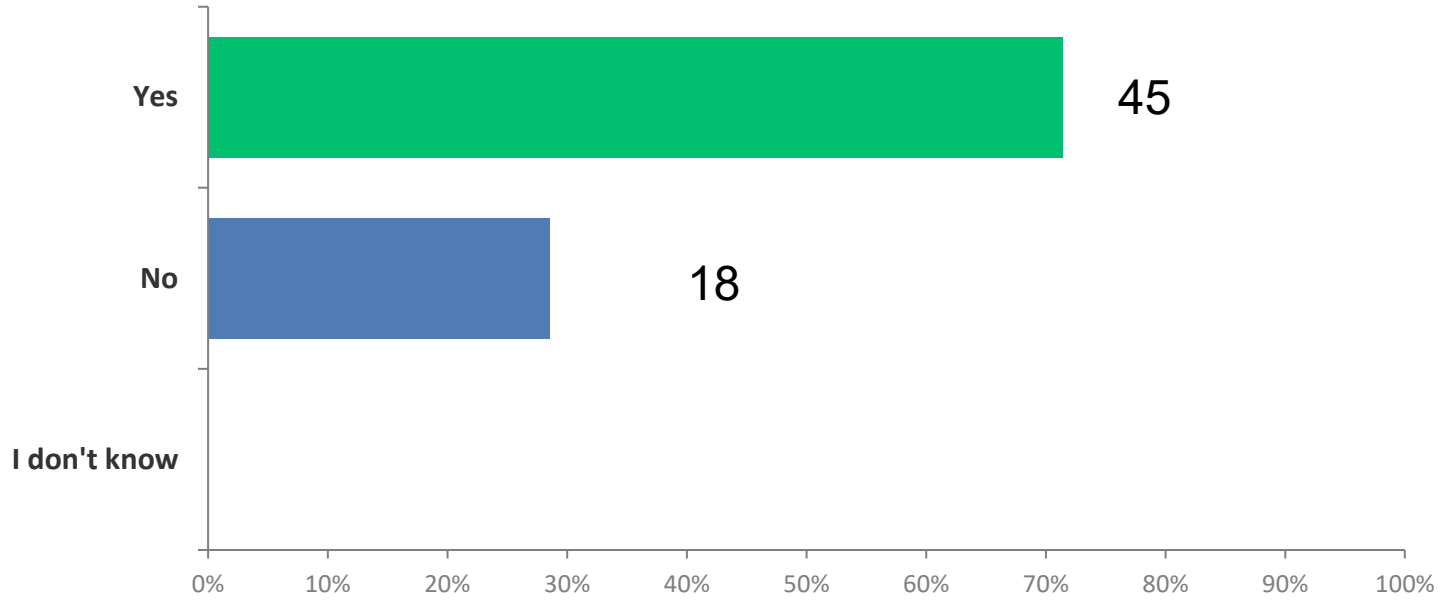
Answered: 59 Skipped: 11



Only for CA19-9 and only if requested by clinician which is rare

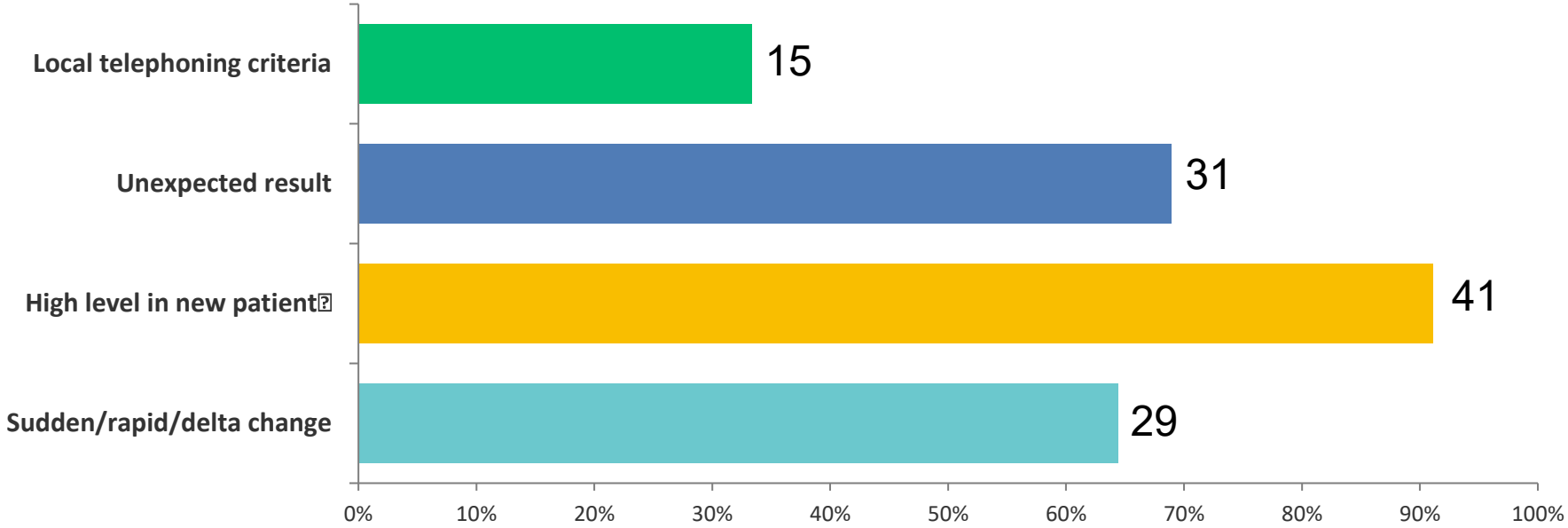
Does your laboratory telephone any tumour marker results?

Answered: 63 Skipped: 7



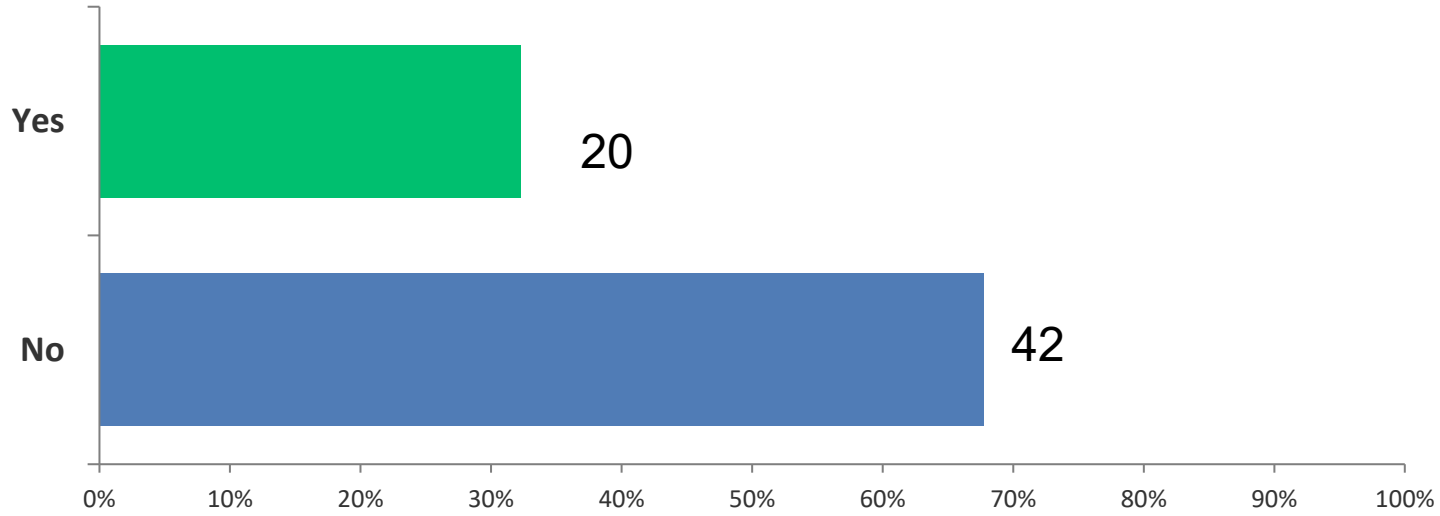
If you telephone tumour marker results, indicate under which circumstances.

Answered: 45 Skipped: 25



Do you provide details of the method for tumour markers provided in house on the laboratory report?

Answered: 62 Skipped: 8

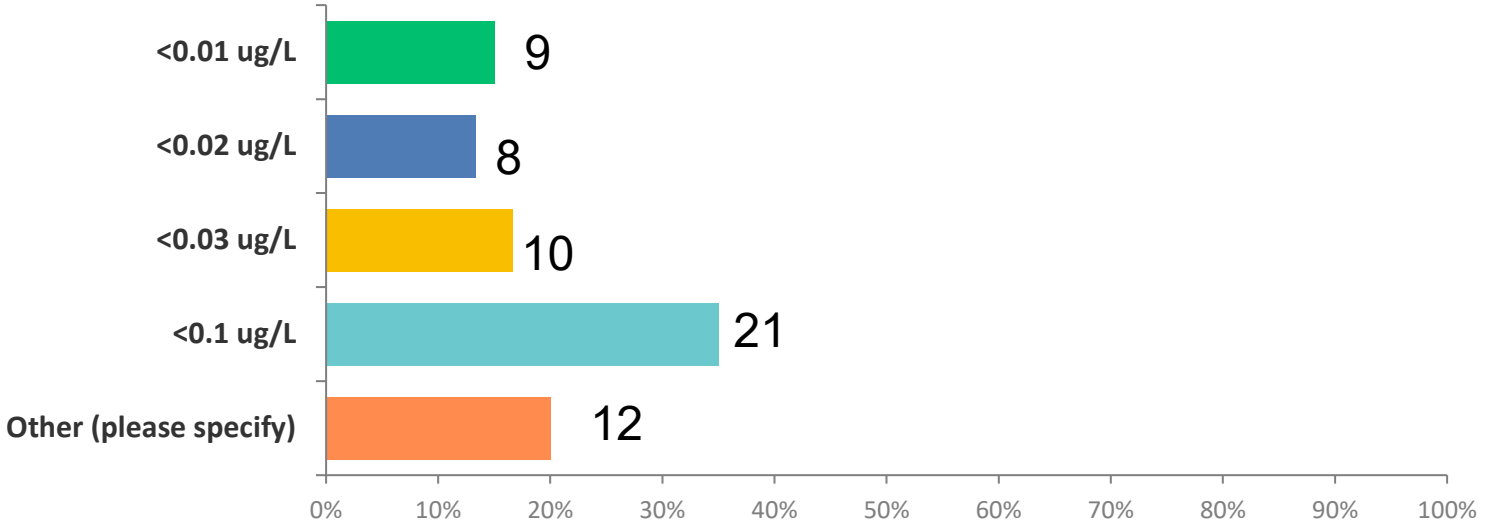


Summary

1. Regarding a possible hook effect, most laboratories checked the sample by dilution if there was a high index of suspicion or if the requestor questioned the result.
2. When the result of a tumour marker provided in-house exceeded the analytical reportable limit most reported the result after further dilution if necessary, with the manufacturer recommended diluent being use.
3. The majority of laboratories telephoned tumour marker results mostly if there was a high level in a new patient.

What is the lowest PSA concentration reported in your laboratory?

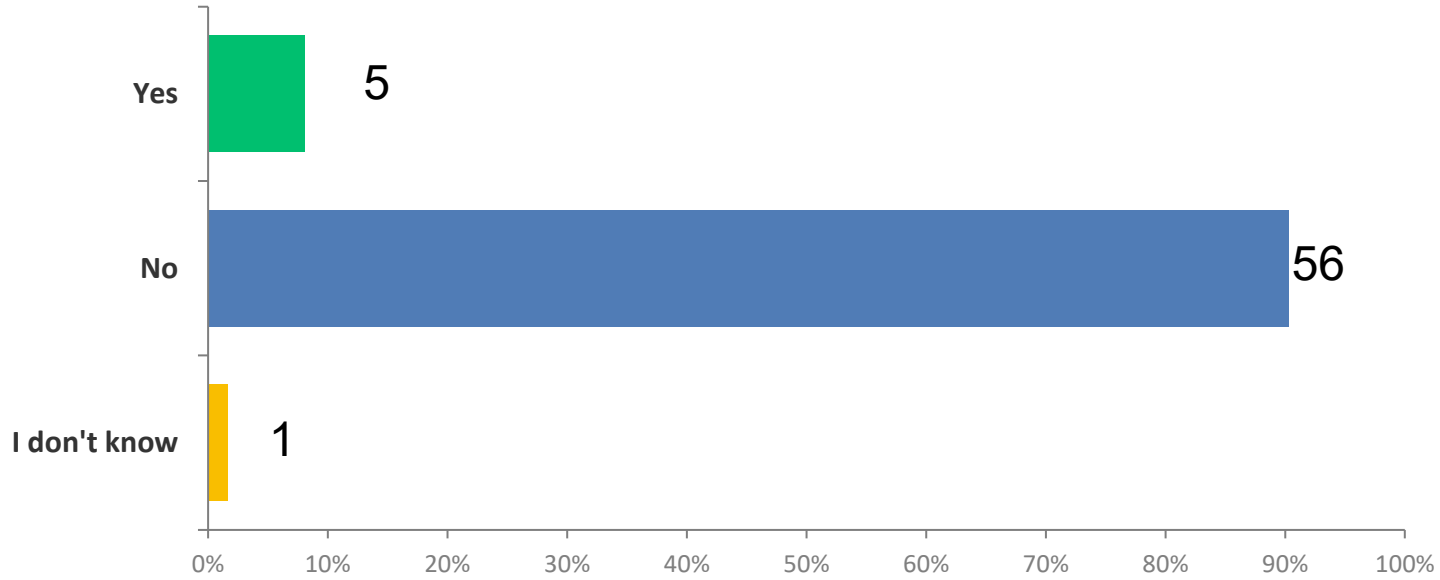
Answered: 60 Skipped: 10



<0.3 ug/l, <0.025 ug/l, <0.006 ug/l, <0.04 ug/l, <0.2 ug/l, <0.001 ug/l, <0.014 ug/l, <0.05 ug/l

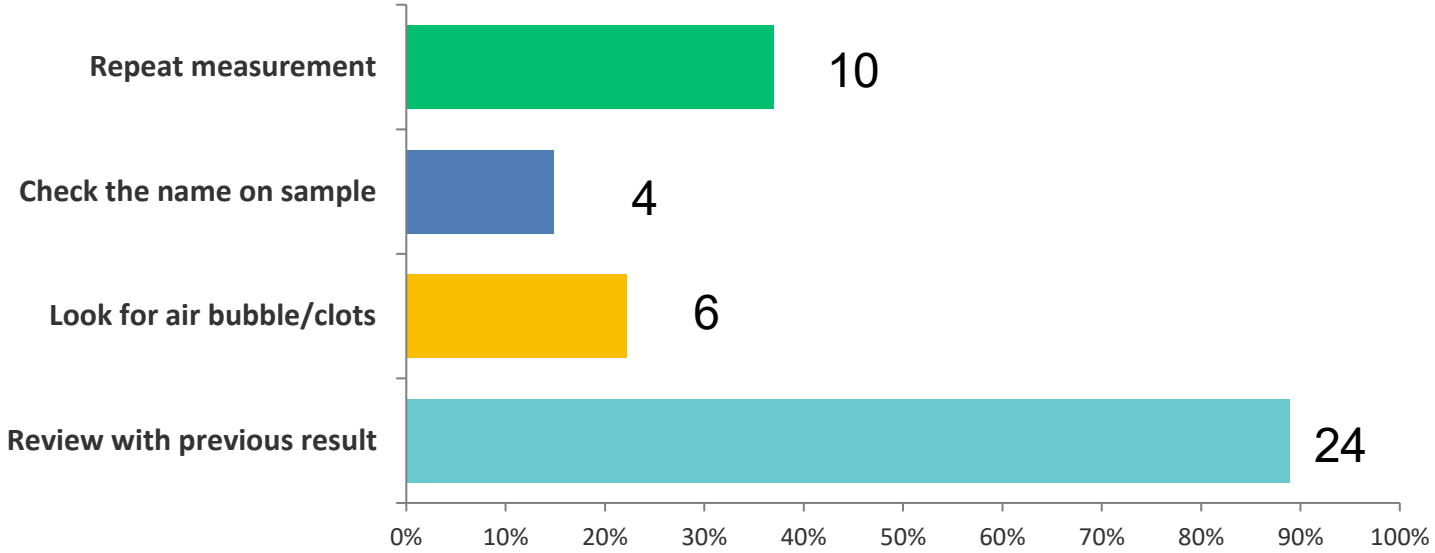
Do you confirm all tumour markers provided in house that are below the lowest reportable limit of the assay?

Answered: 62 Skipped: 8



If a tumour marker result, from an assay provided in-house, is undetectable (below the lowest reportable limit) if this checked/confirmed in any way prior to being reported?

Answered: 27 Skipped: 43



Summary

1. There was considerable variation in the lowest PSA concentration reported by the laboratories.
2. The majority of laboratories did not confirm that all tumour markers provided in-house were below the lowest reportable limit of the assay.
3. If a tumour marker result from an assay provided in-house was undetectable the majority of laboratories reviewed the previous result prior to it being reported.

The following tumour markers were investigated

PSA, Free PSA, CEA, CA 125, CA 15-3, CA 19-9

AFP, HCG, LDH

Serum Protein Electrophoresis, Urine Bence Jones Protein, Serum Free Light Chains

Thyroglobulin, Thyroglobulin antibodies, Calcitonin

Plasma Metanephrines, Urine VMA/Creatinine ratio, Random and 24-hour Urine Catecholamines and Metanephrines, Insulin, 24-hour Urine 5HIAA, Chromogranin A and B, other Gut Hormones

Any Circulating Tumour DNA Test, FIT, cytokeratin 19 fragment antigen (CYFRA 21-1), Neurone Specific Enolase (NSE), Squamous Cell Carcinoma Antigen (SCCA), CA,72-4, Inhibin B, ACTH, S100

32 in total

When requesting any tumour markers assayed in house are users asked to provide any relevant information via order comms?

Answered: 64-22 Skipped: 5-47

	No questions	Questions for all requests	Questions for GP requests	Questions for Trust requests	Questions for Trust except oncology patients
AFP	☐	☐	☐	☐	☐
HCG	☐	☐	☐	☐	☐
LDH	☐	☐	☐	☐	☐

No questions	>80% respondents
Questions for all requests	Highest percentage: 15% (7 respondents) for FIT and second highest: 10% (5 respondents) for plasma metanephrines.
Questions for GP requests	3 respondents for SPE and SFLC 1 or 2 respondents for up to 9 other tumour markers
Questions for Trust requests	1 respondent for up 5 tumour markers (HCG; Thyroglobulin & abs; calcitonin; 24 hr U cats/mets & NSE)
Questions for Trust except Oncology patients	No questions asked for any tumour markers

Does the presence of previous results block requests from progessing?

Very few responses: range 0-16 respondents per test

	Request blocked based on previous result - but it is held for review	Automated block of a request based on previous result, no manual review
PSA	☐	☐
Free PSA	☐	☐
CEA	☐	☐
CA 125	☐	☐
CA 15-3	☐	☐
CA 19-9	☐	☐

Requests blocked based on previous result, manual review.	Highest (12 respondents) serum protein electrophoresis & serum free light chains. ≥ 5 respondents: PSA; CEA; CA 125: CA 15-3; CA 19-9; AFP; BJP
Automated block of a request based on previous result. No manual review	≤3 respondents for: PSA, CEA , CA 125, CA 15-3, CA 19-9 ,serum protein electrophoresis, serum free light chains, FIT and S100

Summary

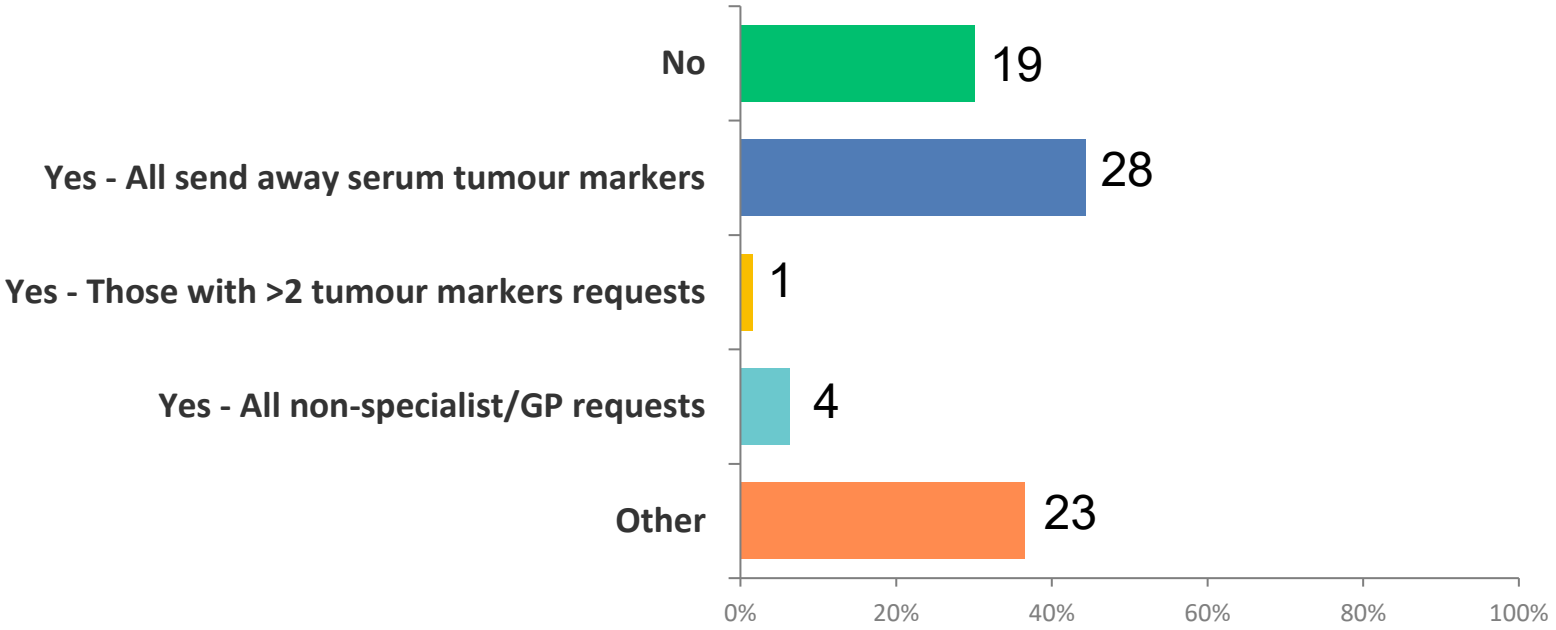
1. >80% of labs ask for no specific information from users when they request in-house tumour marker.

2. Very limited data:

- Many common tumour markers are blocked based on previous result e.g. SPE and SFLC (generally reviewed)

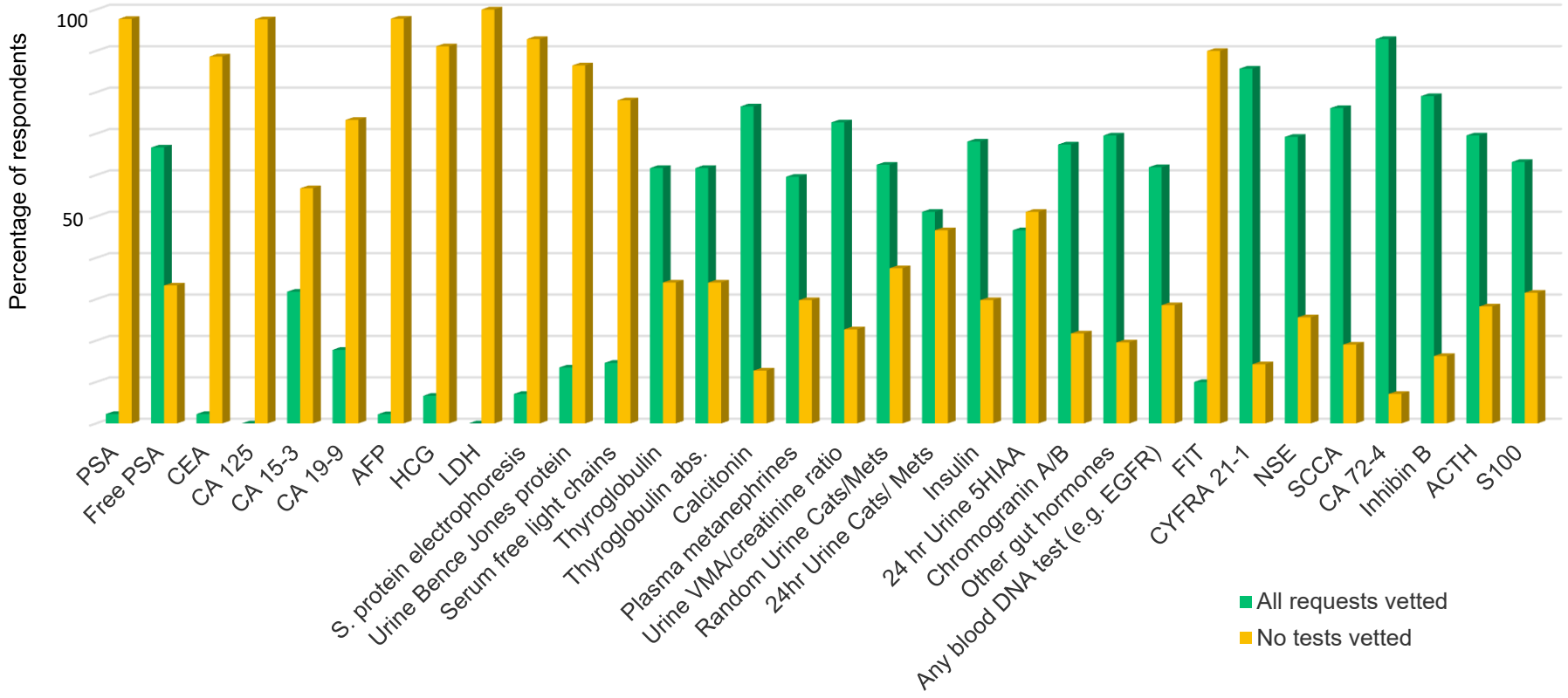
Does your laboratory routinely review or vet any tumour marker requests (not including minimum retesting intervals (MRI))?

Answered: 63 Skipped: 7



Does your laboratory routinely review or vet any tumour marker requests?

Answered: 42-48; except only 21 for molecular test question



Summary

1. 30% respondents (19) do not vet tumour marker requests

2. Of the 70% who vet the tumour markers this primarily carried out by Clinical Scientists (100%), Chemical Pathologists (52%) or specialist registrars (25%).

3. Most specialist tests are vetted: >75% respondents vet Inhibin B; CA 72-4; Squamous Cell Carcinoma Antigen (SCCA); cytokeratin 19 fragment antigen (CYFRA 21-1); calcitonin

Does your laboratory have minimum retesting intervals (MRIs)?

Answered: 63 Skipped: 6

Q12a. Does your laboratory have minimum retesting intervals (MRIs) for tumour markers?
Please tick all that apply

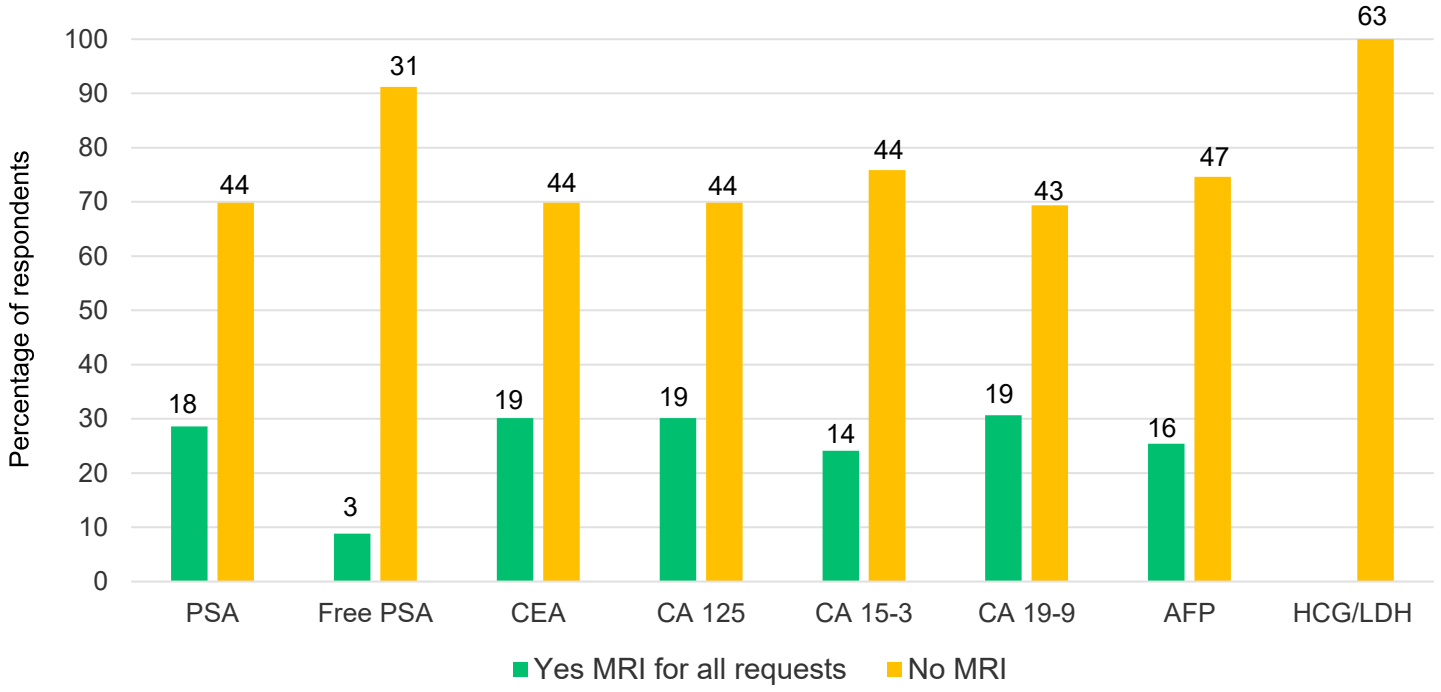
	Yes MRI for all requests	Yes MRI for requests from non-specialist	No MRI
PSA	☐	☐	☐
Free PSA	☐	☐	☐
CEA	☐	☐	☐
CA 125	☐	☐	☐
CA 15-3	☐	☐	☐
CA 19-9	☐	☐	☐

Asked for all 32 tests

Does your laboratory have minimum retesting intervals (MRIs)?

Answered: 63 Skipped: 6

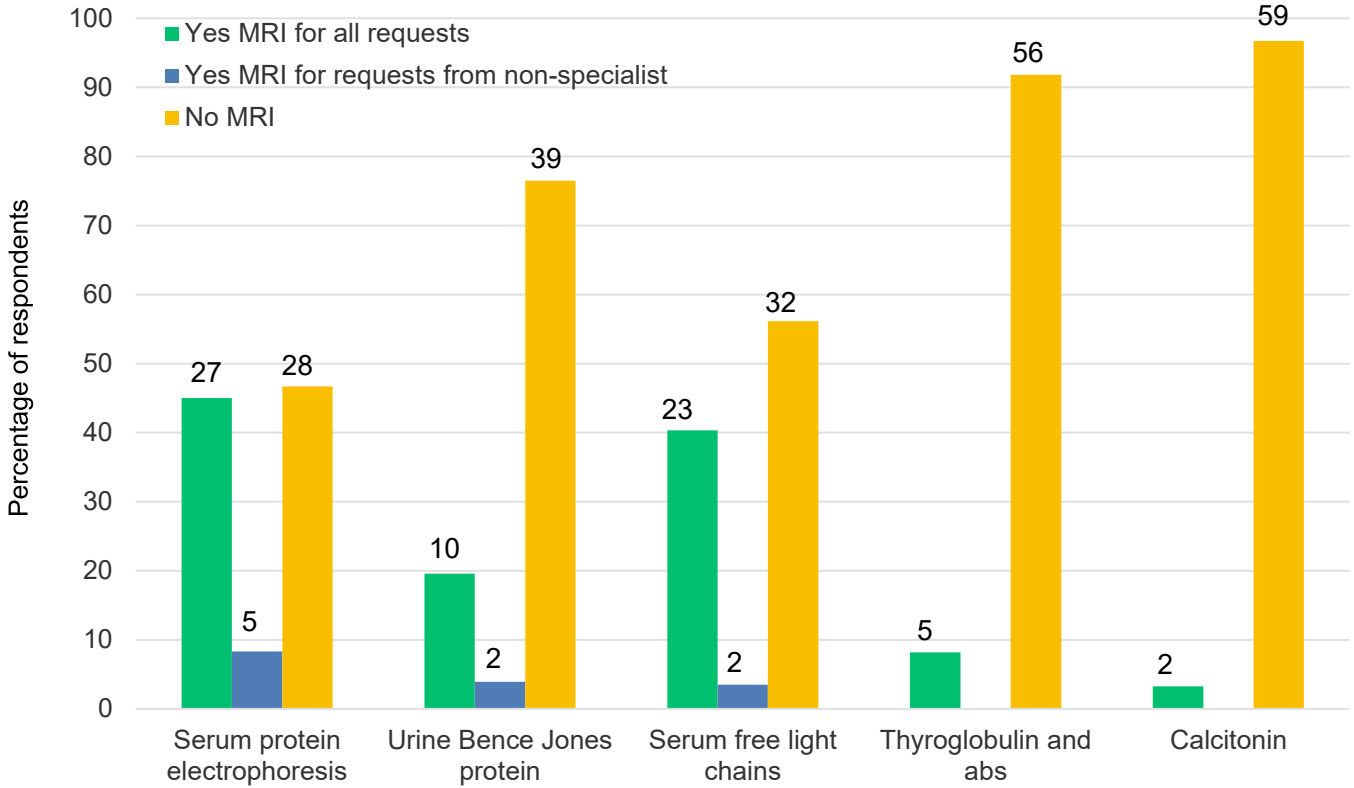
~30% have MRI



Does your laboratory have minimum retesting intervals (MRIs)

Answered: 63 Skipped: 6

MRI
~40% SFLC
~45% SPE



Does your laboratory have minimum retesting intervals (MRIs)

Answered: 61 Skipped: 8

For all the following tests only 1 or 2 labs had MRIs (<2%) the majority had no MRI in place:

Plasma Metanephrines, Urine VMA/Creatinine ratio, Random and 24-hour Urine Catecholamines and Metanephrines, Insulin, 24-hour Urine 5HIAA, Chromogranin A and B, other Gut Hormones

Any Circulating Tumour DNA Test, FIT, CYFRA 21-1, NSE, SCCA, CA,72-4, Inhibin B, ACTH, S100

Summary

1. Generally very specialist tests have no MRI.

2. Serum protein electrophoresis (45%) and serum free light chains (40%) are the most common tests with an MRI.

3. About 30% of have respondents have an MRI in place for PSA (18 labs); CEA (19 labs); CA 125 (19 labs) and CA 19-9 (19 labs).

If you have MRIs please indicate the interval that the request is blocked.

Answered: 22 Skipped: 47

	MRI in days for all requests	MRI in days for requests from non-specialist
Thyroglobulin		
Thyroglobulin antibodies		
Calcitonin		

Other (please specify in text box provided)

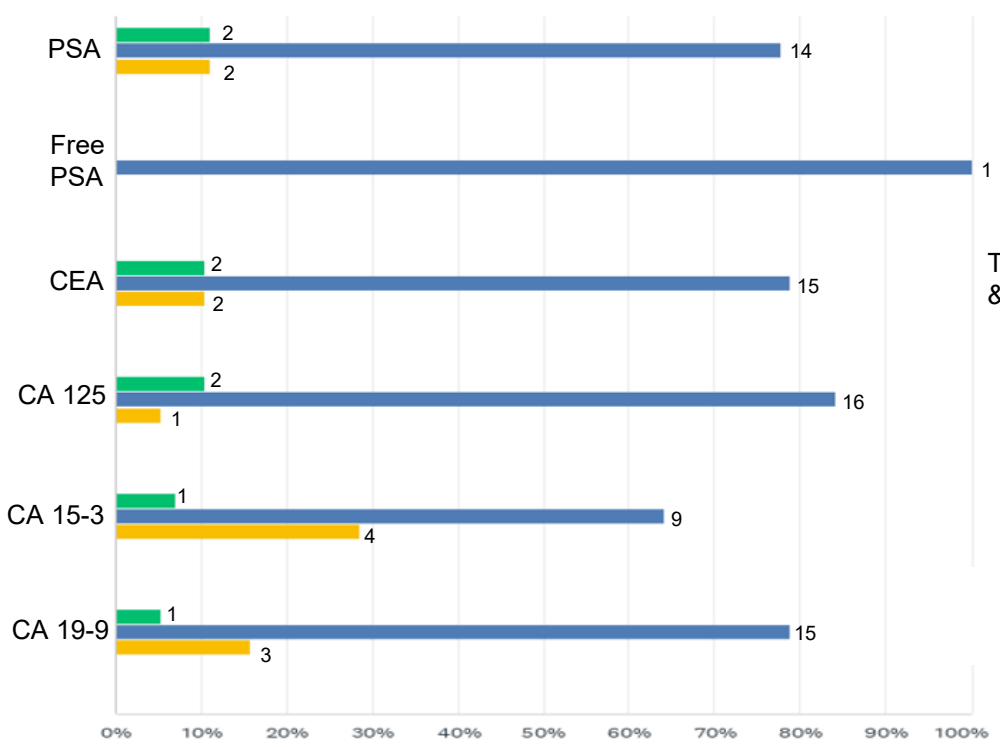
Options:

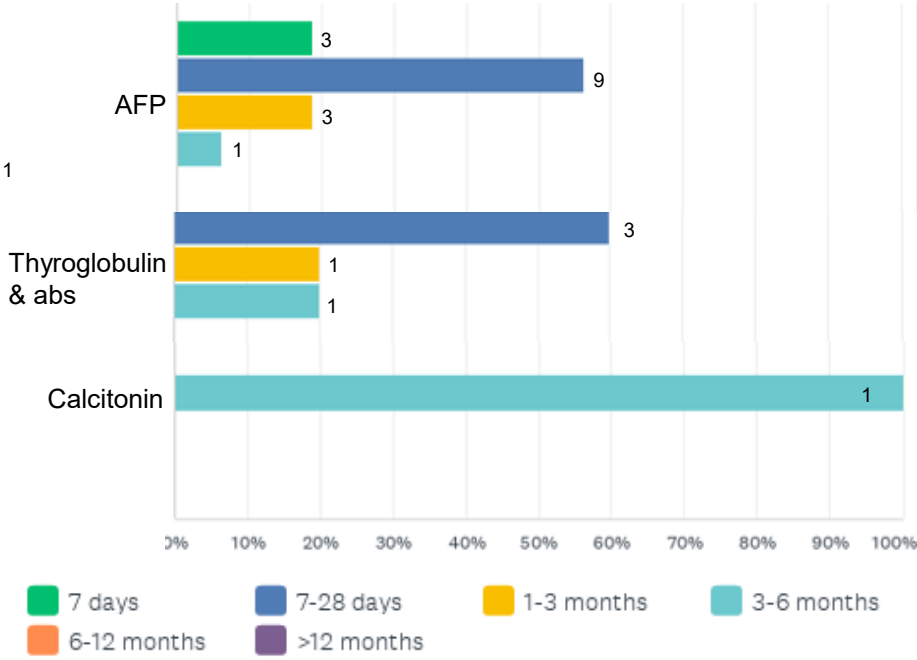
Up to 7 days
7-28 days
1-3 months
3-6 months
6-12 months
>12 months

If you have MRIs please indicate the interval that the request is blocked.

Answered: 22 Skipped: 47

All requests

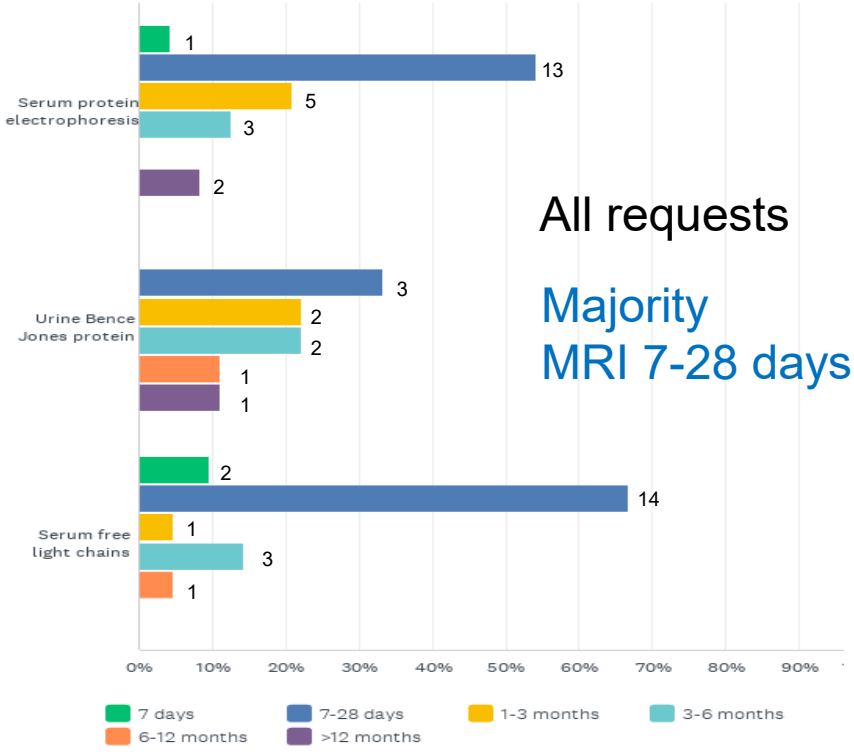




Majority MRI 7-28 days

If you have MRIs for the following myeloma tumour markers please indicate the interval that the request is blocked.

Answered: 34 Skipped: 35



All requests

Majority
MRI 7-28 days

Non-specialist requests

Summary

1. Very limited data as a less than half of respondents use MRIs.
2. The majority MRI used is 7-28 days (non-myeloma tests).
3. For ‘all requests’ serum protein electrophoresis and serum free light chains the majority MRI is 7-28 days.
4. For ‘non-specialist’ serum protein electrophoresis and serum free light chains the MRI is varied and 1-2 months and 3-6 months are more common.
5. MRI for serum protein electrophoresis and serum free light chain are varied depending on the requestor and the previous result.

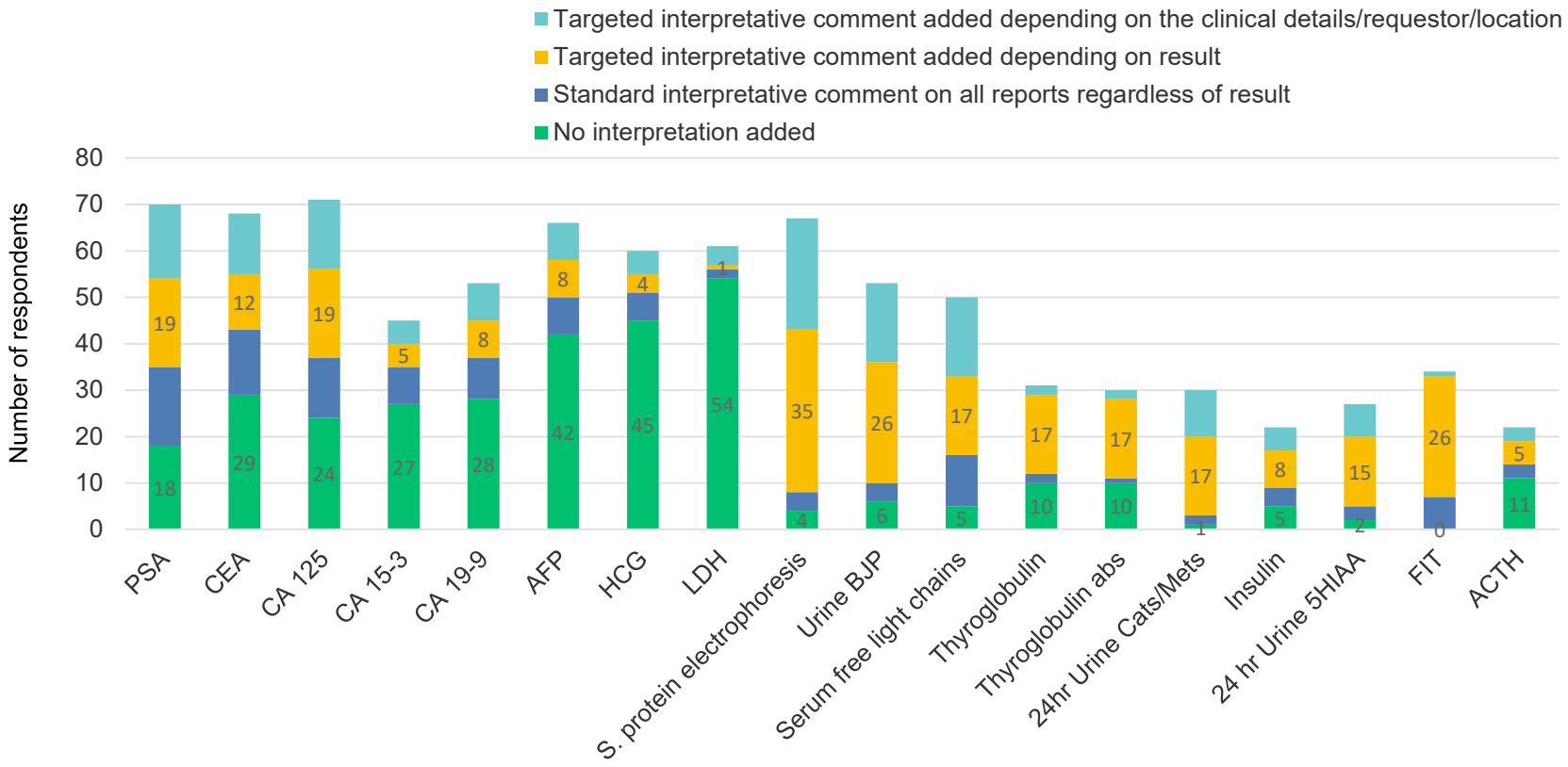
Fluid analysis summary

~75% provide tumour marker analysis in fluids
~87% of this analysis is not ISO accredited
~70% state on the reports that the method is not accredited
~98% do not provide interpretation

Test	CEA	CA 19-9	CA 125	LDH	AFP	HCG	Amylase	CA 15-3	PLAP	S100
Nº. Labs	23	15	7	16	15	10	3	1	1	2

Interpretative comments for Tumour Markers provided in-house. Graph of those with at least 20 responses

- Answered: variable



Acknowledgements

We would like to thank all members for taking the time to complete this audit.

We would like to acknowledge the following for their assistance in this audit:

Tracy Davis from the office of the Association for Laboratory Medicine for taking the audit and preparing the survey monkey, data extraction and providing the initial Power Point slides.

Dr Cathie Sturgeon, Department of Laboratory Medicine & UK NEQAS Edinburgh Royal Infirmary;
Professor Michael Duffy, Clinical Research Centre, St Vincent's University Hospital, Dublin
&
Dr WS Wassif, Chair of LabMed National Audit committee for their invaluable input into the audit questionnaire.

Findings from the slides not shown in the presentation

All

- Participated in a relevant EQA scheme for all tumour markers provided in house

The majority

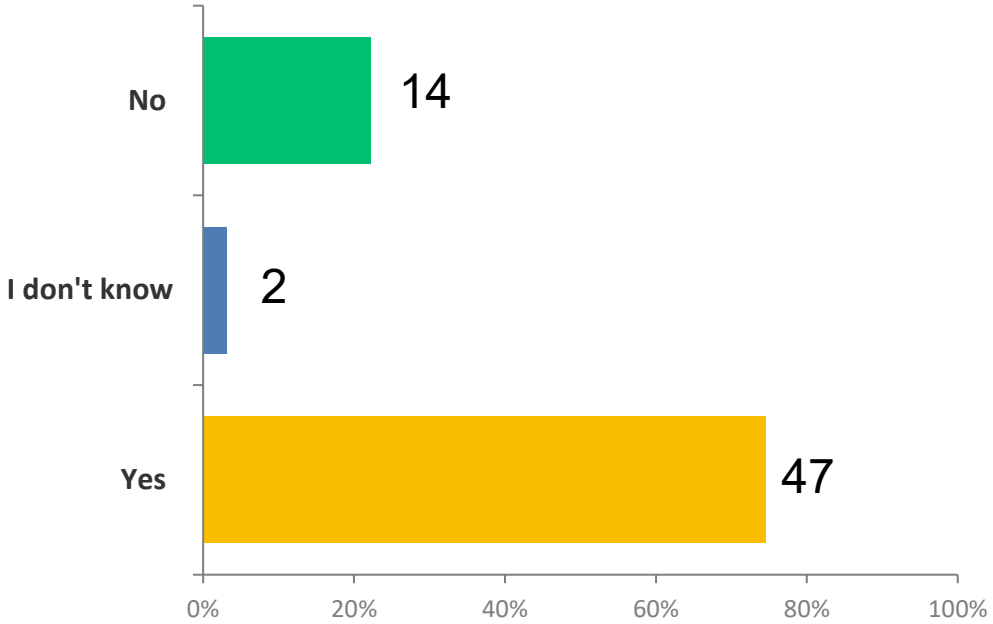
- Served an oncology centre.
- Have not introduced a new tumour marker in the last five years.
- Do not provide guidance for the use of tumour markers.
- Have not carried out a local audit of the appropriate requesting of tumour markers in the last three years.
- Have provision for requestors to access cumulative tumour marker reports.
- Have not been involved in organising or presenting talks on the appropriate use of tumour markers to clinical staff.
- Would welcome a national LabMed guidance for the recommended use of tumour markers.

An equal number

- That cumulative graphs from referral centres were or were not available to clinicians.

Does the laboratory ever measure tumour markers in cyst, pleural fluid or CSF?

Answered: 63 Skipped: 7



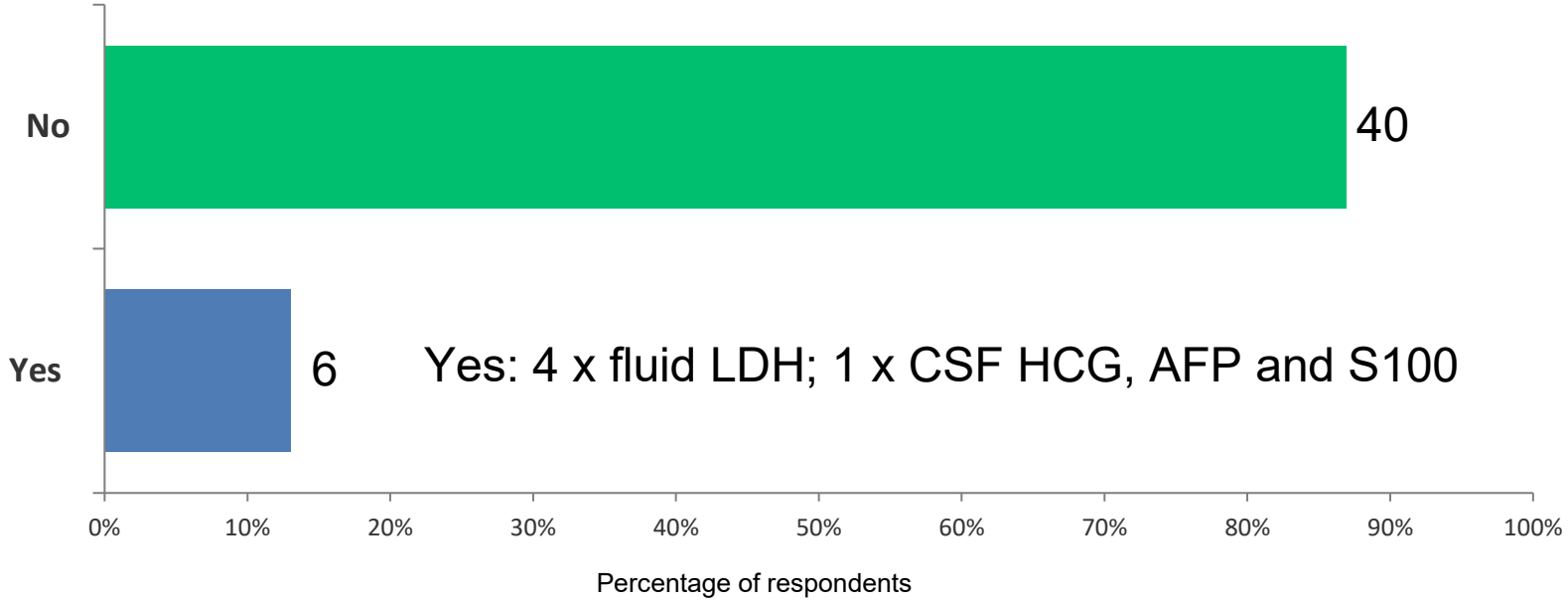
Details of fluids mentioned

Fluid	CEA(12), CA 19-9(6) CA 125(4) LDH(7), AFP(3), HCG(2)
Ascitic	CA 125(1), CA 19-9(1), AFP(1), CEA(1), LDH(1)
Pleural	CA 125(1), Amylase(1), LDH(1), CA 19-9(1), CEA(1)
Pancreatic Cyst	CA 19-9(5), CEA(7), Amylase(2), LDH(2), HCG(2), AFP(2)
Drain	CA 19-9(1), CEA(1), LDH(1)
CSF	AFP(9), HCG(6), CA 125(1), LDH(4), CA 19-9 (1), CA 15-3(1), CEA(1), PLAP(1), S100(2)

A total of 10 laboratories mentioned that all or some were referred

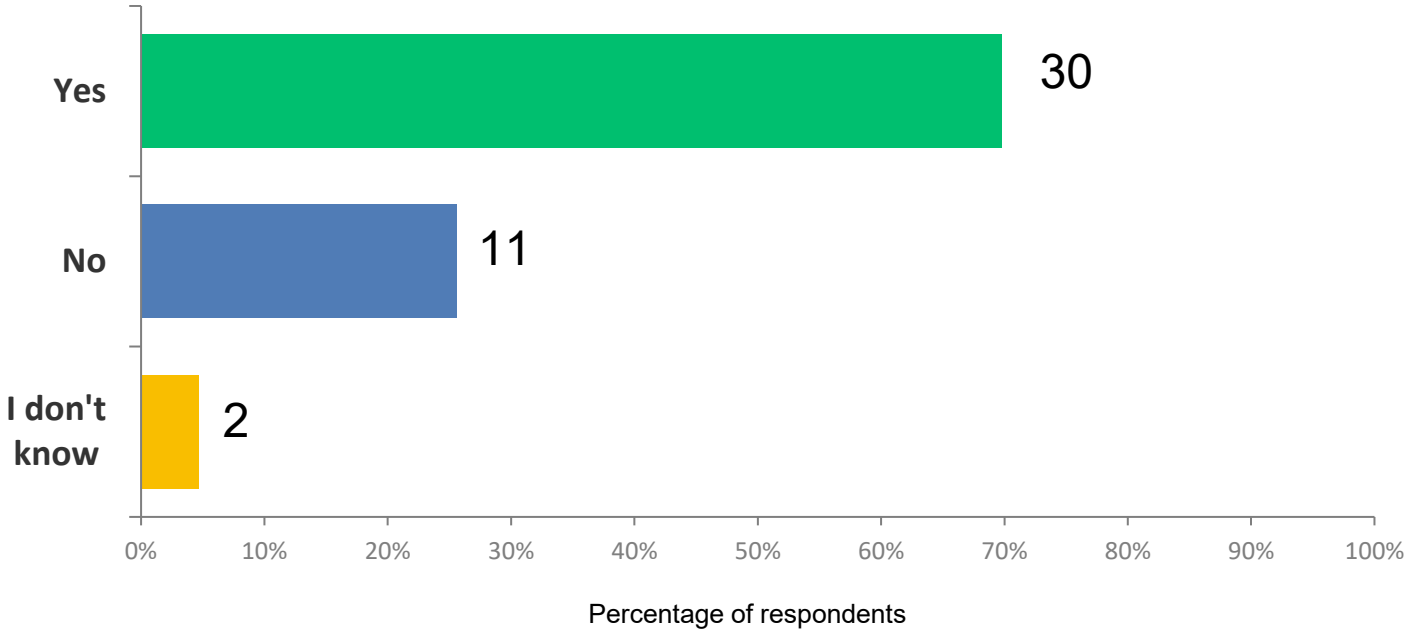
If any fluid tumour marker analysis is performed in-house has the laboratory ISO accredited the tumour marker measurement of these fluids?

Answered: 46 Skipped: 24



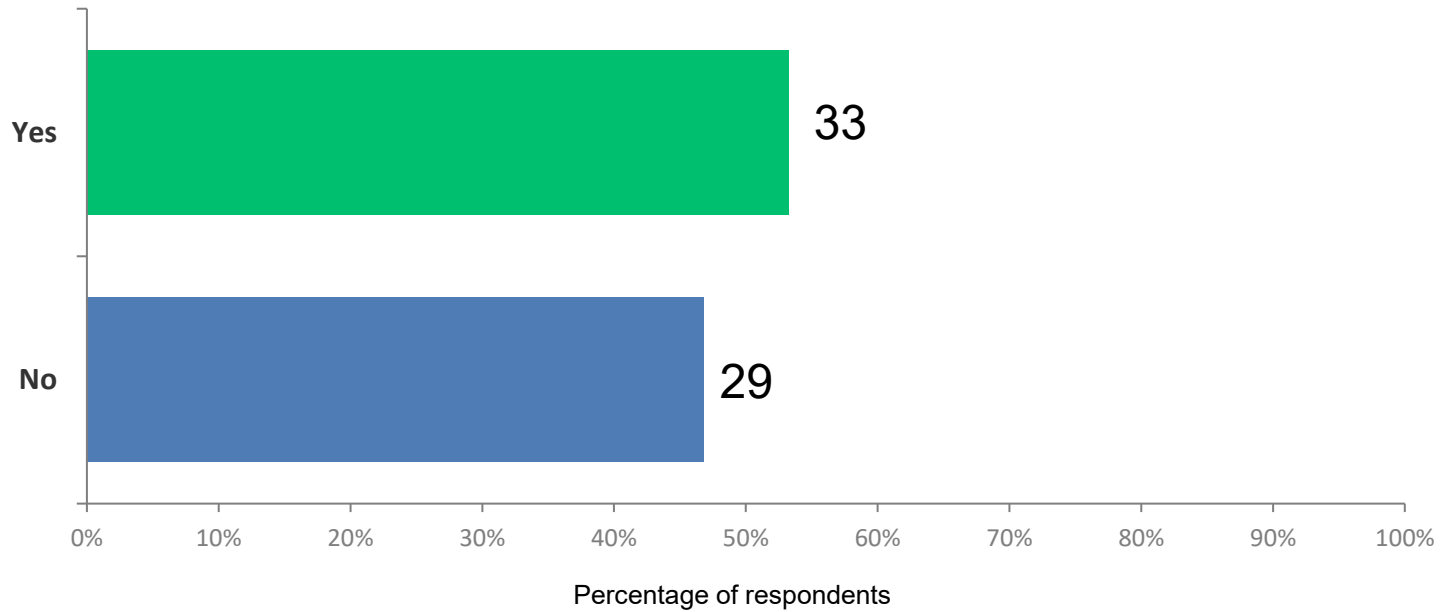
If non-accredited fluid tumour markers are provided does the report state the method is not accredited?

Answered: 43 Skipped: 27



Do you provide FIT in house?

Answered: 62 Skipped: 8



If you provide FIT in house what method is used?

Answered: 32 Skipped: 38