General comments:

The following questions are provided as examples of "new format questions" – as used for the FRCR CO2B since Autumn 2023. This introduced "domain based" scoring, with 3 domains tested in each question.

Candidates should note how each slide usually tests just one of the domains being covered in the question as a whole.

Examiners are provided with guidance as to scoring (see answer slides with red text after each question slide) but can still use their judgement / experience if other answers are provided by the candidate.

Prompts – beyond asking candidates to re-read the question or the information on the slides, examiners try to avoid giving further prompts to candidates (to ensure fairness across the exam). However, some agreed prompts, that can be used in certain circumstances, are decided in advance (see blue text on some answer slides). This is to ensure consistency, but also to help candidates show what they know while under pressure.

Note that questions are written in such a way that candidates are "brought back on track" even if they make a mistake on an individual slide. This means that there should be a chance to score / show knowledge on virtually every slide – even after a major mistake. It is important to "keep going" and score as well as you can over the whole question. After the candidate finishes, the examiner will use the "grid" at the end of each question to reflect on how the candidate performed across each domain. They will weigh up which domain score (0-3) best fits the different answers given across the whole question.

After a set of questions has been answered by 2 rounds of candidates, all the examiners testing those questions meet briefly to confer about how they have run. Any areas of uncertainty around scoring are discussed and agreement is reached before proceeding. In the event of any significant change, affected scores for rounds 1 and 2 can be modified to ensure fairness.

Note that even if a candidate runs out of time on a question, they may still have answered all the slides relating to 1 or 2 of the domains in a question and the impact on their total score may not be as bad as feared.

(Key for answer slides: CP = clear pass, JP = just pass, JF = just fail, CF = clear fail)

Upper GI

A 70-year-old man, PS 1, has an endoscopy showing a gastro-oesophageal junction (GOJ) tumour at 41-43 cm confirmed as adenocarcinoma.

CT : Semi circumferential thickening distal oesophagus / GOJ

PET CT: GOJ lesion SUV 11.9 (\rightarrow), but also right adrenal uptake SUV 6.7 (\rightarrow) Nil else.

What do you advise and why?



70-year-old man, PS 1, GOJ tumour at 41-43 cm.

GOJ adenocarcinoma.

PET CT: SUV 11.9 GOJ lesion, SUV 6.7 Right adrenal uptake No other sites of disease.

What do you advise and why?

Clinical judgement:

Need to appreciate that the adrenal lesion may not be metastatic and does require further analysis

CP - Biopsy or removal of adrenal with understanding of the need to distinguish whether this is metastatic or separate pathology (may suggest discussion at MDT about this), considers urinary metanephrines/serum cortisol

JP - Biopsy / removal of adrenal but not as clear on reasons or omits biochemical tests of primary adrenal pathology

JF - Radical treatment offered to oesophagus (CRT or surgery) without addressing adrenal pathology ie assuming it is unrelated

CF - Straight to palliative chemotherapy (ie assuming adrenal is a met) without considering need to prove adrenal is a metastasis

70-year-old man, PS 1, GOJ adenocarcinoma at 41-43 cm.PET CT: Uptake in primary and R adrenal No other sites of disease.

He has a right adrenalectomy.

Histology from adrenal: adenocarcinoma of upper GI origin.

PMH: pacemaker, hypertension, type 2 diabetes

Final staging: T3 N0 M1 (adrenal)

He is to be offered palliative chemotherapy.

What investigations do you request?

70-year-old man, PS 1, GOJ adenocarcinoma at 41-43 cm.PET CT: Uptake in primary and R adrenal No other sites of disease.

He has a right adrenalectomy.

Histology from adrenal: adenocarcinoma of upper GI origin.

PMH: pacemaker, hypertension, type 2 diabetes

He is to be offered palliative chemotherapy. What investigations do you request?

SACT: ECG/ECHO, DYPD, PDL-1, Her2 status of the tumour

- CP all 4
- JP 3 of above
- JF 2 of above
- CF 1 or none of above

70-year-old man, PS 1, GOJ tumour at 41-43 cm. cT3 N0 M1 (adrenal) adenocarcinoma. PMH: pacemaker, hypertension, type 2 DM

DYPD: no mutations identified

Her2: 3+

PDL-1: Negative (CPS score 0)

Cardiac ejection fraction 55%

What palliative chemotherapy would you offer and how would you supervise it?

70-year-old man, PS 1, GOJ tumour at 41-43 cm. cT3N0M1 (adrenal) adenocarcinoma. PMH: pacemaker, hypertension, type 2 DM DYPD no mutations identified, Her2 3+, cardiac ejection fraction 55% What palliative chemotherapy would you offer and how do you supervise it?

SACT: 6 cycles of CX (cis / cape) plus trastuzumab followed by trastuzumab until progression Cisplatin 60-80mg/m2 d1, capecitabine 625mg/m2d 1-21 or 1000mg/m2 BD d1-14 CT scanning every 3 months with cardiac monitoring (due to trastuzumab)

- CP Correct chemo, doses and response assessment / monitoring
- JP Vague on doses but correct drugs and monitoring

JF - Just CX (without trastuzumab) OR no mention of CT response <u>and</u> cardiac monitoring (if trastuzumab mentioned)

CP - Wrong chemo

PROMPT – clarify drugs and doses (if known). Can point out part of question about supervising it if nothing volunteered eg "and how would you supervise that treatment?" (looking for scans and cardiac function assessment) but <u>no more specific prompt than that</u>.

70-year-old man, PS 1, GOJ tumour at 41-43 cm. cT3N0M1 (adrenal) adenocarcinoma. PMH: pacemaker, hypertension, type 2 DM DYPD no mutations identified, Her2 3+, cardiac ejection fraction 55%

He is offered cisplatin / capecitabine plus trastuzumab

CT after 3 cycles shows response but during cycle 4 he develops central chest pain with anterior ST elevation on his ECG.

How do you manage him?

SACT (managing the toxicity / chest pain)

Sometimes reversible ischaemia with capecitabine but, until proven otherwise, treat as MI. ECG/ cardiac enzymes, update ECHO. O2 / analgesia. Consider angiogram +/- intervention. Antiplatelets / cardiology input etc if MI confirmed. PPM check

Clinical judgement (deciding strategy going forwards)

Stop chemo - no more capecitabine and no role for cisplatin on its own. If recovers and ECHO stable could continue trastuzumab until progression

SACT:

- CP Manages chest pain correctly
- JP Small omissions with treatment of chest pain
- JF Unsure about managing chest pain
- CF V poor on managing chest pain

Clinical Judgement:

- CP Appropriately stops chemo when develops chest pain but continues Herceptin if heart OK
- JP Stops all chemo without considering possibility of restarting Herceptin
- JF Continues Herceptin without checking cardiac function first
- CF Continues all chemo when patient develops chest pain

PROMPT – if just discusses management of cardiac chest pain can ask what they would do about his chemotherapy

A 70-year-old man, PS 1, GOJ tumour at 41-43 cm. T3N0M1 (adrenal) adenocarcinoma. PMH: pacemaker, hypertension, type 2 DM

He continues trastuzumab alone but 3 months later his swallowing has worsened. Still PS 1.

Endoscopy & CT: local progression only.

It is decided to offer palliative radiotherapy.

Describe dose and fractionation

What else should be considered during treatment?

A 70-year-old man, PS 1, GOJ tumour at 41-43 cm. T3N0M1 (adrenal) adenocarcinoma. PMH: pacemaker, hypertension, type 2 DM

Palliative chemotherapy has stopped, he continues on maintenance trastuzumabHe returned 3 months later swallowing had worsened.Endoscopy & CT shows local only progression.It is decided to offer palliative radiotherapy.Describe dose, fractionation and what else is needed for treatment

Radiotherapy:

CP - 30 in 10, perhaps 40 in 15 (ie high dose palliation as just local progression. Can consider CT planning). Talk about cardiac monitoring, pacemaker check post treatment, consent including pacemaker issues.

- JP 20 in 5 OR not much discussion on pacemaker (eg just "arrange a check")
- JF Dose OK. Mentions pacemaker but not concerned in this patient.
- CF Misses pacemaker issues completely OR incorrect dose (eg 8Gy in 1#)

A 70-year-old man GOJ tumour at 41-43 cm. T3N0M1 (adrenal) adenocarcinoma. Palliative radiotherapy is planned to 30Gy in 10F Draw GTV and describe radiotherapy technique





A 70-year-old man GOJ tumour at 41-43 cm. T3N0M1 (adrenal) adenocarcinoma. Palliative radiotherapy is planned to 30Gy in 10F Draw GTV and describe technique

Radiotherapy:

Ant and post field with field edge 1.5-2 cm from marked GTV Some centres would use VMAT plan for 30 in10 CTV 0.5 - 1cm axially,1-2 cm sup and inf, PTV 0.5 - 1cm axially, 1cm sup and inf

- CP GTV with full answer for margins field/VMAT
- JP Most information but small error
- JF Not clear on margins (eg would still treat tumour but a bit too big)
- CF Wrong field/GTV. Inadequate margins. Not AP POP or VMAT/plan

PROMPT – if says POP, get them to draw fields and clarify margin being added. If says VMAT, clarify margin sizes being added



A 70-year-old man GOJ T3N1M1 (adrenal) adenocarcinoma.

4 months after radiotherapy he presents with painful skin metastases on the scalp. Restaging CT: small volume lung and liver metastases. PS 2.

What type of radiotherapy is he receiving? What dose and fractionation is likely?





Lesion behind right ear

Scalp lesion

A 70-year-old man GOJ T3N0M1 (adrenal) adenocarcinoma. 4 months after radiotherapy he presents with painful skin metastases. Restaging CT: small volume lung and liver metastases

What type of radiotherapy is he receiving? What dose and fractionation is likely?

Radiotherapy:

Best answer 8Gy 1F

Must say this is orthovoltage photons PROMPT - if they do, ask what energy is likely to be used here Acceptable range 150-300kV

- CP Single #, orthovoltage and correct energy
- JP Orthovoltage and 8Gy single # (but slight error of energy)
- JF If says 5 or more fractions OR knows orthovoltage but no idea of energy

CF - If says electrons, as would not look like this OR wrong fractionation <u>and</u> says orthovoltage but no idea of orthovoltage energy

Upper GI	Clear fail (score 0)	Just fail (score 1)	Just pass (score 2)	Clear pass (score 3)
Clinical judgement Investigating solitary metastasis adrenal Appropriately stops chemo with chest pain but continues herceptin	Straight to palliative chemotherapy without considering need to prove adrenal is a metastasis or no idea Continues all chemo when patient develops chest pain	Radical treatment offered to oesophagus (CRT or surgery) without addressing adrenal pathology ie assuming it is unrelated Continues Herceptin without checking cardiac function first	Biopsy / removal of adrenal but not as clear on reasons or omits biochemical tests of primary adrenal pathology Stops all chemo without considering possibility of Herceptin	Need to appreciate further investigation needed to determine nature of adrenal lesion – tissue ?imaging and biochemical tests for adrenal primary lesion Appropriately stops chemo when develops chest pain but continues Herceptin if heart OK
Radiotherapy Palliative RT Dose technique margins fields Pacemaker Orthovoltage use	Wrong doses Inadequate margins Wrong fields Not POP or plan (eg single field) No discussion of pacemaker /consent Not sure about orthovoltage Wrong energy <u>and</u> wrong fractionation OR Talks about electrons	Some idea on palliative RT Vague about dose Margins and fields not precise but would still treat tumour eg too big Mentions pacemaker but doesn't think it is important Some idea about orthovoltage, but no idea on energy, <i>or</i> goes for 5 or more fractions	Understands palliative RT Goes for 20 in 5 – otherwise OK OR Describes dose, margins and fields but slight error No thorough discussion on pacemaker but at least flags as issue Knows orthovoltage and correct fractionation but slight error on energy	Good understanding of palliative radiotherapy dose technique 30 in 10, perhaps 40 in15 high dose palliation as just local progression (possibly CT planning due to higher dose) Talk about cardiac monitoring, pacemaker check post treatment, consent including pacemaker issues. Ant and post field with field edge 1.5cm from marked GTV Some centres would use VMAT plan for 30 in10, CTV 0.5 -1 cm axially,1-2 cm sup and inf, PTV 0.5cm axially 1cm sup and inf Recognising orthovoltage treatment , 8Gy/1 150- 300kv
 SACT Knowing prechemo investigations Palliative chemo regime Toxicity management with chest pain 	No idea on prechemotherapy investigations or only 1. Wrong chemo / no idea V poor on managing chest pain	Misses 2 of 4 prechemo investigations Just CX (without trastuzumab) OR no mention of CT response and cardiac monitoring (if trastuzumab mentioned) Unsure about managing chest pain	Understands prechemotherapy investigations but misses 1 of 4 Vague on doses but correct drugs and monitoring Small omissions with treatment of chest pain	Good understanding of checking ecg/echo, DPD, PDL1, Her-2 before chemotherapy with understanding of palliative chemo options. Correct chemo, doses and response assessment / monitoring Manages chest pain correctly

Haematology

87 year old man presents with chest pain and hypotension.
PMH – ischaemic heart disease
CTPA identifies extensive lymphadenopathy
He improves clinically with management of cardiac failure and fast AF

Now PS2

Comment on the FDG PET and likely diagnosis.



Comment on the FDG PET and likely diagnosis.

Interpretation

Widespread FDG avid lymphadenopathy above and below diaphragm with bulk in mediastinum consistent with lymphoma. Some sites may be extranodal.

CP - Widespread lymphadenopathy with bulky disease. Normal excretion of dye in ureter and bladder. Atypical areas of tracer uptake suggesting extranodal disease as well. Lymphoma is most likely diagnosis.

JP - Widespread lymphadenopathy with bulky disease but no comment on renal excretion or extranodal disease. Lymphoma is most likely diagnosis.

- JF Widespread lymphadenopathy only. No lymphoma in differential.
- CF Unsure or failure to appreciate widespread lymphadenopathy.



87 year old man presents with chest pain and hypotension PMH – ischaemic heart disease CTPA identifies extensive lymphadenopathy He improves clinically with management of cardiac failure and fast AF Now PS2

PET shows extensive FDG-avid lymphadenopathy above and below the diaphragm.

Biopsy from palpable right SCF node: DLBCL

He is discussed at the Haematology MDT

What do you recommend?



PET shows extensive FDG avid lymphadenopathy above and below the diaphragm.

Biopsy from palpable right SCF node: DLBCL He is discussed at the Haematology MDT What do you recommend?

Clinical Judgement

Needs cardiac assessment and, at 87, a discussion with patient about objectives of treatment and wishes in context of age and comorbidity. If he wants active treatment then recommend RCEOP or or unvaluent regimen that avoids anthracycline with doses

equivalent regimen that avoids anthracycline with doses reduced for age and comorbidity.



CP - Realises that with age and co-morbidity active treatment may be challenging and patient's wishes will be important. Does he want any? BSC an option if he wishes. If going for active treatment - then recommend RCEOP or equivalent regimen that avoids anthracycline with doses reduced for age and comorbidity

JP - Outlines a suitable chemo option but not explicit about giving patient option of no treatment

JF - Avoids anthracycline but no dose reduction initially or insists they won't offer <u>any</u> chemo options ie BSC only (even with prompt)

CF - Offering R-CHOP or other anthracycline-containing chemo

PROMPT – if immediately says for palliation can ask "and what would you do if the patient wanted to try active treatment?"

87 year old man with DLBCL, PS2. Cardiac failure, AF.

He completes 6 cycles of R-CEOP (rituximab, cyclophosphamide, etoposide, vincristine, prednisolone) with doses modified due to poor cardiac function

Comment on the post treatment PET



Post

He completes 6 cycles of R-CEOP (rituximab, cyclophosphamide, etoposide, vincristine, prednisolone) with doses modified due to poor cardiac function

Comment on the post treatment PET

Interpretation:

CP - Notes the residual avid site in mediastinum and correctly comments that there are other sites but consistent with physiological uptake - such as symmetrical linear shoulder uptake and that the neck uptake at site not involved before will likely be physiological also.

JP - Notes the residual mediastinal mass and seeing, but being unsure about, other sites.

JF - For residual mediastinum but reporting the other sites as positive also.

CF - For missing mediastinum mass.



Pre

Post

PROMPT – Main thing is to identify the mediastinal lump. If they have done that and have seen, but are unsure about, other areas (eg upper arms) can ask "what do you think that might be?" but move on quickly if not sure. Still scoring a 3 unless stating these are other disease sites.

87 year old man with DLBCL, PS2. Cardiac failure, AF.

He completes 6 cycles of dose-modified R-CEOP

Post-chemo PET: A solitary focus of FDG avidity () persists in the mediastinum

Other changes physiological.

What would you recommend and why?



87 year old man with DLBCL, PS2. Cardiac failure, AF.

He completes 6 cycles of dose-modified R-CEOP

Post-chemo PET: A solitary focus of FDG avidity () persists in the mediastinum

Other changes physiological

What would you recommend and why?

Clinical Judgement

In the context of age and cardiac comorbidity, systemic options are limited and radiotherapy to the site of persisting FDG uptake is recommended 30Gy 15F (can go up to 40Gy in 20#)



CP - Appreciates no more chemo options but offers local radiotherapy 30-40Gy (2Gy / #) to site of persistent activity. Considers resistant nature of the lump (size, PET-avid) in dose selection.

- JP Simply offers suitable RT to the lump with little explanation
- JF Offers local RT but dose >40 or <30
- CF No treatment offered or pushes for more chemo

87 year old man with DLBCL, PS2. Cardiac failure, AF.

He completes 6 cycles of dose-modified R-CEOP A solitary focus of FDG avidity persists in the mediastinum

He is planned for radiotherapy (30Gy in 15#) Describe what will be included in your CTV Draw your CTV on this CT slice





87 year old man with DLBCL, PS2. Cardiac failure, AF.

He completes 6 cycles of dose-modified R-CEOP A solitary focus of FDG avidity persists in the mediastinum

He is planned for radiotherapy (30Gy in 15#) Describe what will be included in your CTV Draw your CTV on this CT slice

Radiotherapy

CTV is the persisting FDG avid nodal mass. It would be reasonable to include any immediately adjacent indeterminate nodes but not to attempt to cover all sites of pre-treatment disease or a more extensive mediastinal volume. Yellow or orange contours acceptable.

Covering contralateral nodes (red contour) or more extensive nodal volume is wrong.





- CP CTV is avid residual nodal mass and may include immediately adjacent indeterminate nodes. Yellow or orange contours acceptable. We assume that non avid disease has been treated by chemotherapy
- JP CTV is avid residual nodal mass. Less clear on description
- JF CTV tries to cover more extensive mediastinal volume tries to include non FDG avid disease extends CTV across midline into **red** contour adds a margin from edge of node that extends into lung or vessels.
- CF Poor understanding of principles of lymphoma RT.

87 year old man with DLBCL, PS2. Cardiac failure, AF. Radiotherapy for solitary FDG avid mediastinal mass post chemo He is planned for radiotherapy (30Gy in 15#)

You are asked to review his CBCT after 5 fractions

Comment on the CBCT.



87 year old man with DLBCL, PS2. Cardiac failure, AF. Radiotherapy for solitary FDG avid mediastinal mass post chemo

You are asked to review his CBCT after 5 fractions

Comment on the CBCT.

Radiotherapy

The upper lateral mediastinal contour now extends to PTV despite no mediastinal shift. Need to review axial slices and CBCT on day 1 as well as review patient to assess.



CP - Correctly identifies the upper mediastinal contour change extending to PTV and points out lack of mediastinal shift

- JP Sees contour change extending to PTV but fails to point out lack of mediastinal shift
- JF Says (correctly) there has been no mediastinal shift but fails to spot the contour change
- CF No idea or completely wrong interpretation

87 year old man with DLBCL, PS2. Cardiac failure, AF. Radiotherapy for solitary FDG avid mediastinal mass post chemo

CBCT after 5 fractions shows mediastinal contour extending to the edge of PTV despite no mediastinal shift (\implies).

He is more breathless and struggling to lie flat. This has developed since D1 CBCT.

How might this be explained? How would you proceed?



87 year old man with DLBCL, PS2. Cardiac failure, AF. Radiotherapy for solitary FDG avid mediastinal mass post chemo

CBCT after 5 fractions shows mediastinal contour extending to the edge of PTV despite no mediastinal shift. He is more breathless and struggling to lie flat. This has developed since D1 CBCT.

How might this be explained? How would you proceed?

Clinical Judgment

Re-emergence of cardiac failure may explain symptoms and change in mediastinal contour. But it is quite nodular and localised so recurrence could be a differential. Arrange urgent clinical assessment regarding AF and cardiac failure. Consider restaging CT to exclude tumour progression as well.



- CP Considers heart failure and recurrence. Wants cardiac assessment and re-staging scan
- JP Considers both differentials but lack of detail on next steps
- JF Fails to consider recurrence despite location and nodularity of contour change
- CF Fails to consider heart failure (despite concerning history)

Lymphoma	Clear fail (score 0)	Just fail (score 1)	Just pass (score 2)	Clear pass (score 3)
Clinical Judgment	Offering R-CHOP or other anthracycline-containing chemo	Avoids anthracycline but no dose reduction initially or insists they won't offer <u>any</u> chemo options ie BSC only (even with prompt)	Outlines a suitable chemo option but not explicit about giving patient option of no treatment	Realises that with age and co-morbidity active treatment may be challenging and patient's wishes will be important. Does he want any? BSC an option if he wishes. If going for active treatment - then recommend RCEOP or equivalent regimen <u>that avoids</u> <u>anthracycline</u> with <u>doses reduced</u> for age and comorbidity Appreciates no more chemo options but offers local radiotherapy 30-40Gy (2Gy / #) to site of persistent activity. Considers resistant nature of the lump (size, PET-avid) in dose selection. Considers heart failure and recurrence. Wants cardiac assessment and re-staging scan
Plan with isolated residuum	No treatment offered or pushes for more chemo	Offers local RT but dose >40 or <30	Simply offers suitable RT (ie dose / #) to the lump with little explanation	
Actions after seeing CBCT	Fails to consider heart failure (despite concerning history)	Fails to consider recurrence despite location and nodularity of contour change ie only considers heart failure	Considers both differentials but lack of detail on next steps	
Radiotherapy Planning strategy	Poor understanding of principles of lymphoma RT.	CTV tries to cover more extensive mediastinal volume -tries to include non FDG avid disease– extends CTV across midline into red contour – adds a margin from edge of node that extends into lung or vessels.	CTV is avid residual nodal mass. Less clear on description.	CTV is avid residual nodal mass and may include immediately adjacent indeterminate nodes. (Yellow or orange contours acceptable.) .
Cone beam review	No idea or completely wrong interpretation	Says (correctly) there has been no mediastinal shift but <u>fails</u> to spot the contour change	Sees contour change extending to PTV but fails to point out lack of mediastinal shift	Correctly identifies the upper mediastinal contour change extending to PTV and points out lack of mediastinal shift
Interpretation PET-CT (pre and post)	No lymphoma in PET differential. Unable to appreciate widespread lympadenopathy.	Widespread lymphadenopathy only. No lymphoma in differential.	Widespread lymphadenopathy with bulky disease no comment on renal excretion or extranodal disease. Lymphoma is most likely diagnosis.	Widespread lymphadenopathy with bulky disease with normal excretion of dye in ureter and bladder. Atypical areas of tracer uptake suggesting extranodal disease as well. Lymphoma is most likely diagnosis.
	Fails to identify the residual mediastinal nodule	Seeing residual mediastinum nodule but incorrectly reporting the other sites (eg arms) as positive also.	Just noting the residual mediastinum nodule as significant and being unsure about other sites.	Note the residual avid site in mediastinum and correctly comment that there are other sites but consistent with physiological uptake such as symmetrical linear shoulder uptake and that the neck uptake at site not involved before will likely be physiological also.