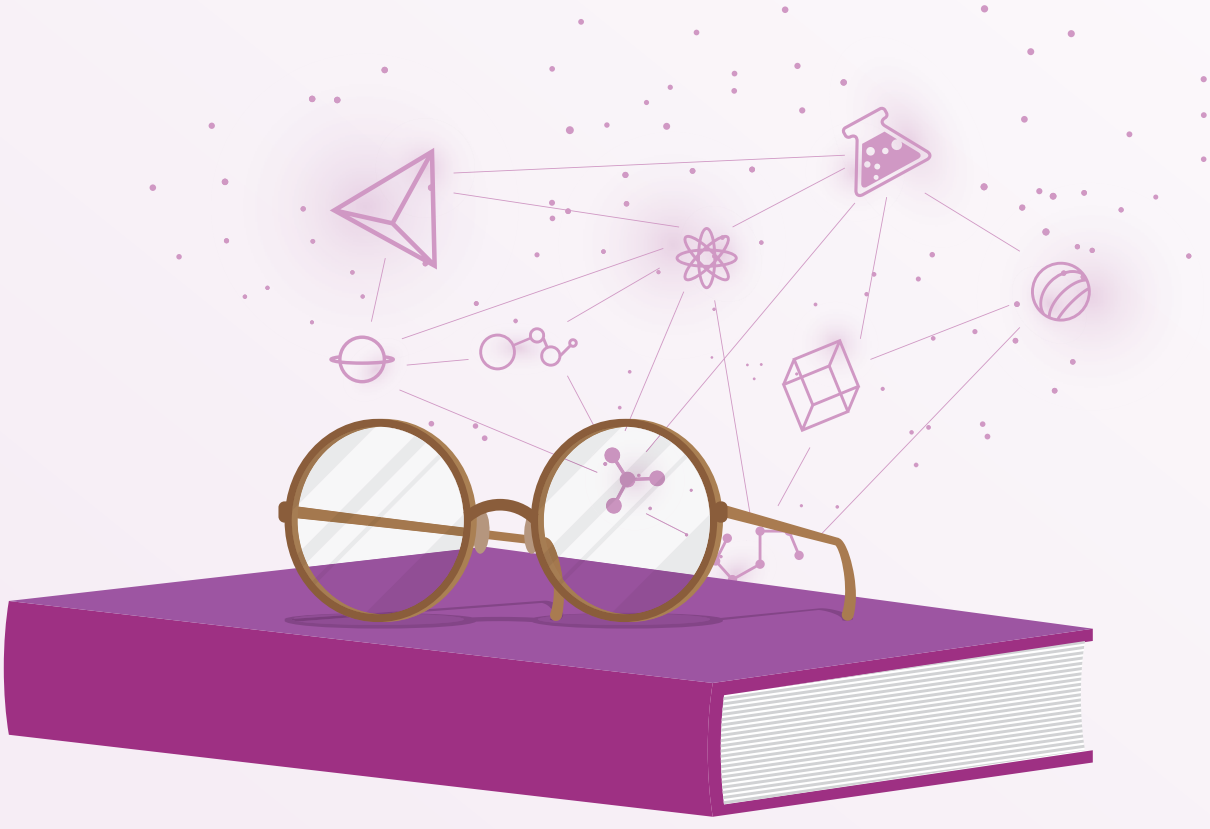
MANUAL FOR ESTRO TEACHERS

ESTRO School



INTRODUCTION

The ESTRO School - Mission Statement

1

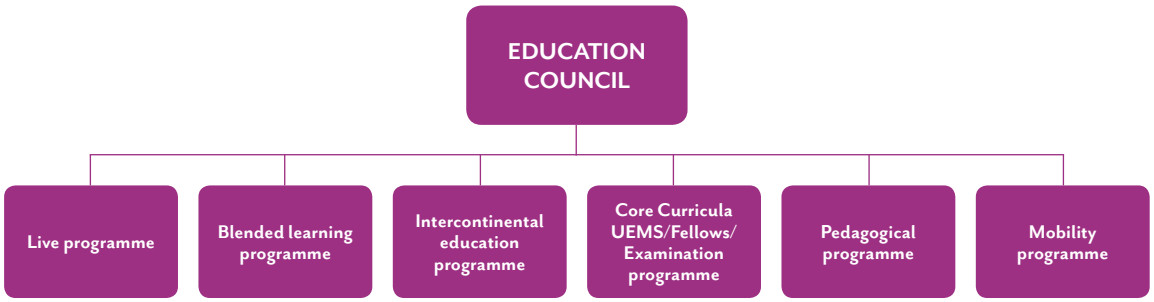
The European School of Radiotherapy and Oncology is an international school that aims to improve, professionalise and standardise knowledge and practice in radiation oncology and associated professions in Europe and beyond.

The ESTRO School offers 35 courses live courses per year, some of which are taking place every second year. 80% of the courses take place in Europe and 20% are organised outside Europe. *(Annex 1 – roadmap)*.

To complement the live courses, the ESTRO School offers e-learning opportunities:

- FALCON Fellowship in Anatomic delineation and CONtouring: used as contouring tool in live courses and as online workshops *(Annex 2 – Falcon User Guide)*
- DOVE Dynamic Oncology Virtual ESTRO: the ESTRO Educational platform containing peer-reviewed publications (ESTRO congress webcasts, abstracts and posters and course material)
- EGLO ESTRO Global Learning Objects: the new ESTRO e-learning modules which increase the educational value of the DOVE library

The former ETC (Education and Training Committee) has now become the Education Council with the following working groups: live programmes, blended learning programme with a link to Falcon, the international education programme, the core curriculum/accreditation/Fellow programme, the pedagogical programme and the mobility programme *(Annex 3 – Educational Council)*.



The ESTRO School organises a teachers' retreat every other year during the congress offering brain-storming sessions in a relaxed atmosphere to discuss pedagogical issues.

2 PRACTICAL INFORMATION

Course directors are appointed by the Education Council through its chair. The position of the course director is reviewed after 3-4 years; replacement is discussed after 5-7 years. In case of any major problems the Education Council chair will, in cooperation with ESTRO liaison persons (see below on p 4), the course director and the teaching faculty, look for and decide on appropriate solutions. There should be one course director unless there are overriding reasons for sharing this job, eg: -duplication of the course in regions outside Europe -interdisciplinary courses with specific requirements for the different subspecialties. For new course directors, advice on setting up a new course and choice of teachers can be obtained through the Education Council.

Teachers are appointed by the course director. Selection criteria are:
- expertise in the field (based on publications, references etc)
- pedagogical & communication skills
- enthusiasm for teaching
- team-player
- commitment to each year attend the course for its full duration, to continuously update the course and your lectures, to update MCQ, etc.

Course directors also have the option of selecting new teachers by open applications through the ESTRO office (via the ESTRO newsletter and/or ESTRO Flash).

For new courses it is preferable to keep the same faculty for at least 3 years. After 4-5 years a gradual turnover starts; teachers usually stay on the course for 5–7 years maximum.

All teachers and course directors are expected to be ESTRO members (unless those working outside the field of radiation oncology) and are expected to be present throughout the whole length of the course in order to contribute to discussion after lectures and case presentations as well as for personal development and team integration.

There is no honorarium for the faculty but their travel and accommodation is covered by ESTRO at economy rates. *(see annex 4: ESTRO Travel Policy)* They receive a cost allowance (150€/day for course directors, 100€/day for teachers) to cover for dinner costs and small extras; during the course, teachers are invited to a teachers' dinner and to a social dinner. The other evenings can be spent freely but often the faculty dine together and share the costs *(see annex 5: Reimbursement form)*.

The ESTRO School can on demand provide worldwide travel insurance (unlimited medical and repatriation expenses) for all faculty members for the time spent on an ESTRO course.

The ESTRO School will make every effort to ensure the safety of the course faculties and participants. The ESTRO office will monitor the destination of the courses with regard to specific risks (eg natural disasters, public health, public order, terrorist attacks and other sources) which an organiser should reasonably foresee and will decide to cancel when the situation is considered unsafe. However, the ESTRO School cannot be held liable for unforeseen 'force majeure' behind its control. *(see annex 6: ESTRO School Principles and Safety Policy)*

The project manager will send a faculty reply form to gather information about travel and accommodation *(see annex 7: Faculty Reply Form)*.

All teachers receive a certificate of attendance for the course and all courses are accredited by by EACCME, the European Accreditation Council for Continuous Medical Education and by the American Medical Association (AMA). For courses aimed at physicists only accreditation is sought through EBAMP (The European Board for Accreditation in Medical Physics).

All directors, teachers and contouring administrators are moreover entitled to participate for free to one ESTRO teaching course per year and each director can additionally request one free registration for one person to attend one teaching course per year.

All teachers will be contacted by the course director to discuss the programme. The ESTRO project manager will contact the teachers to fix the date of the course and inform them about the venue.

Each course is 'overviewed' by a **'liaison person'**. Liaison persons are members of the Live Course Programme and overview a number of courses from the School programme in a specific field or technique. They discuss their findings with the directors/faculties in order to guarantee a permanent analysis for these courses.

Information about creating successful educational teams can be found in *(Annex 8: Successful Educational Teams)*.

COURSE MATERIAL 3

The course material from the previous year will be made available online to the participants as background information. All presentations should be provided to the ESTRO project manager **at the latest before the start of the course.** The latest version of all presentations is uploaded at the end of the course and remains available online for all participants and for all the teachers for 1 year.

In the physics course, students get access to the **final** course material a couple of weeks before start of the course.

An ESTRO School ppt template is available for preparing presentation slides & case studies *(see annex 9: Slide template)*.

When preparing course presentations the teachers should **respect the intellectual property (IP)** and copyright legislation. They mainly concern the integration of material from third parties in one's presentation:

- in principle one should obtain consent from third parties to use their material
- **BUT** it is legally acceptable to quote from published work for the purpose of education or in the frame of scientific activities, when these quotes are made conform fair professional practice and serve the intended target. These quotations should obviously always mention the source and the name of the author(s).

ESTRO thoroughly investigated the legislation applicable to IP and copyright in order to avoid possible problems and protect faculties from possible conflicts regarding IP and copyright. The legal advice can be found on the ESTRO website and is complemented with some practical examples *(see annex 10: Legal advice on IP and copyright)*

All faculty members are asked to sign a teacher's agreement form explaining these regulations *(see annex 11: Teachers' agreement)*. By signing this form, they agree to follow these rules and agree to have their presentations made available online in the ESTRO library DOVE (Dynamic Oncology Virtual Environment) to the participants of their specific course, to all ESTRO faculty members and to the ESTRO Ambassador members. Each teacher has the right to refuse this online communication of his/her presentations or to exclude specific slides from their presentation. This agreement will be sent by survey monkey to all faculty members after each course.

4 COURSE PRESENTATIONS AND CONTENT

Defining Learning outcomes for EACH course presentation

Learning Outcomes specify the intended endpoint of a period of engagement in specified learning activities. They are written in the future tense and should clearly indicate the nature and/or level of learning required to achieve them successfully. They should be achievable and assessable and use language that learners (and other teachers) can easily understand. They relate to explicit statements of achievement and always contain verbs.

Outcomes should be **SMART**: Specific, Measurable, Achievable, Realistic and Timebound.

Individual outcomes should relate to one of the three domains described by Bloom (1956):
- Cognitive (knowledge and intellectual skills)
- Psychomotor (physical skills)
- Affective (feelings and attitudes).

Outcomes should avoid ambiguity or over-complexity. The table below lists the elements of the revised cognitive domain with a brief description, and then some useful verbs that can be used to map the learning outcome on to the relevant level.

Bloom's Taxonomy: cognitive domain	Description	Useful verbs for outcome-level statements
Evaluation	Ability to judge X for a purpose	Judge, appraise, evaluate, compare, assess, conclude, contrast, criticise, critique, defend, describe, discriminate, explain, interpret, justify, relate, summarise, support
Synthesis	Arranging and assembling elements into a whole	Design, organise, formulate, propose, categorise, combine, compile, compose, create, devise, design, explain, generate, modify, organise, plan, rearrange, reconstruct, relate, reorganise, revise, rewrite, summarise, tell, write
Analysis	Breaking down components to clarify	Distinguish, analyse, calculate, test, inspect, break down, compare, contrast, diagram, deconstruct, differentiate, discriminate, distinguish, identify, illustrate, infer, outline, relate, select, separate
Application	Using the rules and principles	Apply, use, illustrate, practise, change, compute, construct, demonstrate, discover, manipulate, modify, operate, predict, prepare, produce, relate, show, solve
Comprehension	Grasping the meaning but not extending it beyond the present situation	Comprehend, convert, defend, distinguish, estimate, explain, extend, generalise, give example, infer, interpret, paraphrase, predict, rewrite, summarise, translate
Knowledge	Recall of information previously presented	Define, list, name, recall, record, define, describe, identify, know, label, list, match, name, outline, recall, recognise, reproduce, select, state

If possible, resist the temptation to use words and phrases like:
Know..., Understand..., Really know..., Fully understand..., Be familiar with..., Become acquainted with..., Have a good grasp of..., Obtain a working knowledge of..., Acquire a feeling for...,

The majority of these examples are imprecise and difficult to make **'SMART'.**

Potential pitfalls	How to avoid them…
Trying to achieve too much in one session	Plan the session carefully, allow time for discussion, activities and reflection
Trying to cover too many learning outcomes	Stick to a small number of learning outcomes (ideally three) and be as specific as you can in terms of exactly what you are expecting the learners to be able to do at the end of the session
Learning outcomes defined at the wrong level (re Bloom)	Think carefully about exactly what you are expecting the learners to be able to do, think about their 'learning journey': their prior learning and the stage they have reached
Learning outcomes not specific enough, don't define exactly what you want them to be able to do	Practise writing them and think about how you might assess the objective
Learning outcomes not linked to teaching and learning methods	Select the teaching and learning methods that help learners achieve the outcome (level, domain), e.g. if skills, need demonstration, practice (simulation – real), possibly broken down into steps, build in feedback, not just reading about it or watching a video
Learning outcomes not linked to assessment	Always link the learning outcomes to an assessment (formative or summative), i.e. how will you and the learner know that they have achieved the outcome satisfactorily? Make sure the assessment assesses the right domain so that skills are assessed by practical clinical assessments, where appropriate.
Learning outcomes not practical or feasible	Often there are too many learning outcomes specified to be covered in the time available or with the number or stage of learners.
Learning outcomes not linked to evaluation, little capacity to review and change	If you are told what the outcomes are rather than setting them for yourself, be aware of the process by which you can feed back to course organisers about how the session has worked. Think about making the links between learning outcomes, teaching and learning methods, assessment and evaluation transparent so that you can refresh the curriculum. Don't assume that the learning outcomes are set in stone. Update them according to external changes, research and medical advances

5 COURSE EVALUATION

POLLING

If the faculty wants to use polling to stimulate the interactivity or evaluate the course and/or learning curve of the participants, it is recommended that all teachers install the latest version of polling software ESTRO is using (Turning Point - www.turningtechnologies.com) on their laptops and integrate the questions within their presentations. Onsite, ideally one faculty member should be appointed to coordinate the voting tool activity during the course. Here is a link about using a voting tool for more effective and interactive teaching and learning (www.dropbox.com).

EVALUATION QUESTIONNAIRE

A standard evaluation questionnaire *(see annex 12: Evaluation Form)* is used for all courses with a rating score of one to five for a number of items and the possibility to add comments. The ESTRO project manager collects these evaluations, compiles the data and provides them to the course director. The course director informs the teachers about the results of the evaluation and discusses with the faculty if changes/adaptations should be made to the course format, content, faculty etc.

Usually this evaluation is undertaken online, using "Survey monkey". This makes collection and compilation of results quicker and easier. However, it is also possible to use the paper version of the evaluations, in case participants cannot access the online questionnaire.

MCQ EXAM

Tests containing approximately 40-50 questions should be made available to all course participants to assess the learning outcome of the course. The test can be completed
- on an electronic form via internet within a defined time period following the course or
- on site during the course using the voting tool.

Marks are returned to the participants by the ESTRO office.

In most teaching courses, MCQs are undertaken online, using Class marker (www.classmarker.com) or by using the voting system Turning Point. If this option is taken, the number of questions should be reduced to 20-25 as the teachers comment the right answer after each question.

"Writing MCQs is both a science and an art"

In 1956, Benjamin Bloom published a taxonomy of cognitive learning as a hierarchy of knowledge, comprehension, application, analysis, synthesis and evaluation. Through the years, educators have adopted Bloom's taxonomy for test development and simplified and organized it to include the following three categories:
- **knowledge** (recall or recognition of specific information),
- combined **comprehension** and **application** (understanding or being able to explain in one's own words previously learned information and using new information, rules, methods, concepts, principles, laws and theories), and
- **problem solving** (transferring existing knowledge and skills to new situations).

Since the desired outcome of an educational program requires that "learners" do more than recall facts, MCQs should be carefully designed to assess, as much as possible, problem-solving capabilities which increase the validity of the examination.

Strengths and Limitations of MCQs

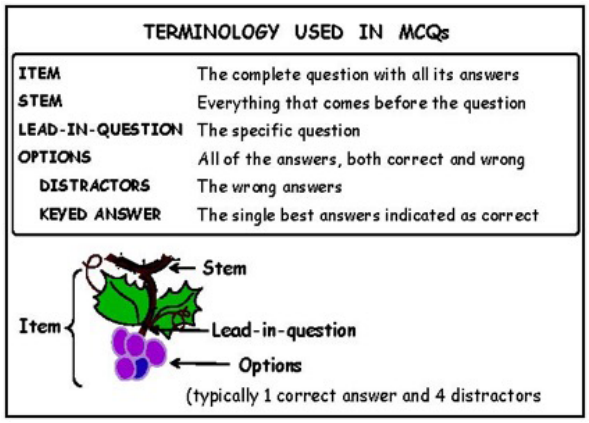
Strengths:

- Scoring is easy, objective and reliable.
  - Scores are more reliable than subjectively scored items (e.g essays)
  - Scores are less influenced by guessing than true-false
- Can cover a lot of material very efficiently (about one item/minute of testing
- Capable of assessing learning outcomes that cover different cognitive learning levels.
- Achievement and progress can be compared amongst persons, groups, years.
- Electronic manipulation to vary the order in which questions are presented to the candidates reduces the chance of cheating.

Limitations:

- Constructing good questions is time consuming.
- Frequently difficult to find plausible distractors
- Sometimes there is more than one defendable "correct" answer.)
- Often the focus is on testing factual information (failing to test higher levels of cognitive thinking.)
- Can be ineffective in assessing some types of problem solving situations.
- Scores can be influenced by reading (and/or language) ability.
- May encourage guessing.

"Anatomical" Parts of a MCQ



The figure above depicts the components of a typical multiple choice question (or item). The traditional MCQ is one in which a student chooses one answer from a number of choices (options) supplied. Typically the item presents a set amount of factual information, called the "stem," followed by a lead in question and usually 4-5 options as possible answers. Too few options means guessing is rewarded more frequently and too many options means the student wastes time. The multiple choice item is unique in that the standard by which the best answer is selected is contained in the **stem**. It is important to realize that the best answer does NOT have to be the one and only indisputably correct response to the question, as long as the subject matter experts who reviewed the question agree it is the best answer of those presented.

(see annex 13 – A Guide to successfully writing MCQs)

(see annex 14 – Presentation on successfully writing MCQs)

6 ACCREDITATION AND CERTIFICATION

Accreditation from any relevant bodies should always be sought for these courses. Most ESTRO courses are accredited by UEMS (European Union of Medical Specialists), the reviewing process is conducted by ACOE (Accreditation Council of Oncology in Europe). UEMS accreditation is endorsed by EACCME, the European Accreditation Council for Continuous Medical Education and by the American Medical Association (AMA). For courses aimed at physicists only accreditation is sought through EFOMP (European Federation of Organisations in Medical Physics).

The reviewing process is lengthy and bureaucratic, and it must be submitted to the EACCME at least 14 weeks before the event. This means that the ESTRO Project Manager will need a few documents related to the course quite early on, namely:

- The course's programme (or at least a first version of it), including all details of the faculty
- The evaluation form
- A "Director's Declaration", completed and signed by the Medical doctor in charge of the course. In cases where the course director is not a clinician, he/she will choose a clinician from the faculty to complete and sign this form
- A conflict of interest disclosure form signed by every member of the organising committee (ESTRO's ETC)

Where there is a relevant national scheme, teachers can also count this activity as part of their own continuing professional development (CPD).

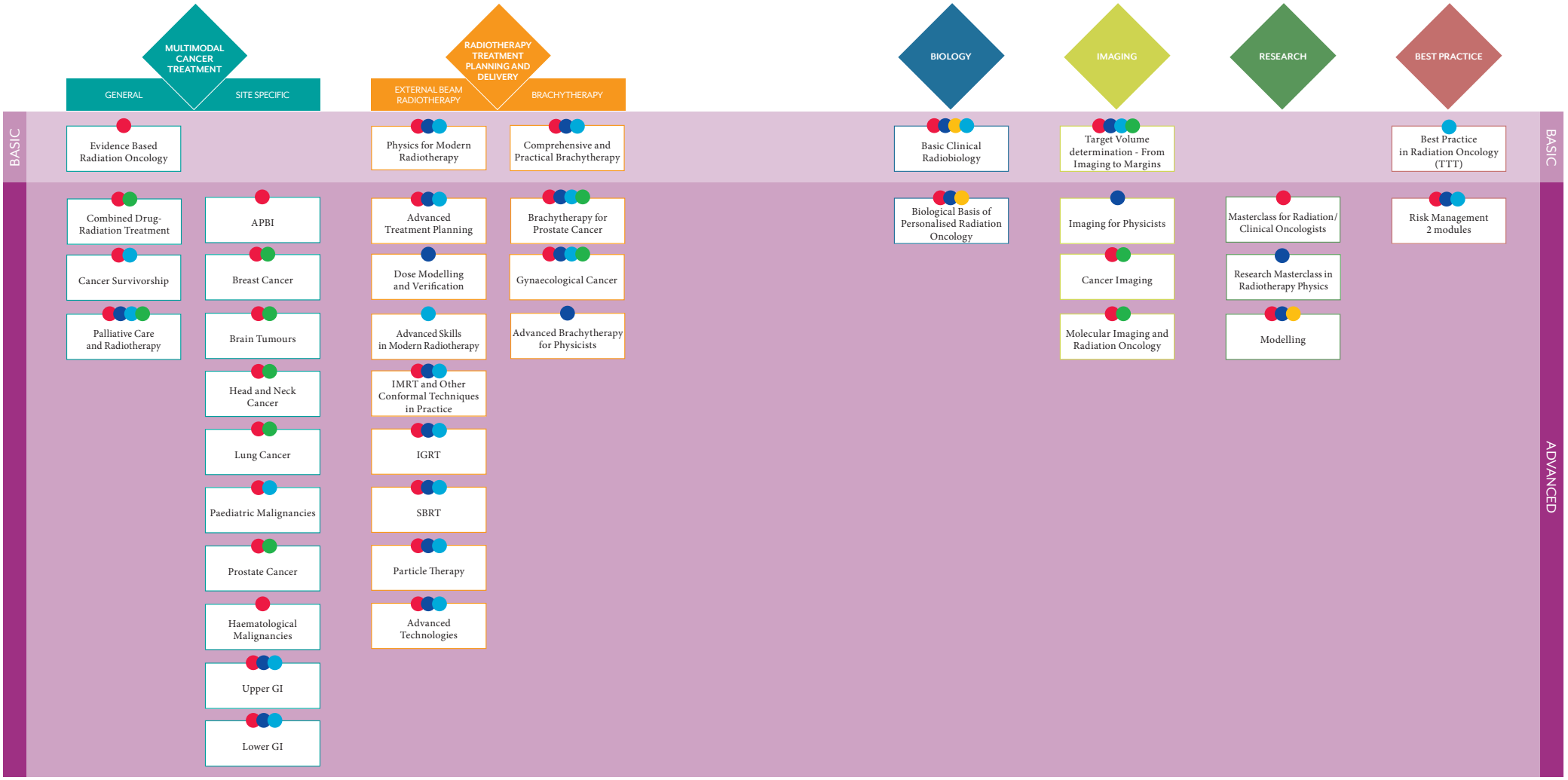
A certificate of completion of the course will be given to participants who have attended all sessions. This is awarded following completion of an evaluation form. The teachers receive a similar certificate.

Which Course to Attend?

2017 Roadmap to Teaching Courses

RADIATION ONCOLOGIST · MEDICAL PHYSICIST · RADIOBIOLOGIST · RADIATION THERAPIST · OTHER SPECIALIST

POSTGRADUATE TRAINING IN RADIATION ONCOLOGY



UNDERGRADUATE TRAINING FOR MEDICAL STUDENTS

- Medical Science Summer School Oncology for Medical Students
- ESO-ESSO-ESTRO Multidisciplinary Course in Oncology for Medical Students

FALCON-EduCase User Guide:

Content:

You can go through the User Guide from A to Z or right click on the section of interest in the content list and click on “open hyperlink”.

Introduction to FALCON-Educase

FALCON-EduCase is an online training tool for educational purposes at ESTRO courses, meetings, workshops and (individual) training at home. The FALCON-EduCase interface is not a treatment planning system but a user friendly educational instrument for training radiotherapy professionals in contouring tumor volumes, target areas, normal structures and OAR. Thus you may not find features such as auto-contouring, interpolation tools, expansion tools etc.

How to get started with FALCON-EduCase

You do not need specific software other than Adobe Flash Player, which you can download for free from the internet. After having done that (if you do not already have it), go to http://estro.educase.com click on “member login” and type your username and password in the

pop-up window. A new page will show up. At the bottom of the page you will find the available ‘Cases for Delineation.’ Click on the type of cases you want to see and you will be

presented to all the available cases within the selected group. For opening a specific case click on “Launch the case viewer” and you will be directed to the case. Allow some time for the data to be fully loaded. Sometimes a second password is needed – this is provided to you by the ESTRO course coordinators.

Additional resource files

For some cases additional resource files are available for download, such as additional DICOM images, pdf files or power-points. Resource files are indicated under the case name. Click the file to download. Some hospital firewalls may prohibit the download of files, and it may be necessary to perform the download outside the hospital.

Now you are ready to get started!

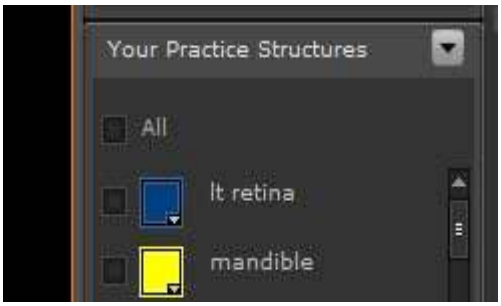
Contouring Tools

Viewing Authors contours and User’s Practice contours

On the right menu column you will see an “Author Structures” section on top and “Your Practice Structures” on the bottom. *(The “authors contours” refer to the teacher/expert contours and the “practice contours” will refer to user (student) that is logged in)* Author’s contours can be toggled on/off by clicking the “All” checkbox or each ROI individually. “Your Practice Structures” can be toggled on/off by clicking the “All” checkbox or each ROI individually.

Clicking “Your Practice Structures” does not initiate contouring. It is only for viewing. For contouring the structures you must select the ROI from the pull down menu in the Contouring Tools menu.

General User View



All User’s Drawn Contours

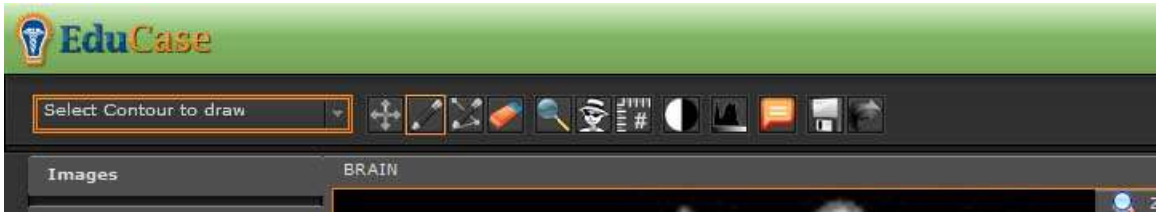
Drawing Contour Tools

To find the contouring tools, maximize your screen and roll over the “Tool Console” tab at the top of your CT or MR scan to bring up the Tool folder options. Click the “Contouring Tools” folder to initiate the contouring tool features.

"Contouring Tools" menu include:

1. ROI selection pull down menu (This is to select the ROI you wish to contour): you find the menu in the upper left corner of your screen.

2. If a user selects a drawing tool icon, such as the freehand or point-to-point tool, an alert will prompt the user to select a ROI from the pulldown menu



3. Pan Tool: Pans image in main image pane 

4. Free hand drawing tool: Used to draw contour after ROI has been selected from ROI pull down menu. 

5. The free hand drawing tool also allows to expand and cut a contour:

- To "cut" a contour, begin drawing outside the contour and draw inside the contour you wish to cut. Complete your cut by drawing outside again and let go of mouse to complete your cut.
- To expand your contour, begin drawing inside the contour and draw outside the contour you wish to expand. Complete your expansion by drawing inside again and let go of mouse to complete your expansion.

6. Point-to-Point drawing tool: Used to draw the contour after ROI has been selected from ROI pull down menu. To complete drawing you must click on first point to close the contour loop. Each point can be dragged to optimize contour once loop is closed. A complete contour must have a minimum of 4 clicks (3 point contour) to close the contour loop. 

7. You can easily switch from freehand to Point-to-Point tool which allows for more accurate drawing and fine tune editing.

8. For creating an isotropic expansion press the button seen at your right. Choose “select source contour”, next type in the requested expansion in mm and then the name of the target contour (the expanded contour). 

9. The interpolate button allows you to interpolate between already drawn contours of an selected ROI. Just as with a regular TPS, the interpolation will be more precise if interpolation is done over a few sections. 

10. Eraser tool: Click the eraser icon to remove unwanted contours. Each click removes the latest drawn contour. Erasing contours only removes contour on the slice you are on. 

11. Magnifying Glass: Click icon to initiate small magnification feature on main image pane. A box will appear to drag over section of image to be magnified. Mouse scroll can change magnification. 

12. Spy Glass: Allows user to view through primary image and see secondary image layered below. 

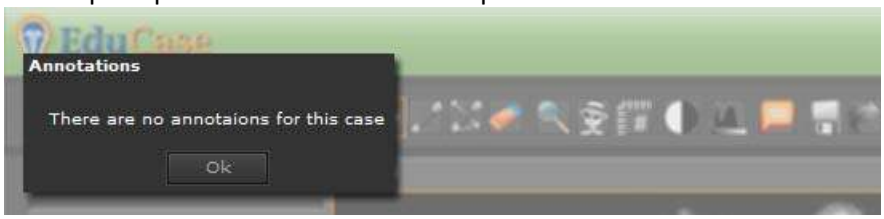
13. Ruler measure length in Millimeter based on location of dragging icons on main image screen 

14. DVH Chart: The Dose Volume Histogram chart displays the chart lines associated with the ROIs in both Cumulative and Differential values. 

This function is not available in all cases.

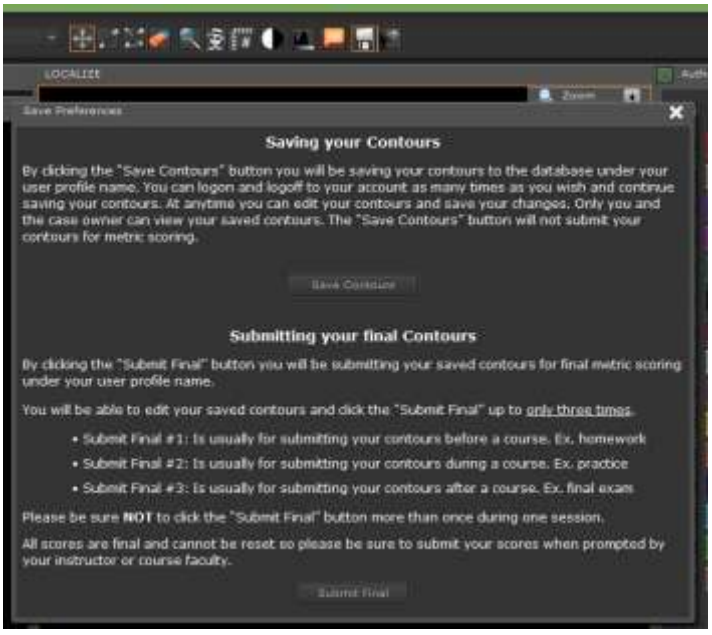
15. Window Level: Allows user to change window levels for image data sets using predefined window levels or manual adjustment on main image pane once icon is initiated.

16. Click the Annotation icon, to toggle on/off annotations that were created by the case owner and attached to individual contours. User will be prompted if annotations are not present



17. "Save Contours": By clicking this button you will be prompted with a popup window to save your contours or submit your final contours for scoring

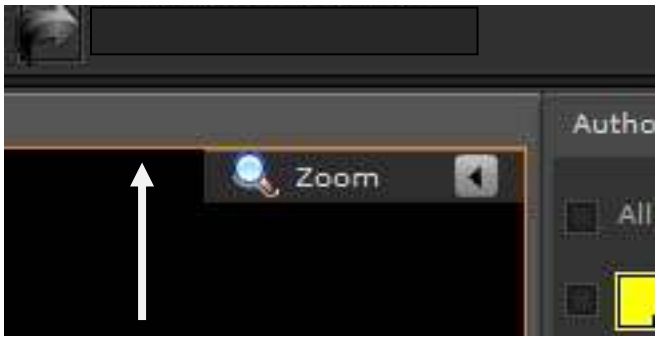
18. "Save Contours" and "Submit Final" contours popup window:
    - Click the "Save Contours" icon, to initiate the Save window on the main image.
    - The "Save Contours" button allows users to save their contours as they progress through a case. Users can return to the same case at a later date, start where they left off from the last time they "Saved"
    - The "Submit Final" button save the user's contours, calculates the user's Area Domain and Line Domain scores, and takes the user to the default page of the Area Domain metric section.



19. Load Contours (Case Owners only): This button allows case owners to select individuals or groups from the master saved list and toggle on/off their contours from the contouring menu column.

"Main Image Pane"

1. Initiate Main Image Pane: You must click on the Main Image Pane in order to interact with the image. An orange border will appear when image pane is active.



2. **Pan image**: Panning image is set as default. Once a user clicks a contouring tool icon, example: *Freehand drawing*, they must click the "pan" icon again to pan an image on the main image pane

3. **Zoom image**:
    a. Click on Main Image Pane to initiate "Zoom" menu bar Click "Zoom" menu bar to initiate zoom feature
    b. Drag arrow or click line to zoom image in and out
    c. Click "Zoom" menu bar again to close

4. Navigate image slices: You go navigate from slice to slice by using any of the three following methods:

   a. Image Pane: slice number navigation is located at the bottom of the main image pane. Can be viewed when main image pane is initiated

   b. Mouse Scroll: Slice can be navigated up or down by using the mouse scroll wheel

   c. Thumbnails: You can select a specific numbered slice by choosing one of the thumbnail images on the left-hand “Slices” menu bar

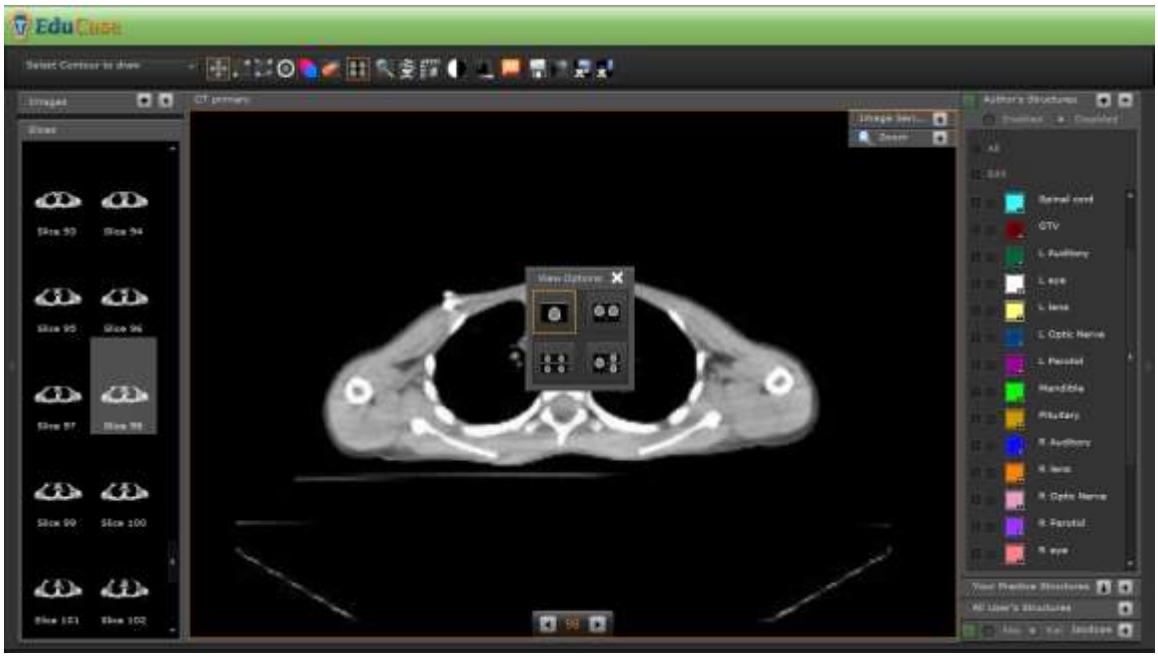
View Tools

View Tools Icon

The "View Tools" icon allows the user to view reconstructions in one plane or multiple planes. Once viewed as preferred by the user, contouring tools are deployed to execute the segmentation.

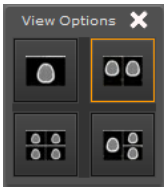
Single Window mode

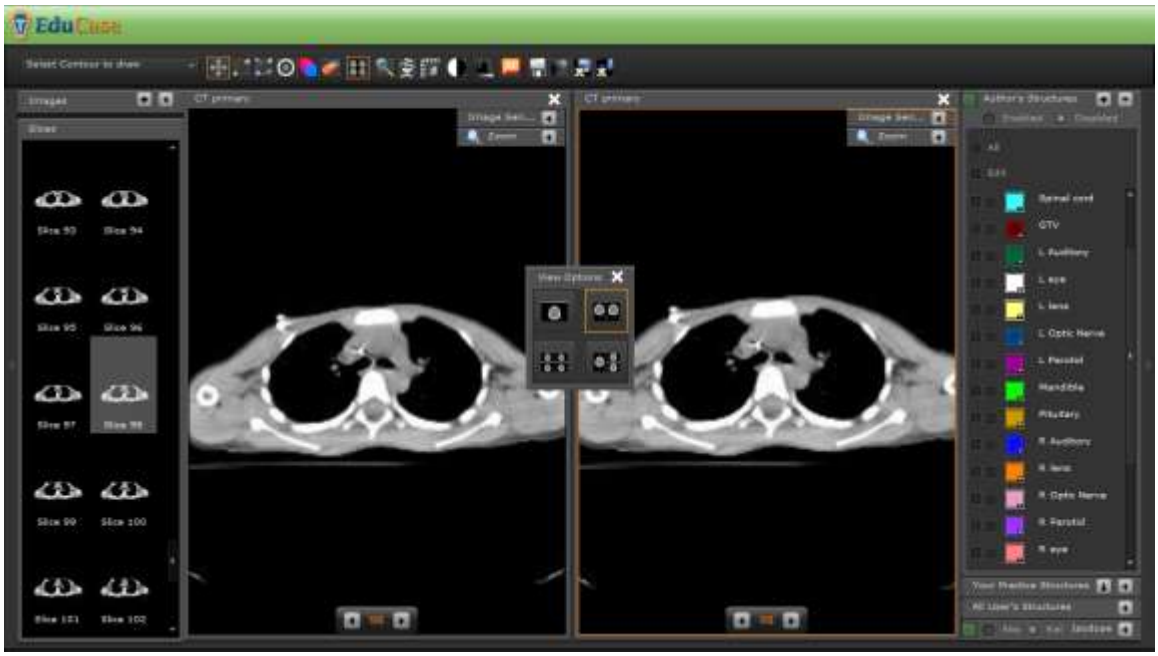
This is the default mode for viewing each axial reconstruction in a single window.



Two Window mode

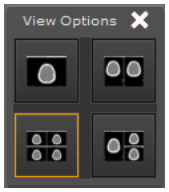
In this example we have opened two windows, revealed the primary CT from the Image Series controls in the first window, and revealed only the secondary CT/PET images in the second window.

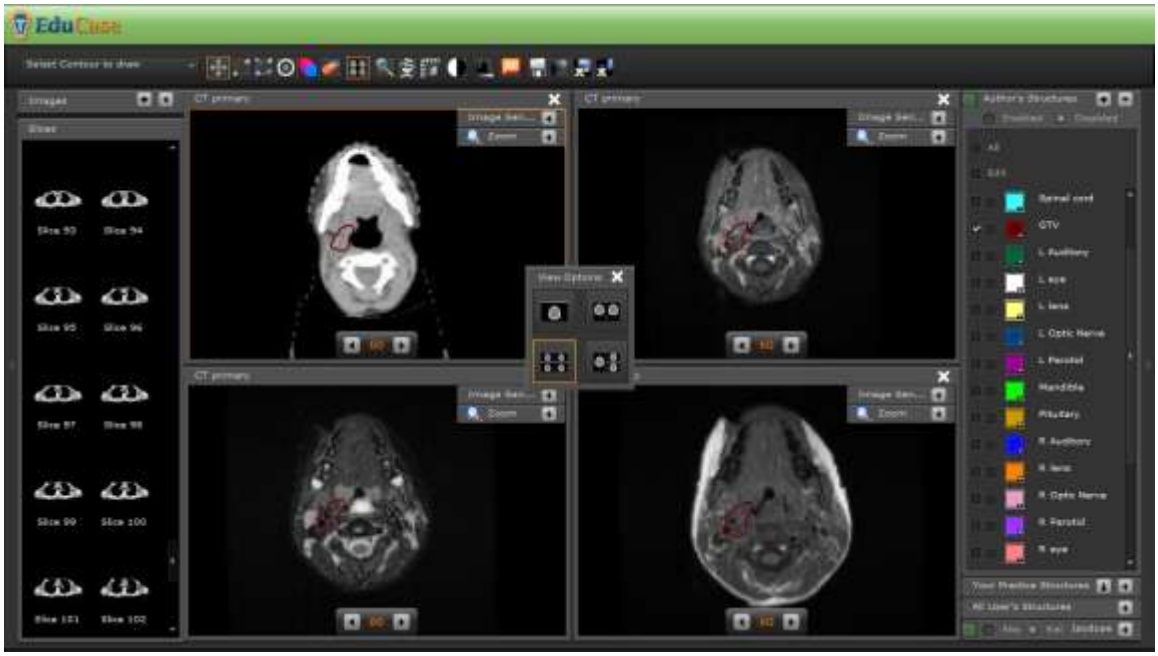




Four Window mode

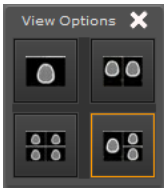
In this example we have opened the four window mode and revealed only one of the data sets from the Image Series controls for each window.



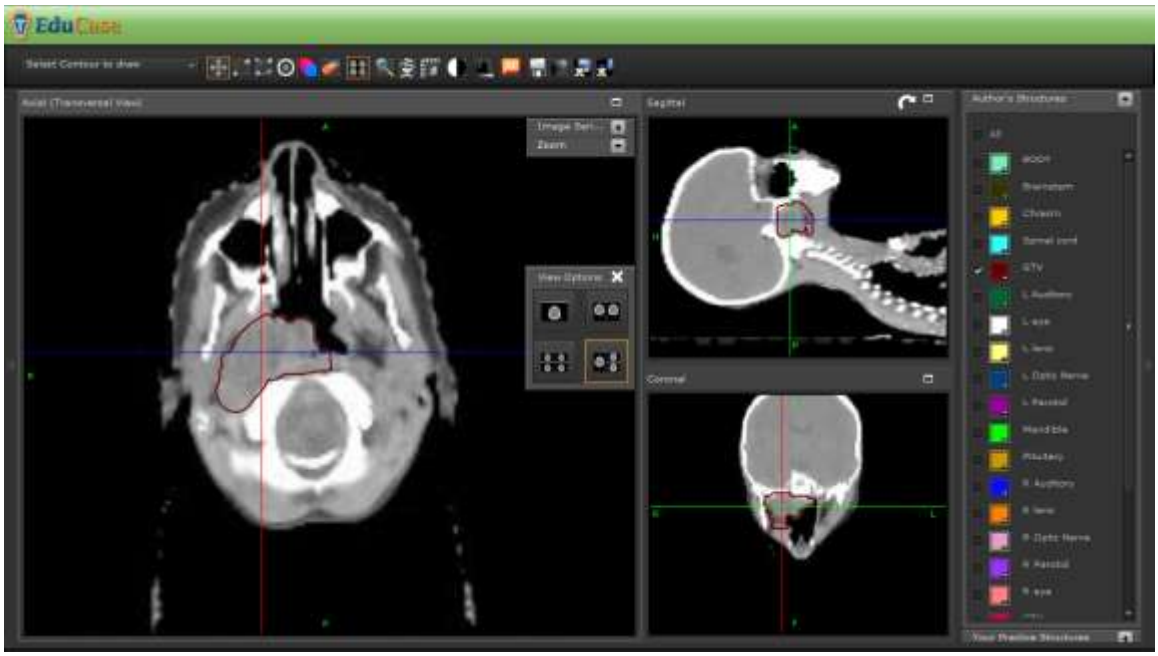


Orthogonal Window mode

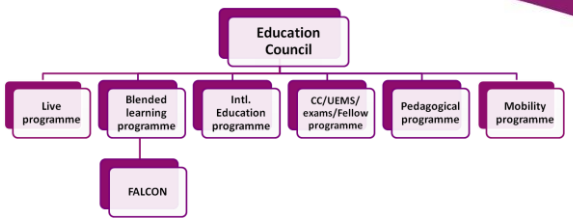
Orthogonal view allows users to navigate the Axial, Sagittal, and Coronal planes for any case. Currently secondary image sets can only be viewed in the primary Axial plane.



- Users can drag and drop each smaller plane into the larger primary plane window by holding your mouse on the header bar and dragging the image to the larger plane.
- Navigation: Users can hold down the space bar for guidelines navigation or rollover each plane and use the mouse roller to scroll through each of the individual plane slices.
- Sagittal view orientation: Users can rotate the Sagittal image plane by clicking the rotate icon in the Sagittal view header bar


EduCase
Select Contour to show
Axial (Transverse View)
Sagittal
Coronal
Author's Structures
Image Set
Zoom
View Options
All
GTV

Educational Council



1. Director (professional) - **JG Eriksen**
2. Director (admin + educational) – **C Verfaillie**
3. Presidential representative - **U Ricardi (all presidents welcome)**
4. Progr. Leader Live Group – **JG Eriksen**
5. Progr. Leader Blended Group – **M Leech**
6. Progr. Leader Intl Group – **R Poetter**
7. Progr. Leader CC/UEMS Group – **K Benstead**
8. Progr. Leader Mobility Group – **MC Vozenin**
9. Progr. Leader Pedagogic Group - **C Verfaillie**
10. ESTRO Office - **VVanEgten**

Representation from all groups (RTT, Phys, RB, GEC, ACROP, yESTRO) + IAEA

M Kamphuis – P Hoskin– N Jornet – C Belka – JE Bibault up to Agora – Ben Heijmen – E Zubizarretta

ESTRO School

SOCIETY INSTRUCTION
DOCUMENT CODE
Board / 2014 / 07

22 September 2014

EUROPEAN SOCIETY FOR RADIOTHERAPY & ONCOLOGY

TRAVEL POLICY FOR ESTRO REPRESENTATIVES

DOCUMENT HISTORY
First approved on 17 Dec 2012
Amendment on 12 July 2013
Amendment on 22 Sept 2014

CONTENTS

This travel policy applies to all travel made by non-staff members in the Society. Regarding staff travel, management will define internal regulations within the frame of this policy. The policy is only in English.

1. OBJECTIVES OF THE TRAVEL POLICY

1.1. Definition of society trip

A society trip is a trip required and paid by ESTRO for a person assigned to perform working tasks (teachers) or elected duties (Board, Council, Committee members and ESTRO representatives) away from their regular place of business. Travel related to the scientific programme of an ESTRO event follows the congress manual.

The objective of this travel policy is to ensure uniform ways of action regarding society travel required by the activities of the Society so that trips are made in the most economical yet feasible way possible both in regard to costs and time used.

In addition, to the traveller himself/herself, the ESTRO staff member in charge of the trip is responsible for compliance with the travel policy, for monitoring the travel costs as well as for respecting the common travelling rules.

1.2. Travel cost management

The need and purpose of the trip has to be defined and the ESTRO staff member in charge of the trip's budget has to approve it before the arrangements for the trip are made. All arrangements should be made by ESTRO staff. Only when previously authorised in writing by the ESTRO office, the travellers can make their own arrangements as long as an accurate price estimation has been approved by ESTRO staff member in charge before booking.

Non compliance could result in non-reimbursement.

The traveller and the person in charge of the trip's budget have to estimate together whether the purpose of the trip can be achieved without actually travelling (e.g. using video or telephone conference facilities of the society or in a corresponding manner). The traveller has to plan the trip and get the approval for it well in advance so that the most economical way of travel and ticket type can be used in order to achieve savings in travel costs.

These instructions will be specified when necessary with e.g. travel restrictions.

2. TRAVEL CONTRACT COMPLIANCE

2.1. Airline

The Society does not have contracts with airlines, but prefers to fly with airlines that are part of the Star Alliance Company Plus programme. This programme earns the Society points that can be used for either up-grading or buying tickets while also allowing the traveller to accrue points on their individual frequent flyer programme. Airlines involved are:

- *Air Canada*
- *ANA*
- *Austrian*
- *British Midland International BMI*
- *Brussels Airlines*
- *Continental Airlines*
- *LOT Polish Airlines*
- *Lufthansa*
- *SWISS*
- *TAP Portugal*
- *United Airlines*

Primarily, lowest suitable fares (Economy Restricted class) available should be used and when possible Star Alliance airline carriers should be preferred. The traveller's frequent flyer programme will have no impact when choosing the airline. The earlier the flights can be booked the more affordable the fares can be.

Low Cost Carriers (LCC´s) may be used when it is justified considering rate and effectiveness.

2.2. Hotel

The Society has a contract in Brussels with Marivaux hotel and this is the preferred hotel when staying in Brussels, unless a lack of room or other compelling reason makes it necessary to use another hotel.

The Society does not have contracts with other hotels elsewhere, but small local hotels within a reasonable price range are preferred, others in max 3 star hotels and Presidents in office at 3-4 star hotels, price still being the first nominator.

When possible the expertise of local people should be used to find reasonable priced hotels in preferred areas.

Hotel bookings are done through the Society's travel agency. When planning a trip well beforehand, a cheaper option from a hotel should be available.

Non compliance will result in non-reimbursement.

2.3. Car rental

Society´s preferred car rental company is SIXT, which is a partner of the Star Alliance programme.

The standard for car rental is not higher than a mid-sized car, e.g. Ford Mondeo and Opel Vectra.

The use of own car is accepted and preferred for travelling when it is economical in view of the traffic connections and when it is approved by the person in charge.

The reimbursement will be calculated with the Belgian official rate (0.3456 EUR/km – adapted every 1st July)

Non compliance will result in non-reimbursement.

2.4. Train

Bookings are to be made in 2nd class, only Board and council members are allowed to book tickets in 1st class.

Non compliance will result in non-reimbursement.

2.5. Travel agency

ESTRO has made an agreement for travel agency services with FCm Travel Solutions. The agency will serve ESTRO through their online tool and dedicated team.

Purchasing of travel services from any other instance than FCm is highly discouraged as the online tool also includes LCCs.

Non compliance will result in non-reimbursement.

3. TRAVEL QUALITY STANDARDS

3.1. Standards for air travel

All air travel must be planned and booked early enough so that economical ticket types may be used. The flight reservation must be made without delay after possible trip is known in order to use special rates effectively.

European flights have to be flown in the cheapest suitable Economy class offered. Other classes are permitted if the price is not higher or due to special circumstances:

- *Medical reason - documentation of this has to be available in case ESTRO asks for it*
- *The three Presidents of ESTRO may when needed fly in Economy Flexible*

For intercontinental flights Premium Economy is allowed, although the most economical option is recommended. In cases when the airline does not offer Premium Economy the booking may be made in a booking class allowing upgrade by frequent flyer points or payment by the traveller. Business class booking is not allowed unless the price does not exceed the price of the Premium Economy or upgradeable economy ticket. Business class is allowed to the three Presidents.

Intercontinental flight is defined as a single flight leg being equal to or longer than 7 hours (and between 2 continents). E.g. direct flight from Brussels to Mumbai is considered an intercontinental flight as the direct flight is longer than 7 hours. However a flight from Brussels to Mumbai with a change in Istanbul is not considered an intercontinental flight as a single flight leg (BRU-IST or IST-BOM) is not equal or longer than 7 hours though the overall travel time is longer than 7 hours. Additionally, intercontinental flights with a single leg being equal or longer than 7 hours with an overall intercontinental travel time of more than 20 hours allow upgrading to economy plus.

Non compliance will result in non-reimbursement.

3.2. Frequent flyer programmes

The Society is enrolled in the Star Alliance Company Plus programme and all bonuses gained from this programme are its property, however simultaneously collected individual frequent flyer programme bonuses are travellers' property.

The bonus points accrued from the Star Alliance programme, possible free tickets and other services must be used for future society travel or to upgrade flight classes. This bonus programme must not influence the decision when choosing an airline, hotel or other services. The tax costs (eg. airport tax) of the free tickets as well as reference of using such a ticket must be added in the travel reimbursement form.

3.3. Standards for accommodation

The standard for hotel accommodation is standard single or double room in moderate class hotels; max 3 star hotels for others and for the Presidents in office 3-4 star hotels, price still being the first nominator.

3.4. Standards for car rental

Society´s preferred car rental company is SIXT, which is a partner of the Star Alliance programme. The standard for car rental is not higher than mid-sized car, e.g. Ford Mondeo and Opel Vectra.

3.5. Standards for trains

Bookings are to be made in 2nd class, only Board and council members are allowed to book tickets in 1st class.

Non compliance will result in non-reimbursement.

4. TRAVEL PROCEDURES

4.1. Approving travel

The traveller shall submit by email a travel request to ESTRO staff member in charge of the trip's budget regarding any business travel before the trip. The traveller and the ESTRO staff member in charge must evaluate the use of alternative methods of travel. The travel details must be presented as early as possible in order to acquire the most economical way of travel. The level of approval will be specified when necessary with e.g. travel restrictions.

Non compliance will result in non-reimbursement.

4.1.1. Spouse travel

Allowed, when approved, and travel arrangements can be done by ESTRO office, but all costs are paid by the spouse her/himself.

4.2. Procedures for booking a trip

4.2.1. Using allocated travel agency

All travel related bookings must be made through the FCm travel agency as mentioned in point 3.5. FCm travel agency will act according to preferred instructions given by the Society and will also monitor the compliance of this travel policy.

All arrangements should be made by ESTRO staff. Only when previously authorised in writing by the ESTRO staff member responsible for the trip, the travellers can make their own arrangements as long as an accurate price estimation has been approved by ESTRO staff member in charge before booking.

Non compliance will result in non-reimbursement.

4.2.2. On-line bookings

Primarily, FCm Online self-booking tool should be used for flights, trains, hotels and car rental when possible. The second alternative is to use the homepages of hotels or SIXT car rental.

4.2.3. Trip bookers

The person making the booking is the ESTRO staff member responsible for the event, meeting or course. Bookings have to be made according to the travel policy and the congress manual respectively.

Generally the Executive Assistant books for the Board and Council members as well as the Management team. The course co-ordinators and committee liaison people book travel resulting from these activities. Travel for ESTRO conferences is managed by the Congress or Programme Manager.

4.3. Reimbursement

The objective is to ensure uniform ways of action when reimbursing reasonable costs incurred when carrying out duties assigned by ESTRO. These parameters apply to faculty, elected officers and others who acquire costs when following out activities of the Society. To guarantee reimbursement of costs, when valid, approval of said costs has to be received in advance from the ESTRO office. Non compliance could result in non-reimbursement.

The ESTRO office person in charge of the travel, for which the reimbursement is allocated to, is responsible for compliance with this policy.

4.4.1. Reimbursable expenses

General expenses valid for reimbursement:

1. *transportation costs*
2. *accommodation costs*
3. *registration fees (only when applicable)*
4. *training costs (only when applicable)*
5. *meal compensations*

6. *other costs on site related to work*
7. *sleeper tickets on trains*
8. *seat tickets*
9. *airport, bridge, road and parking charges*
10. *fuel costs*
11. *vaccination*
12. *reasonable laundry expenses on trips exceeding 1 week*
13. *cost incurred related to currency conversions (e.g. exchange fee)*
14. *visa costs*

4.4.2. Travel expense reporting

The reimbursement form must be settled in documental and traceable manner for approval to the ESTRO staff member responsible for the travel. Deadline for submitting forms is 30 days after end of travel. Forms sent after the deadline are not reimbursed. However as long as the postal date is the day of deadline the form is valid even though arriving after deadline to the ESTRO office.

All original receipts must clearly show reason and date for the receipt and be attached to the reimbursement form.

4.4.3. Reimbursement of ESTRO Presidents in office

The Executive Assistant handles the travel bookings and is the person to whom reimbursement forms are sent. In case arrangements are done by oneself point 3 on Travel quality standards has to be followed and approval from the ESTRO office received beforehand.

Costs for registration to specific events and potential trainings might be covered by ESTRO upon approval of the Executive Council, in consultation with the management.

Travel to Board meetings annexed to the annual ESTRO congresses and ECCO congresses are covered for one night's hotel stay, flights are covered only if the President does not attend the congress.

Reimbursable expenses 5-14 have to be reasonable and linked to the travel.

4.4.4. Reimbursement of ESTRO Board members

The Executive Assistant handles the travel bookings and is the person to whom reimbursement forms are sent. In case arrangements are done by oneself point 3 on Travel quality standards has to be followed and approval from the ESTRO office received beforehand.

Travel to Board meetings annexed to the annual ESTRO congresses and ECCO congresses are covered for one night's hotel stay, flights are covered only if the Board member does not attend the congress.

Costs for registration to the annual ESTRO congress is not covered by ESTRO. Potential trainings to improve governance of the Society have to be pre-approved by ESTRO to be eligible for reimbursement.

Reimbursable expenses 5-14 have to be reasonable and linked to the travel.

4.4.5. Reimbursement of other ESTRO functions

The ESTRO staff member responsible for the travel handles the travel bookings and is the person to whom reimbursement forms are sent. In case arrangements are done by oneself point 3 on Travel quality standards has to be followed and approval from the ESTRO office received beforehand.

Travel to meetings annexed to the annual ESTRO congresses are not covered.

Costs for registration to the annual ESTRO congress is not covered by ESTRO. Potential trainings to improve governance of the Society have to be pre-approved by ESTRO to be eligible for reimbursement.

Reimbursable expenses 5-14 have to be reasonable and linked to the travel.

5. TRAVEL SAFETY AND INSURANCE

5.1. Safety considerations

The aspects relating to personal risk shall be taken into account when arranging trips. The Society does not cover the cost of traveller and luggage insurance for travel made on behalf of the Society.

5.2. Travel insurance

ESTRO members travelling on ESTRO business are insured by ESTRO as long as the travel booking has been made by the ESTRO office.

In case an ESTRO member books their own travel, regardless of whether it has been approved by an ESTRO staff member, that travel is not insured by ESTRO, thus the traveller in these cases will need to take care of their own insurance.

In case of an emergency please, contact this number ***+49 (0) 69 97113 745***. Claims should be sent to the Executive Assistant at the ESTRO office.

DOCUMENT IDENTIFICATION

Document approver: ESTRO Board

Document owner: Office co-ordinator

DOCUMENT HISTORY

First approved on 17 Dec 2012
Amendment on 12 July 2013
Amendment on 22 Sept 2014

REIMBURSEMENT FORM

*Please send the signed form with your **original** receipts to the ESTRO project manager responsible of the course **within 30 days from the end of you travel.***

DETAILS

Name:

Course:

Date and place:

EXPENSES

	Description	Currency	Exchange rate**	Amount in EUR
Per diem				
Onsite travel costs (country of the course)	____	____	____	____
Local travel costs (in faculty's country)	____	____	____	____
Other expenses*	____	____	____	____
			Total claim	____

*The per diem covers every cost **except** for the taxi, public transport, toll, miles with private car and parking incurred for the course. Any other expense must have been agreed with the project manager before. Please note that all reimbursements will be done in Euro. By claiming these costs from ESTRO the undersigned declares not to claim for the same expenses elsewhere.
**Please use the rate of www.oanda.com (day of the expense = rate to be used)

- ○ Wire the total claim in the last bank account provided.
- ○ Wire the total claim in another bank account (please fill in the annex bank details)

Date Signature

Annex : Bank Details

Name of bank:

Bank address:

BIC/SWIFT Code:

IBAN:

Name of account holder:

Address of account holder:

Date:

Signature:

ESTRO SCHOOL PRINCIPLES AND SAFETY POLICY

The ESTRO School offers educational courses and workshops to (radiation) oncology professionals in Europe and abroad.

The decision to offer education and training in any country is based on needs and requests and guided by the principles of neutrality and impartiality. The ESTRO School and its faculties maintain complete independence from all political, economic or religious powers.

The ESTRO School can on demand* provide worldwide travel insurance (unlimited medical and repatriation expenses) for all faculty members for the time spent on an ESTRO course.

*Some teachers may benefit from worldwide travel insurance through their regular employer; for those who don't, the ESTRO offices can provide the insurance when arranging the travel of the teachers

The ESTRO School assumes the responsibility to watch over the safety of the course faculties and participants

- When there is an indication of risk or danger in travelling to the country where a course is planned, the ESTRO office will actively survey the situation by checking the travel advice from the ministries of foreign affairs from countries like the US, UK, Germany, France and from the country where the course is planned (this list is not exhaustive).
- In case of imminent danger and increased risk, the School directors will take the necessary decisions in collaboration with the faculties to cancel or postpone the course.
- Any teacher remains free to decide on an individual basis to cancel his/her participation to a course planned in a country that is possibly at risk.

FACULTY REPLY FORM

ESTRO course on **Evidence Based Radiation Oncology**, Porto, Portugal, 12 – 17 June 2016

Please return the completed form to makkers@estro.org by 1 April 2016

Please complete your details/requirements:

Personal information (as printed on your passport)

First name: ..... Family name: .....
Dietary requirements: ..... Physical requirements: .....

Travel & insurance

Travel costs are covered by ESTRO at economy rates.

☐ I will arrange for my own travel to Porto and back. ***Only book your travel after having received written approval by the ESTRO office. Costs can be claimed back based on actual invoices /original receipts and through the reimbursement form that you will receive onsite in Porto.***

☐ Please book my travel

I will travel by: ☐ Train / ☐ Plane
Departure: from (city/country) ..... and day ..... June 2016
Return: to (city/country) ..... and day ..... June 2016

☐ I have my own medical, travel and personal insurance

☐ I would like to take out the ESTRO travel insurance since this is not offered by my regular employer (unlimited medical and repatriation expenses for the time spent on an ESTRO course)

Accommodation

ESTRO covers the costs for your accommodation (including breakfast and WIFI) in **the Ipanema Park hotel** in a **single** room for **6 nights*** in the period between 11 and 17 June 2016.

Extra costs at your personal charge.

Check---in date: ..... June 2016 **Approx. check---in time**: .....
Check---out date: ..... June 2016 **Number of nights**: .....

Additional nights can be reserved by us, but are at your own expense. You will have to pay for these extra nights upon departure.

Turning point polling software

☐ I will NOT make use of any polling software in my lectures

☐ I will use turning point for (specify the lectures you will use it for and if you will use it during or at the end of your lecture)

Lecture 1	☐ from my computer	☐ from ESTRO computer
Lecture 2	☐ from my computer	☐ from ESTRO computer
Lecture 3	☐ from my computer	☐ from ESTRO computer
Lecture 4	☐ from my computer	☐ from ESTRO computer
Lecture 5	☐ from my computer	☐ from ESTRO computer
Lecture 6	☐ from my computer	☐ from ESTRO computer

To create succesful educational teams

Fedde Scheele & Irene Slootweg

ESTRO School

Program:

Part 1: Collaboration in educational teams

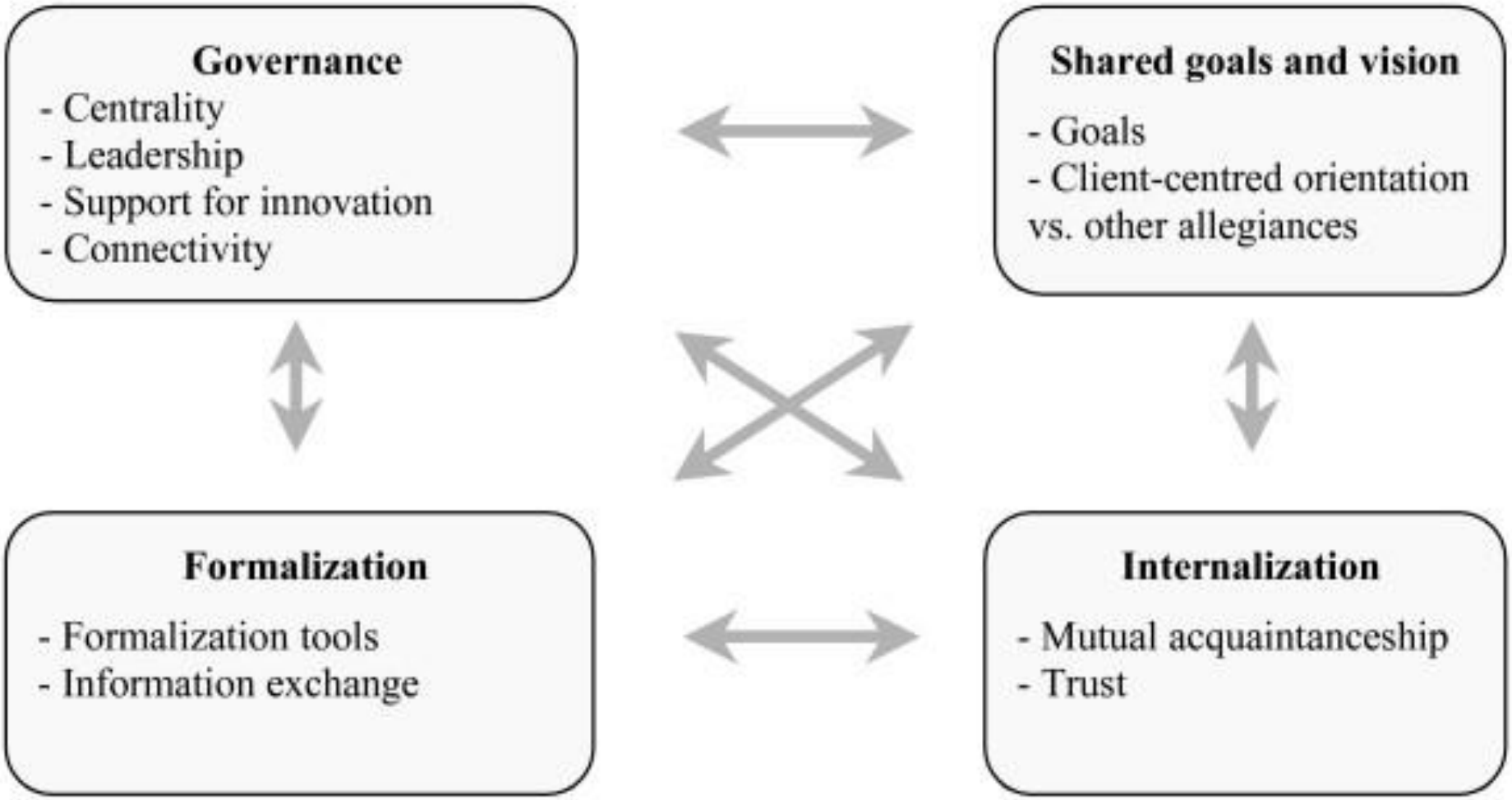
Basic Material

1. Experience with teamwork as program director – Fedde
2. Research of teamwork in teaching teams - Irene
3. Different ways of looking at the process of collaboration (D'amour)
4. Color Print in Theory of Change (De Caluwé)

Discussion in small groups about case questions

Agreements to stimulate teamwork

A model of collaboration
Danielle D'Amour (2009)



Teamwork of teaching teams

- **Study 1: to explore how clinical teachers work together (2012)**
- **Study 2: to develop a robust instrument for evaluating teamwork in teaching teams (2014)**

- **Study 3 to explore leadership of program directors in teaching teams (2013)**
- **Study 4: to explore team communication amongst clinical teachers (2015)**

De Caluwé

Blue print thinking

- Change = planning!
- Rationale, logic, planning
- Efficiency
- Projectmanagement
- Monitoring, measurable
- Timeslot

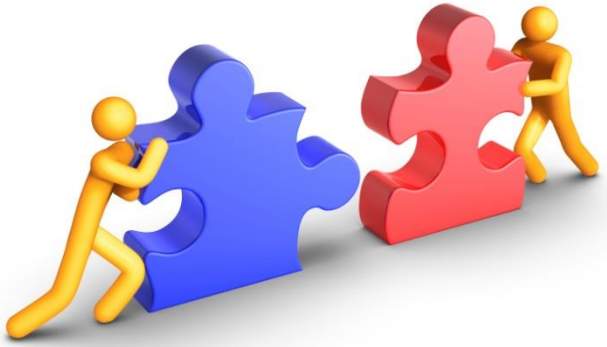
D’Amour: Formalization

Yellow print thinking

- Change = politic
- Power
- Key persons
- Strategic coalition
- Strategic positions
- Overcome resistance = create support!

D’Amour: Governance

Red print thinking

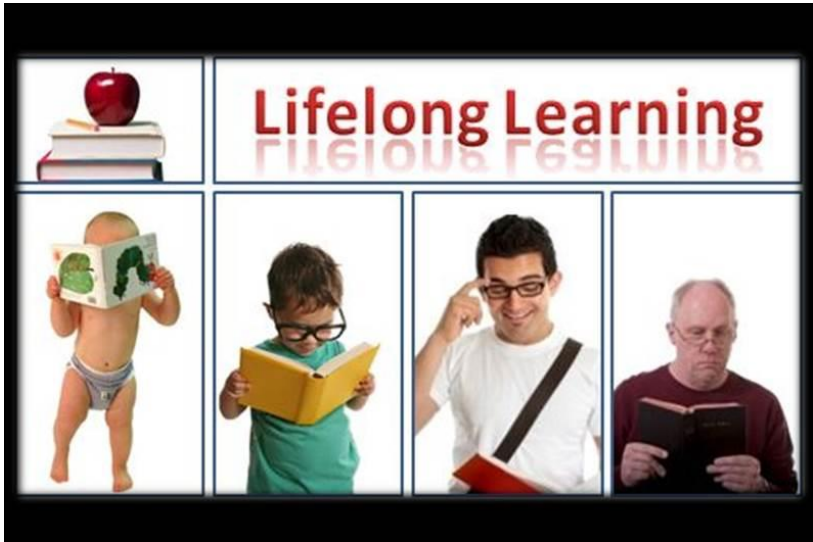


- Change = motivation
- To help each other
- Subtle leadership, Trust
- Stimulation and distribute awards
- Individual desire and shared interests
- Chance = contract with rights and duties

D’Amour: Shared Vision and Goals

Green print thinking

- Change = learning
- Learning to think, feel and do in a different way
- Collaborative learning
- Development and Education
- Self directed learning.
- Life long learning



White print thinking

- Change = movement
- Based on vision
- Creativity
- Complex eco-system: limited predictability
- Human Value
- Space and resources
- Less organisation.

D’Amour: Internalization

Instruction:

- Small Groups dicussion to tacle one of the case questions
- 20 minutes time to develop conclusion and problem solving with different color print thinkings
- 5 minutes elevater pitch to convince the whole group of the solution!

Case questions:

1. How to make groups decision? And when? What is the role of the course director
2. How to incorporate young and unexperienced blood? And when? And why?
3. How long can someone stay as member? How we monitor the quality of the individuals?
4. How would we value the evaluations of the course?
5. What is the value of faculty development and evaluation faculty members by peers?
6. What kind of leadership is important?
7. How important is it to agree on the same teaching ideas?

Program:

Part 2: The state of the art of educational visions and method

Basic Material: Evidence of medical education Vleuten & Driessen

Discussion in small groups to explore state of the art

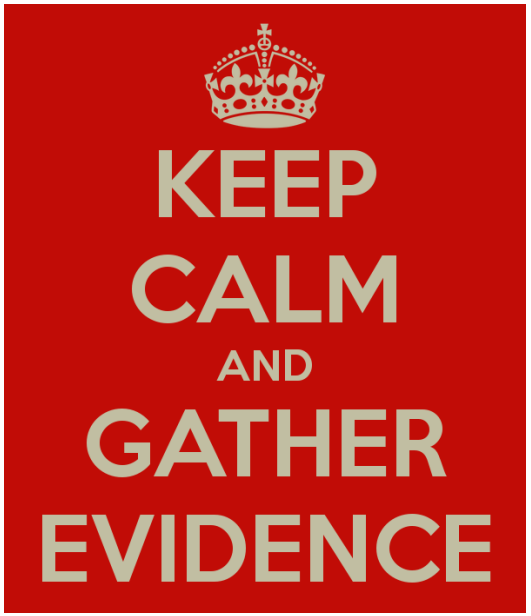
Reach consensus about excellent educational

What would happen to education if we take education evidence seriously?

C. P. M. van der Vleuten & E. W. Driessen

6 areas of evidence

1. Elaboration
2. Cooperative learning
3. Mentoring
4. Feedback
5. Engagement
6. Learning by social context



and of course:

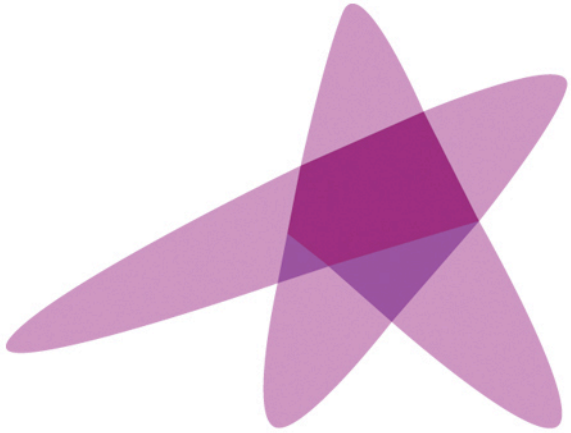
7. Evidence based medicine

Instruction:

- Small Groups dicussion the area; each group one area
- 15 minutes time to develop arguments and conclusion
- 10 minutes elevater pitch to convince the whole group of the importance of the evidence for the education in the ESTRO courses!

Take home messages

- Collaborate or die.
- Develop a multi perspective of change.
- The process of teaching has the same impact than the content.
- Experiment with the color-prints.



ESTRO School

WWW.ESTRO.ORG/SCHOOL

Titles in Arial

- Text in Georgia or Times New Roman

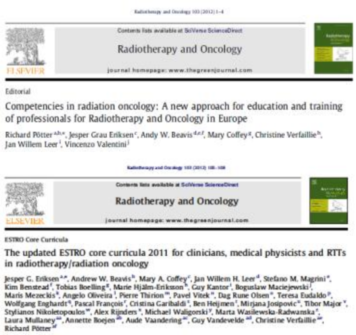
Copy/paste your original slides into this powerpoint file and make sure you use the option ‘use destination theme’.

Theme colors (ESTRO school) and fonts (Arial/Georgia/Times New Roman) are set as default.

MAKE SURE TO USE THE FIRST GENERAL ESTRO SLIDE AS AN OPENING SLIDE TO YOUR PRESENTATION

ESTRO School

PUBLICATION OF THE UPDATED CC



Radiotherapy and Oncology 103 (2012) 1–4

Contents lists available at SciVerse ScienceDirect

Radiotherapy and Oncology

journal homepage: www.thegreenjournal.com

Editorial

Competencies in radiation oncology: A new approach for education and training of professionals for Radiotherapy and Oncology in Europe

Richard Pötter[a,b,*], Jesper Grau Eriksen[c], Andy W. Beavis[d,e,f], Mary Coffey[g], Christine Verfaillie[h], Jan Willem Leer[i], Vincenzo Valentini[j]

Radiotherapy and Oncology 103 (2012) 103–108

Contents lists available at SciVerse ScienceDirect

Radiotherapy and Oncology

journal homepage: www.thegreenjournal.com

ESTRO Core Curricula

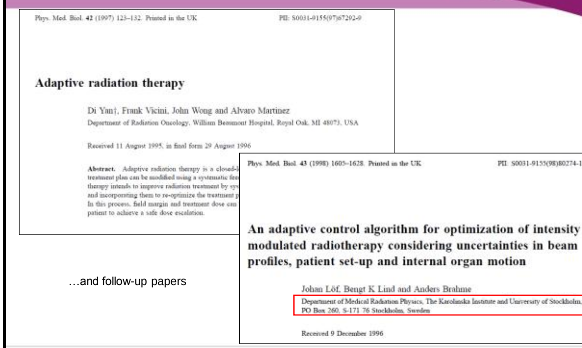
The updated ESTRO core curricula 2011 for clinicians, medical physicists and RTTs in radiotherapy/radiation oncology

Jesper G. Eriksen[a,*], Andrew W. Beavis[b], Mary A. Coffey[c], Jan Willem H. Leer[d], Stefano M. Magrini[e], Kim Benstead[f], Tobias Boelling[g], Marie Hjälm-Eriksson[h], Guy Kantor[i], Boguslaw Maciejewski[j], Maris Mezeckis[k], Angelo Oliveira[l], Pierre Thirion[m], Pavel Vitek[n], Dag Rune Olsen[o], Teresa Eudaldo[p], Wolfgang Enghardt[q], Pascal François[r], Cristina Garibaldi[s], Ben Heijmen[t], Mirjana Josipovic[u], Tibor Major[v], Stylianos Nikoletopoulos[w], Alex Rijnders[x], Michael Waligorski[y], Marta Wasilewska-Radwanska[z], Laura Mullaney[aa], Annette Boejen[ab], Aude Vaandering[ac], Guy Vandevelde[ad], Christine Verfaillie[ae], Richard Pötter[af]

ESTRO School

Publication of the updated CC:
ACCEPTABLE
Reason: quote of the Title and Authors of the article only and source mentioned

‘Adaptive RT’: How it all started



Phys. Med. Biol. 42 (1997) 123–132. Printed in the UK PII: S0031-9155(97)67292-9

Adaptive radiation therapy

Di Yan†, Frank Vicini, John Wong and Alvaro Martinez

Department of Radiation Oncology, William Beaumont Hospital, Royal Oak, MI 48073, USA

Received 11 August 1995, in final form 29 August 1996

Abstract. Adaptive radiation therapy is a closed-l treatment plan can be modified using a systematic fee therapy intends to improve radiation treatment by sys and incorporating them to re-optimize the treatment p In this process, field margin and treatment dose can patient to achieve a safe dose escalation.

Phys. Med. Biol. 43 (1998) 1605–1628. Printed in the UK PII: S0031-9155(98)80274-1

An adaptive control algorithm for optimization of intensity modulated radiotherapy considering uncertainties in beam profiles, patient set-up and internal organ motion

Johan Löf, Bengt K Lind and Anders Brahme

Department of Medical Radiation Physics, The Karolinska Institute and University of Stockholm, PO Box 260, S-171 76 Stockholm, Sweden

Received 9 December 1996

…and follow-up papers

-2-

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Adaptive RT:
ACCEPTABLE
Reason: quote of text is limited; authors and source are mentioned

Local Therapy and Survival in Breast Cancer

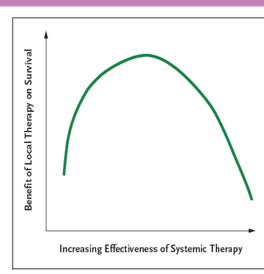
<u>Reductions in LRR</u> with systemic therapy are reported in studies with and those without RT, but the magnitude of the reduction appears to be **greater with the combination** of systemic therapy and RT than with systemic therapy alone.

The survival benefits of achieving local control documented in the EBCTCG meta-analysis are of similar magnitude or greater than those accepted by patients for systemic therapy, yet they **received considerably less attention.**

Punglia R.S. et al., NEJM 2007;356:2399-2405.

ESTRO School

Local Therapy and Survival in Breast Cancer



Punglia R.S. et al., NEJM 2007;356:2399-2405.

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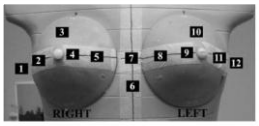
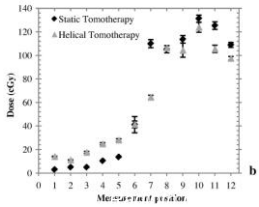
Local Therapy and Survival in Breast Cancer:
ACCEPTABLE
Reason: quote of text is limited and only one table included; authors and source are mentioned

Normal tissue dose and second risk due to megavoltage fan-beam CT, static tomotherapy and helical tomotherapy in breast RT



Skin measurement locations in the breast region.



Skin dose measured from a single static and helical tomotherapy treatment fraction

Quin A. et al, Radioth Oncology (2013) in press

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Normal tissue dose and second risk due to megavoltage fan-beam CT, static tomotherapy and helical tomotherapy in breast RT

Second cancer risk

The following includes further details on how the BEIR VII lifetime attributable risk (LAR) [1] was calculated for this study.

$$LAR(D,e,a) = \sum_{a}^{85} M(D,e,a)\frac{S(a)}{S(e)}$$

where e is the age at exposure, a is attained age, for lung $M(D,e,a)$ is the logarithmic weighted average of excess relative risk (ERR) and excess absolute risk (EAR) and for breast $M(D,e,a)$ is EAR, and $S(a)/S(e)$ is the probability of surviving from age at exposure to attained age (derived from the Anderson and DeTurk tables [2]).

$$ERR(D,e,a) = \beta \exp(\gamma e^*)\left(\frac{a}{60}\right)^{\eta}\lambda^C(a)$$

$$EAR(D,e,a) = \beta \exp(\gamma e^*)\left(\frac{a}{60}\right)^{\eta}$$

where β is the ERR/Sv and EAR per 10^4 WY-Sv for age at exposure 30+ at attained age 60, γ is a constant dependent on age at exposure, for lung $e^*=(e-30)/10$ for age at exposure less than 30 and $e^*=0$ for age at exposure greater than 30, and for breast $e^*=e-30$ for all age at exposure, η is a constant dependent on attained age, and λ^C is the attained age baseline risk of developing the cancer [3]. For lung risk estimates the BEIR VII recommends the logarithmic weights 0.3 and 0.7 for ERR and EAR respectively. A 5-year latency period was used and a dose-rate-effectiveness-factor of 1.5 was applied to correct for dose fractionation, as suggested by BEIR VII [1].

Quin A. et al, Radioth Oncology (2013) in press

ESTRO School

Normal tissue dose and second risk in breast RT: ACCEPTABLE

Reason: quote of text & formulas is limited as well as other material (1 image, 1 table);
authors and source are mentioned

PROSTATE CANCER

Table 4. Impact of treatment on pain (n = 30)

Level of relief	n*	(%)
Minimal relief	8	(27)
Partial relief	8	(27)
Complete relief	6	(20)
No improvement	6	(20)
Worsening of pain	2	(6)

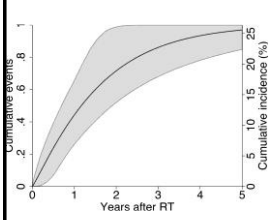
Table 3. Ambulatory status following treatment (n = 32)

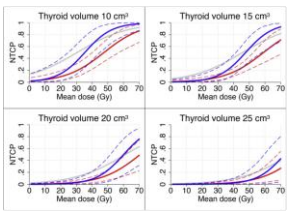
	Post-treatment status	
	Ambulant	Non-ambulant
Pre-treatment status		
Ambulant n* = 16	13 (81%)	3 (19%)
Non-ambulant n* = 16	2 (12.5%)	14 (87.5%)

ESTRO School

Prostate Ca: NOT ACCEPTABLE
Reason: No mention of source and author of quoted tables; the fact that the tables have been 'edited' do not justify the use without mentioning author and source

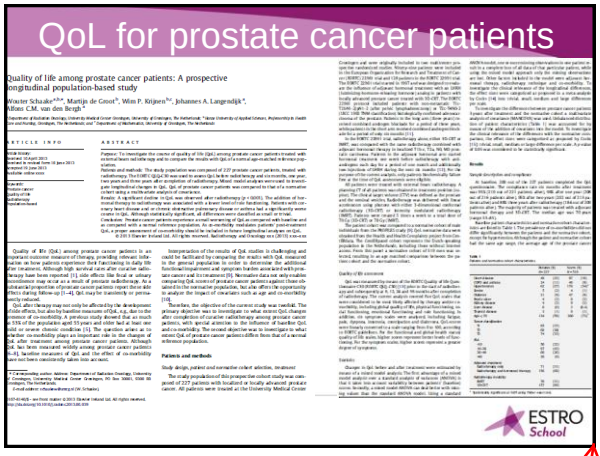
Hypothyroidism after primary RT for H&N squamous cell ca: NTCP modeling with latent time correction

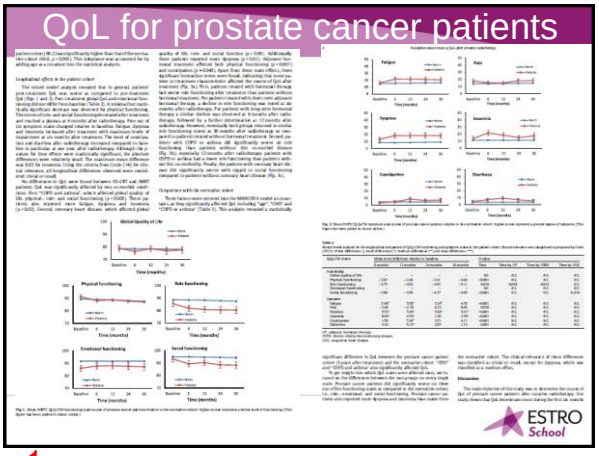




ESTRO School

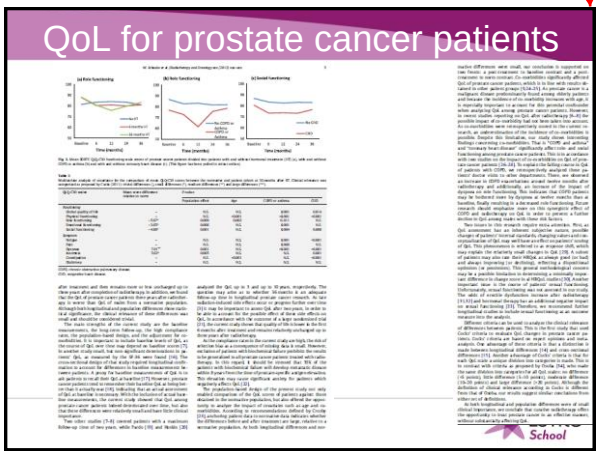
Hypothyroidism after primary RT: NOT ACCEPTABLE
Reason: No mention of the source and authors of the quoted graphs

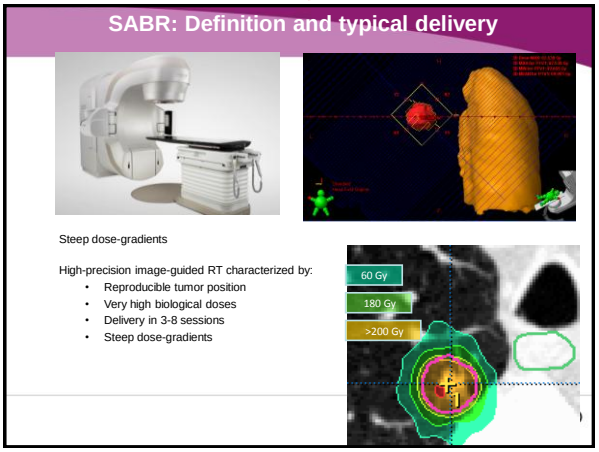




QoL FOR PROSTATE CA PTS (3 slides): NOT ACCEPTABLE
Reason: full article is included which is much more than a brief quotation; therefore it is not acceptable, even if author and source are mentioned

SABR: NOT ACCEPTABLE
Reason: source of the pictures not mentioned





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COURSE TITLE:……..

TEACHER'S NAME:……..

Thank you very much for being an ESTRO teacher and for your willingness to share your knowledge and experience. Your time and commitment are critical to the furthering of ESTRO's mission of advancing research in improving the treatment of cancer patients with (radiation) oncology.

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➲ I have read the Agreement above, initialed and accept this agreement.

……

Signature

……

Date

Email completed form to EMAIL OF PERSON IN CHARGE OF THE COURSE or fax +32 2 779 54 94.

Evaluation Form for an ESTRO Course on

Title

City, Country

Date

ESTRO hopes that you have found this course to be useful, but since nothing is perfect, we need your input to continue to develop this course to meet participants' needs. We therefore ask you to fill this evaluation form during the course and return it at the end of the course. Your evaluation will be anonymous. Thank you for your comments.

I. Background Information

1. Gender: ☐ Male ☐ Female

2. Specialty:

Radiation Oncologist	☐ Specialist	☐ Trainee
Radiation Physicist	☐ Specialist	☐ Trainee
Radiobiologist	☐ Specialist	☐ Trainee
RTT	☐ Specialist	☐ Trainee

Other, please specify:_____

Number of years worked in the field of speciality:_____

3. I heard about the course from:

- ☐ **ESTRO publications**
- ☐ **Department director**
- ☐ **Colleagues**
- ☐ **IAEA**
- ☐ **Radiotherapy & Oncology journal**
- ☐ **National Organizations**
- ☐ **Internet**
- ☐ **Other**_____

4. I have previously attended the following ESTRO courses *(please cross the corresponding number)***:**

1	Basic Clinical Radiobiology	16	Advanced Skills in Modern Radiotherapy
2	Dose Modeling and Verification for External Beam Radiotherapy	17	Multidisciplinary Management of Lung Cancer
3	Modern Brachytherapy Techniques	18	Multidisciplicary Management of Head and Necl Cancer
4	Particle Therapy	19	Hematological Malignancies
5	IMRT and Other Conformal Techniques in Practice	20	Palliative Care and Radiotherapy
6	Image-Guided Cerviox Cancer Radiotherapy	21	Physics for Modern Radiotherapy
7	Target Volume Determination	22	Basic Treatment Planning
8	Molecular Imaging and Radiation Oncology	23	Advanced Treatment Planning
9	Multidisciplinary Management of Breast Cancer	24	Imaging for Physicists
10	Mutidisciplinary Management of Prostate Cancer	25	Comprehensive Quality Management in Radiotherapy
11	Lower GI	26	Biological Basis of Personalised Radiation Oncology
12	Upper GI	27	Image-Guided and Adaptive Radiotherapy
13	Advanced Brachytherapy Physcis	28	Multiodisciplinary Approach of Cancer Imaging
14	Image-Guided Stereotactic Body Radioatherapy	29	Accelerated Partial Breast Course
15	Evidence Based Radiation Oncology	30	Pediatric Radiation Oncology

5. Did you have any training in treatment planning before?

- ☐ Not at all
- ☐ Some training at the department
- ☐ Attended a local course: _____hours
- ☐ I attended a national course: _____hours
- ☐ Other: _____

II. Organization Matters

Grading Scale: 1. Poor | 2. Sufficient | 3. Average | 4. Good | 5. Excellent

6. The quality of the handout material: Grade:___

7. The social arrangements: Grade:___

8. Other comments: Grade:___

III. Course Content

General

(Please cross)

1. Did the course provide the following goals and learning outcomes:

	1	2	3	4	5
a. General introduction to the process of computerized treatment planning	No		Relatively		Yes
b. The data necessary for treatment planning	No		Relatively		Yes
c. The importance of treatment preparation and verification	No		Relatively		Yes

2. Please, provide your overall rating of the quality of the education offered at this meeting	1 No	2	3 Relatively	4	5 Yes
3. Please, rate how useful you found the company exhibition at this meeting	1 No	2	3 Relatively	4	5 Yes

Content

(Please cross)

4. Was the information useful and relevant to your work and practice techniques?	1 No	2	3 Relatively	4	5 Yes
5. Do you feel that the presented information was well balanced and supported by adequate evidence?	1 No	2	3 Relatively	4	5 Yes
6. Did the programme allow adequate time for discussion and questions?	1 No	2	3 Relatively	4	5 Yes
7. Did you feel the scientific lectures were free of promotional material?	1 No	2	3 Relatively	4	5 Yes

Organization

Please cross)

8. How would you rate the facilities and venue for the purposes of this meeting?	1 No	2	3 Relatively	4	5 Yes
9. How would you rate the management and organization of this meeting?	1 No	2	3 Relatively	4	5 Yes

Lectures

1st day Wednesday, September 14, 2016

Grading Scale: 1. Poor | 2. Sufficient | 3. Average | 4. Good | 5. Excellent

L1 Lecture 1 – Broadening the therapeutic band width - NB Grade:___

L2 Lecture 2 – Dose calculation algorithms & their differences in clinical impact - MS Grade:___

L3 Lecture 3 – Applying ICRU in treatment planning - NB Grade:___

L4 Lecture 4 – Non-IMRT planning – from simple to complex - MST Grade:___

L5 Lecture 5 – Relationships between 3D dose distributions and clinical toxicities – Chest – UN Grade:___

L6 Lecture 6 – Planning aspects breast irradiations - DVDB Grade:___

L7 Lecture 7 – Introduction case 1 : Breast with supraclavicular lymph nodes – DVDB Grade:___

L8 Lecture 8 – Planning aspects case 1- GM Grade:___

L9 Lecture 9 – Individual planning (non IMRT) – all Grade:___

2nd day Thursday, September 15, 2016

L10 Lecture 10 – Discussion planning results from Day 1 – All Grade:___

L11 Lecture 11 – Relationships between 3D dose distributions and clinical toxicities – H&N and Pelvis - NDN Grade:___

Grading Scale: 1. Poor | 2. Sufficient | 3. Average | 4. Good | 5. Excellent

L12 Lecture 12 – Rationale behind IMRT – MS Grade:___

L13 Lecture 13 – Concepts in inverse planning - MS Grade:___

L14 Lecture 14 – Practical aspects of IMRT planning (PART 1) - GM Grade:___

L15 Lecture 15 – Practical aspects of IMRT planning (PART 2) - MST Grade:___

L16 Lecture 16 – Company presentation Grade:___

L17 Lecture 17 – Physical and biological optimization - GM Grade:___

L18 Lecture 18 – Introduction case 2: prostate - DVDB Grade:___

L19 Lecture 19 – Planning aspects case 2 - GM Grade:___

L20 Lecture 20 – Individual planning (non-IMRT) - All Grade:___

3rd day Friday, September 16, 2016

L21 Lecture 21 – Discussion planning results from day 2 – All Grade:___

L22 Lecture 22 – On the pareto front - MST Grade:___

L23 Lecture 23 – Basic principles of rotational IMRT planning - GM Grade:___

L24 Lecture 24 – Geometrical uncertainties and how to deal with them - MS Grade:___

Grading Scale: 1. Poor | 2. Sufficient | 3. Average | 4. Good | 5. Excellent

L25 Lecture 25 – MRI in treatment planning - NDN Grade:___

L26 Lecture 26 – Molecular imaging in treatment planning - UN Grade:___

L27 Lecture 27 – Company presentation Grade:___

L28 Lecture 28 – Advanced planning strategies for lung tumours (clinical aspects) - UN Grade:___

L29 Lecture 29 – Advanced planning strategies for lung tumours (physicall aspects) - GM Grade:___

L30 Lecture 30 – Introduction case 3 – Lung (Stage III NSCLC) - UN Grade:___

L31 Lecture 31 – Planning aspects case 3 - MST Grade:___

L32 Lecture 32 – Individual planning - all Grade:___

4th day Saturday, September 17, 2016

L33 Lecture 33 – Discussion planning results from day 3 – All Grade:___

L34 Lecture 34 – Adaptive planning strategies - MS Grade:___

L35 Lecture 35 – Library planning - GM Grade:___

L36 Lecture 36 Robust and probalistic planning - MS Grade:___

L37 Lecture 37 – Dose painted planning – GM Grade:___

L38 Lecture 38 – Rigid and non-rigid multimodality image registration - MS Grade:___

Grading Scale: 1. Poor | 2. Sufficient | 3. Average | 4. Good | 5. Excellent

L39 Lecture 39 – Company presentation Grade:___

L40 Lecture 40 – Particle therapy planning - MST Grade:___

L41 Lecture 41 – Introduction Case 4: Bilateral oropharaynx –NDN Grade:___

L42 Lecture 42 – Planning aspects – case 4 - MS Grade:___

L43 Lecture 43 – Individual planning (IMRT) - all Grade:___

5th day Sunday, September 18, 2016

L44 Lecture 44 – Discussion planning results from day 4 – All Grade:___

L45 Lecture 45 – IMRT breast planning - MS Grade:___

L46 Lecture 46 – Physicist's perspective – GM Grade:___

L47 Lecture 47 – Doctor's perspective – NB Grade:___

IV. Course Registration and membership – how would you rate:

The online process?
Membership subscription renewal Grade:___
Registration to the course Grade:___

The efficiency and utility of staff during the registration process
Membership subscription renewal Grade:___
Registration to the course Grade:___

The online registration system
Membership subscription renewal Grade:___
Registration to the course Grade:___

V. Conclusion

Which topics would you like added to the course?

What topics could be omitted?

Any special comments?

If you find the time and the money to attend another ESTRO course, which one would be your first choice and why?

Which other courses should ESTRO organize?

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info@uems.net

A Guide to Successfully Writing Multiple Choice Questions (MCQs)

Peter G. Mills, Mark A. Westwood, Alfred Tenore

"Examinations are formidable even to the best prepared, for the greatest fool may ask more than the wisest man can answer"

Charles Caleb Colton (1780 – 1832)

The purpose of this review is to provide guidelines that can be used by the UEMS community to assist them in a challenging task of writing effective and high quality MCQs.

In 1956, Benjamin Bloom published a taxonomy of cognitive learning as a hierarchy of *knowledge*, *comprehension*, *application*, *analysis*, *synthesis* and *evaluation*. Through the years, educators have adopted Bloom's taxonomy for test development and simplified and organized it to include the following three categories:

1) **knowledge** (recall or recognition of specific information),

2) combined **comprehension** and **application** (understanding or being able to explain in one's own words previously learned information and using new information, rules, methods, concepts, principles, laws and theories), and

3) **problem solving** (transferring existing knowledge and skills to new situations).

Since the desired outcome of an educational program requires that "learners" do more than recall facts, MCQs should be carefully designed to assess, as much as possible, problem-solving capabilities which increase the validity of the examination.

Introduction:

Before considering the particular subject of MCQs we should consider the context in which we believe that MCQs have a long term important role.

1) Assessment drives learning, thus making it a critical component of the educational process.

2) There is no single type of assessment that can be considered as being "perfect".

The purpose of an examination process is to permit inferences to be drawn concerning the knowledge of an examinee in order to assess his/her competence to practice selected functions in an effective and efficient manner. It follows that there are valid questions about the usefulness of MCQs along the lines of :

"What types of questions are better, multiple-choice, true or false, essay questions, oral examinations,……etc?"

Although all question types may be useful for assessing a variety of levels of thinking, it is important to realize that the role and value of knowledge assessment in the postgraduate medical education setting is clearly limited. It might be considered self evident that the expectation of patients being treated by a physician is that any technical procedure will be performed or interpreted with an appropriate level of knowledge and skill. In practice however patients want their Doctor to be kind, to be up-to-date, to show respect for the principles of consent, to provide an accurate description of the range of possible treatments available in a cost-effective and risk minimising way, to provide appropriate information to their close relatives, and to behave in the many other different ways which are summarised by the concept of "professionalism". It can be persuasively argued from the patient's perspective that skills and attitudes or professionalism are as important if not more important than pure factual knowledge. Thus the role of MCQs and Assessment of Knowledge, are of limited importance in the context of defining what is a "Good doctor."

In an age of rapid electronic access to knowledge, the ability of the doctor to **use** this knowledge in a wise and humane manner is as important, if not more so, than the possession of that knowledge. Therefore, to maintain overall competence and expertise, Knowledge Based Assessments (KBAs) must be complemented by methods to assess Skills and Professionalism. An examination aimed only at assessing knowledge and how it is used is insufficient in itself, to address the expectations of patients.

Returning to MCQs, critics of this form of examination argue that this methodological format is unable to test higher level learning/thinking. In fact, it is a common belief, albeit erroneous, that MCQs represent an overly simplistic methodology which is most appropriately used to effectively evaluate only superficial learning or low-order cognitive capacities such as "recall" (widely considered as demonstrating a low level of mastery of a subject according to Bloom's taxonomy of

the cognitive domain). Because of this, it is often argued that the complexity of day-to-day clinical medicine cannot be reflected in such an apparently "simple" assessment tool. Nevertheless, although MCQs are typically better at detecting recall of facts rather than understanding of concepts, it is possible to write conceptually based items to test higher levels of understanding such as ***evaluation*** and ***synthesis*** through careful writing of creative questions. Therefore, the criticisms voiced against the concept of MCQs should be directed towards the flaws in the construction of the items rather than to their inherent weakness.

It is common knowledge that the "multiple choice question" is the most common type of written test item used in undergraduate, graduate and post-graduate medical education. The principles of writing effective MCQs are well documented in test-item construction manuals, educational measurement textbooks and the research literature. Despite this a study from the National Board of Medical Examiners showed that violations of the most basic item-writing principles are very common in medical education examinations.

There is no doubt that it is harder to write a concept-based MCQ rather than a knowledge-based one and it is also harder to write a good MCQ than a bad one.

One approach to overcome flaws in construction is to write questions where the participant is asked to make a (multiple-choice) decision whilst providing some evidence/data upon which to base the decision. The MCQ options presented should all represent plausible decision options, the correct selection of which, requires the interpretation of the evidence and the application of appropriate decision making methodologies. In this way the questions seek to test clinical reasoning and judgement rather than logic or an ability to pass exams.

After reviewing the extensive literature concerning the best and most appropriate methods to assess factual/conceptual knowledge it is clear that MCQs have become accepted as the "least flawed" method of the current forms of assessment, especially compared to the "traditional" oral examinations. The highly subjective nature of the multiple components of oral examinations leaves this method of assessment potentially wide open to legal challenges. In contrast to oral examinations, MCQs are by their nature objective, easy to grade, efficient in time and allow some degree of comparison between learners, information which is highly regarded and most constructive both in a "formative" as well as a "summative" examination. In summary, although MCQs have obvious limitations, in terms of objectivity and efficiency, because alternative methods are unsatisfactory, they will in future provide one component of the assessment of doctors.

The intellectual context for the use of MCQs

The intellectual content of MCQs must always relate back to a published curriculum. Good test question writing begins with identifying the most important information or skill that is to be learned; therefore a direct relationship between objectives and test items must exist.

The MCQs should be seen as a mechanism for ensuring that the candidate possesses an appropriate depth of knowledge across the entire Curriculum. Therefore, the test items should come directly from the objectives embedded within that curriculum. They should focus on important and relevant content with some topics deemed to have greater relevance and importance than others. It is the responsibility of the exam-setting group to commission appropriate numbers of questions dependent on the predetermined importance of each topic.

Strengths and Limitations of MCQs

As pointed out at the beginning of this introduction, "no single type of assessment can be considered as being perfect". It therefore becomes important to review what are the strengths and limitations of MCQs, the most popular methodological form of assessment currently used by the majority of educational communities.

Strengths:

1) Scoring is easy, objective and reliable. Marking the exam can be undertaken by computer methods rather than the introduction of costly and potentially erratic human factors.
    a) Scores are more reliable than subjectively scored items (e.g essays)
    b) Scores are less influenced by guessing than true-false items (avoids the absolute judgments found in True-False question formats).
2) Can cover a lot of material very efficiently (about one item/minute of testing), allowing the assessment of a broad sample of achievement.
3) Capable of assessing learning outcomes that cover different cognitive learning levels.
4) Provides highly structured and clear tasks where the "correct" answers are predetermined and therefore, do not involve subjective judgments.
5) Incorrect alternatives provide diagnostic information.

6) Items can be written to allow the examinee to discriminate among options that vary in degree of correctness.

7) Achievement and progress (formative tests) can be compared from person to person, class to class and year to year.

8) As the bank of MCQs is progressively built up, the costs of assessment of knowledge become predictable and contained.

9) Electronic manipulation to vary the order in which questions are presented to the candidates reduces the chance of cheating.

Limitations:

1) Constructing good questions is time consuming.

2) Frequently difficult to find plausible distractors (sometimes there is more than one defendable "correct" answer.)

3) Often the focus is on testing factual information (failing to test higher levels of cognitive thinking.)

4) Can be ineffective in assessing some types of problem solving situations.

5) Scores can be influenced by reading (and/or language) ability.

6) Structure may lead students to read more into the question than was intended.

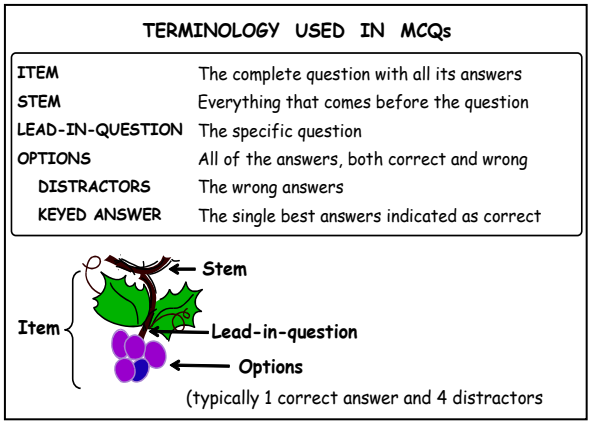
7) Construction of high quality items places a high degree of dependence on the writing ability of the author of that question.

8) May encourage guessing.

9) Do not allow the student to create their own answer (no information concerning individual thought processes on how an answer was arrived at.)

10) The examining body needs to own and keep electronically secure the questions and the correct answers (The hardware used in the exams must also be secure to maintain exam security).

"Anatomical" Parts of a MCQ



The figure to the right depicts the components of a typical multiple choice question (or item). The traditional MCQ is one in which a student chooses one answer from a number of choices (options) supplied. Typically the item presents a set amount of factual information, called the "stem," followed by a lead in question and usually 4-5 options as possible answers. Too few options means guessing is rewarded more frequently and too many options means the student wastes time. The multiple choice item is unique in that the standard by which the best answer is selected is contained in the ***stem***. It is important to realize that the best answer does NOT have to be the one and only indisputably correct response to the question, as long as the subject matter experts who reviewed the question agree it is the best answer of those presented.

Features of MCQs

The following sections outline techniques for writing and evaluating multiple choice items by considering first the ***stem*** and then the ***responses***. A well constructed MCQ consists of a positively worded leading statement or "stem", followed by a clearly expressed question. The stem will have a clear relationship to a specific item within the curriculum. The ***stem*** is followed by five possible ***responses*** consisting of one agreed correct answer and four wrong answers or "distractors"

Stem (and lead-in-question):

1) Usually written first and is best written as a **complete** sentence or question.
   Examples:
   Complete sentence/question: *"Which of the following is a diagnostic feature of inflammatory bowel disease?"*
   Incomplete sentence/question: *"Inflammatory bowel disease….*
   a) Research has shown that the use of incomplete stems tends to lower a student's correct response rate by 10 to 15%.
2) Should be kept as short as possible and include only the necessary information needed in order to select the correct option.
   a) Clinical vignettes do not have to be long to be effective (avoid verbosity, irrelevant material and "red herrings")
3) Should NOT be tricky or misleading.
   a) Trick questions which might lead the knowledgeable examinee to give the wrong answer should be avoided.

4) The language used should be simple so that the level of reading difficulty is kept low.
   a) The stem should not be a test of the examinee's reading ability. As the language of choice is often English it should be borne in mind that many apparent everyday phrases, which are simple to understand for the native English speaker, can be confusing for other speakers of English.
5) Should test concepts of understanding or data evaluation and should avoid simple tasks such as recall or pattern recognition.
6) The content of the stem focuses on a central theme or problem, using clear and precise language, without excessive length which can confuse or distract test takers.
7) As a general principle, the stem should be stated in a **POSITIVE** form, structured to ask for a correct answer and not a "wrong" answer.
   a) Negative statements are not characteristic of normal thought processes, and consequently may place the candidate who is attempting to decipher the item at a disadvantage.
   b) Negatively posed questions (e.g. "all of the following, except") are less effective and more difficult to understand.
   c) If considered important to be used in particular situations the negative term (e.g. "not", "except", etc) should be **bolded**, CAPITALIZED, underlined, etc to make sure that it is noticed.
8) Specific terms must be avoided (both in the stem and/or distractors):
   a) ***Absolute terms*** ("all", "always", "none", "never", etc) since there are very limited situations where things are absolute or universally true.
   b) ***Relative terms*** ("may", "can", "could", etc) may be cues for the correct answer.
   c) **Imprecise terms** ("few", "many", "sometimes", "occasionally", "rarely" "seldom", etc) are not uniformly understood.
9) Do not use abbreviations, acronyms, eponyms, etc. without an explanation of the term in simple understandable language.
   a) The question should not become a test of whether the examinee understands the meaning of the term!
   b) There should be a clearly defined lexicon of commonly used abbreviations which will be universally understood and which are not open to misinterpretation.
10) Sentence structure in the stem should be grammatically accurate and logically related to the responses. It should present all relevant information to ensure clarity and understanding.

11) Although the multiple choice item format is brief, sufficient information to make an interpretation, answer the question, or solve a problem must be included.

    a) Avoid superfluous information, but be certain that all necessary details are included.

    b) Avoid the use of personal pronouns such as "you" which are inappropriate and perhaps confusing.

12) Each question should be self-contained and not refer directly to another question.
    a) It should not be possible to deduce the answer of one question from the information presented in a previous or subsequent question.
13) Within a European context, questions should not relate to specific national requirements (e.g. legal regulations for flying or driving licenses.)

Responses:

1) Each multiple choice item should have five mutually exclusive responses

2) The best answer should be the one agreed upon by the experts; however, the other four distractors should also seem plausible to the candidates who have partial, incomplete or inappropriate knowledge.

    a) There should be an evidence base for determining which of the answers are correct and which are incorrect.
    b) The location of that evidence - whether in international guidelines, textbooks or the scientific literature - should be available to the question writer, the question-writing group and to the candidates themselves.
    c) The evidence must be cited within the curriculum that is being assessed.

3) The position of the "correct" response should vary from the A, B, C, D and E positions

    a) Research shows that the B and C positions are overused.

    b) "Testwise" candidates may key in on this fact and choose the B or C positions to increase their chance of getting the answer right when forced to guess.

    c) Keep correct answers in random positions (avoid any pattern formation that could potentially be detected by candidates)

    d) If necessary after the test is written, reorder the sequence where the correct answers are placed

    e) Another method is to have all responses to all questions listed alphabetically. However, care must be taken with this approach as this can alter the correct response to certain types of questions.

4) The "distractors" may be considered logical misconceptions of the best answer.

5) The grammatical structure of all the responses should be a logical conclusion to the question (or statement) presented in the stem.

    a) Because the author of a question tends to pay more attention to the correct option than the distractors, grammatical errors (cueing the answer) are more likely to occur in the distractors.

6) Repetitive language within the responses should be avoided.

    a) Words which are repeated in every response may be placed in the stem so that the candidate has less to read and is less likely to be confused by the structure.

7) The responses should be parallel in structure or category of information (e.g. all related to "treatments", or "diagnoses", etc).

8) The responses should be similar in length.

   a) There is a tendency among item writers to make the correct answer the longest answer.

   b) Astute candidates in examination technique may therefore be able to correctly guess the correct answer on a disproportionate number of occasions.

9) When writing distractors, it is wise to avoid the use of superlatives such as "**always**" and "**never**"

   a) Statements containing these items are highly likely to be incorrect and candidates will discard these options thereby increasing the chances of correctly guessing the correct answer.

10) Each distractor should be mutually exclusive and not overlapping.

   a) *Example*: if a series of percentages is to be used for the responses, each range must be unique to the response.

      A. 5 - 20

      B. 25 - 40

      C. 45 - 60

      D. 65 - 80

      E. 85 - 100

   b) If responses are overlapping, the candidate may not be able to determine the best answer not because they do not know the answer, but because the answer is incorporated into more than one response.

   c) This may also lead to challenges of validity of the exam result by unsuccessful candidiates who will argue more than one response is correct due to this overlap.

11) Avoid using "**none of the above**", "**all of the above**", as a response.

   a) The "***none of the above***" response does not test what the candidate knows, but only that he/she can recognize that the correct answer is **not** present.

   b) The "***all of the above***" response is essentially an overlapping response, because it requires the candidate to consider the responses in combination

   c) Knowing that two are correct leads the astute candidate to "*all of the above* " by default without knowing the importance or correctness of the remaining responses.

12) To make distractors more plausible, use words that should be familiar to the examinee.

Students' strategies in taking MCQ exams

Just as guidelines are written to help educators construct good multiple choice questions, numerous publications can also be found that are oriented towards helping the student maximize his/her guessing capabilities in order to correctly respond to MCQs.

In the preceding pages we have covered most if not all the so-called test-wise strategies used by students to answer MCQs. However, it would seem appropriate at this point, to list what is typically considered as the student's guide to improving their guessing strategies and to some extent subverting the purpose of the examination.

1) Pick the longest answer
2) When in doubt pick the answer "C"
3) Never pick an answer which includes the word "***always***" or "***never***" in it.
4) If there are two answers which express opposites, pick one or the other and ignore other alternatives
5) Pick the more scientific-sounding answer
6) Don't pick an answer which is too simple or obvious
7) Pick an answer that contains a word which you remember was related to the topic
8) Choose an answer that contains a word, phrase or meaning that is found in the stem
9) Choose the answer that includes the majority of the elements in common with the other options ("convergence strategy")
10) Eliminate wrong answers and see (guess between) what is left!
11) A common multiple choice item strategy is to place the most tempting wrong answer before the right answer
12) If all else fails, guess!

Setting up a successful high-quality Exam

Since the hope of the UEMS is that the rigorous quality and standards imposed on the overall organization of these exams may persuade European National governments to recognize and accept these exams, it must be borne in mind that the basic structure of the exam process in question must be transparent to National or International regulators who are contemplating possible local recognition of the exam.

It is apparent that writing good MCQs is both a science and an art. Item writing is an arduous task which requires not only mastery of the subject matter but also command of verbal communication skills and an understanding of the examination population.

The necessary requirements for a well-structured examination process based on MCQs include the following sections:

1) **Developing** new items on a continual basis (as assigned based on the needs of the examination and previously contributed material).

   a) Professional item writers plan on one hour or more to write one good question.

   b) When starting to write questions it is highly likely that the first few questions will require substantial modification by more experienced question writers in order to become good questions.

2) **Reviewing** and selecting items for inclusion in the written examination.

   a) A review group (small in number) should be set up with the specific task of selecting questions which will cover, in number and content, the specific discipline of the exam.

   b) The specific objective of the group is to select from the MCQ bank a range of questions appropriately distributed throughout the curriculum, with a range of perceived difficulty, and where available the use of “marker questions” known to perform well.

   c) The use of "old" questions that have been validated provides a longitudinal standard and further validates the exam process.

   d) The goal of the group is to draw upon a pool of examination items which are appropriate to measure the knowledge and skills necessary for safe and effective performance in the field of practice.

   e) The recommended number of MCQs in an exam should not be less than 100 (for any specific specialty discipline) in order to achieve sufficient reliability and validity of the exam.

3) **Monitoring:**

a) The content, task, and cognitive skill distributions of items.

b) The content quality to avoid duplicate items on the same knowledge/skill.

4) **Analysing** the performance of each item to ascertain the quality of the content and structure of each item in terms of:

a) **Item difficulty:**

The percentage of students that answered each item correctly.

1) The goal is to construct a test that contains only a few items that more than 90% or less than 30% of students answer correctly.
2) Difficult items are those that about 50% to 75% of students answer correctly.
3) Items are considered easy to moderately difficult if 70% to 85% of students answer correctly.

b) **Index of discriminiation:**

The percentage difference in correct responses between 2 groups of students (generally the top 25% and the bottom 25%)

1) The discrimination ratio for an item will fall between +1.0 and -1.0. The closer the ratio is to +1.0, the more effectively that item distinguishes students who know the material (the top group) from those who don't (the bottom group).
2) Ideally each item will have a ratio of at least +0.5. An item with a discrimination ratio of +0.60 or greater is considered a very good item, while a discrimination of less than +0.19 indicates a low discrimination item that needs to be revised.
3) Items with a negative index of discrimination indicates that the poor students answer correctly more often than do the good students and such items should be avoided.
4) Questions that appear to be too difficult should be further reviewed to determine if the question is faulty or if the questions needs further revision to improve the clarity of the correct response.

c) **Reliability:**

This is the extent to which a test yields the same results on a repeated basis.

1) Items in a test represent a small sample of all the possible MCQs that could be asked, and the test score should be indicative of the score of the same student on any other set of relevant items.
2) A good way to assess this is with the use of "marker questions" which have previously performed well in discriminating candidates.

d) **Validity:**

The extent that a test measures what it claims to measure.

e) **Resource intensiveness:**

The costs of constructing and grading items. MCQs are relatively easy to grade, especially with computer assistance, but are difficult and time-consuming to construct.

There are the following additional points to consider:

f) No one truly knows how well a question is going to perform until data have been analyzed after learners have taken the test on at least one occasion.
g) Sophisticated analysis is not necessary, but as a minimum the tally of how many times each choice was selected and what proportion of the respondents correctly answered the question should be obtained.
h) Analyses of these simple data can reveal if questions are too easy or too difficult, and if distractors are working according to the way they were intended to work.

5) **Providing** expert input into the criterion standard against which candidates are measured.

a) This refers to setting the "pass mark", a special score that serves as a boundary between those who are considered to have performed well and those who have not.
    1) Remember, the purpose of the examination is to select the group of candidates that perform well enough and to eliminate those who do not perform well.
b) The issue of candidates successfully "**guessing"** the correct answer:
    1) The answer to a multiple choice question can always be guessed with a 20-25% chance of getting the correct answer (depending on the number of options and also the number of obvious distractors).
    2) Theoretically, this means that an examinee will be able to score an overall mark of around this percentage in an assessment made up of MCQs, without knowing anything about the subject matter. Items with a negative index of discrimination indicates that the poor students answer correctly more often than the good students do. Such items should be avoided.
    3) Approaches for dealing with this include:
        a. Adjusting the overall pass mark to take this into account,
        b. The use of negative marking on each incorrect answer thereby discouraging guessing
    4) "Negative marking" is almost unknown outside the UK and even in the UK public examination boards do not currently use it.
        a. Although it may be considered to discourage guessing, candidates who do guess are statistically likely to guess wrongly as this is the function of the distractors.
        b. "Negative marking" penalises candidates who lack confidence even though they may have an equal knowledge and understanding of the subject matter compared to more confident individuals. This in particular can disadvantages female test takers who are as a population less likely to guess an answer.
c) Once the test has been appropriately validated, "pass marks" need to be set which can be thought in terms of:

1) The "**absolute**" pass mark (expressed as a number or percentage of questions needed to be answered correctly, e.g. 70%)
    a. This is criterion reference based and therefore it is possible for all candidates to pass or fail
2) The **"relative**" pass mark (expressed in relation to a number or percentage of individuals taking the exam, e.g. top 33%)
    a. This is norm-reference based therefore the grade of the examinee is determined by both his/her own achievement compared against the achievement of all other candidates.
3) The "**Angoff**" pass mark. The Angoff score is determined after the question has been written, reviewed and accepted as appropriate for the examination.
    a. It is determined before the examination by a set of experts (who may or may not be the part of the question writing group).
    b. It is the likelihood of borderline competent candidate whose knowledge, skills and abilities are considered just sufficient to pass the examination overall of correctly answering that individual question.
    c. A good examination will consist of a series of questions with a wide distribution of Angoff scores.
    d. "**Modified Angoff**" scores are determined in a similar way but are determined **after** the examination has been sat by the test takers and the performance of each question is known and taken into account by those determining the modified Angoff score.
    e. A combination of Angoff and modified Angoff scores can be used to determine the passmark for a particular diet of an examination.
    f. Questions where the Angoff or score is significantly at odds with the actual performance of the question in the exam should be reviewed to determine if the question is faulty or requires further revision.

Finally:

Whilst the generation of new questions is essentially a task for the individual, the process of maximising the quality of MCQs is a task for a group of motivated and experienced MCQs writers who will, at times, need to meet face-to-face.

Experience suggests that the face-to-face format, although more costly, facilitates an international atmosphere and understanding. It encourages individual contributors and is considered irreplaceable, not only to motivate individual writers but to maximise the intellectual benefit from each newly developed MCQ. Discussion of individual topics should be encouraged and the contribution of all individuals valued. In particular those who are inexperienced questions writers should be facilitated in a constructive manner to enhance their individual contribution to the joint

task of developing high-quality European MCQs. The face-to-face format is also educational to the individual MCQ writers and usually enhances the quality of subsequent MCQs. In general, the quality of questions produced by any individual writer tends to increase with time and collaborative experiences. In the context of a European exam, writers from different countries, different cultures and different languages must be sourced. This will ultimately ensure the highest validity of any examination at a European level.

If well chaired these sessions are much more productive than the more impersonal communication methods such as e-mails or tele-conferences. Each session needs to have a time limit for discussion for each individual question with the conclusions of "accepted", "rejected", or "back to the author for reworking". Once a question has been accepted it needs to be categorised in terms of its length, its difficulty and the section of the curriculum to which it refers. All MCQs writers must have access to current versions of the relevant curriculum and should be encouraged to index their questions as they construct them. Ideally, an electronic template should be employed for writing and then discussing new MCQs. This helps to facilitate uniformity of MCQs writing style, transmission of the questions to other members of the writing group and to facilitate discussion. Questions which contain images or movies should generally be classified as long as the data contained in the image or movie will take time for the candidate to digest.

Conclusion:

The formation of the EU has had many political and economic consequences such as disappearing borders**,** free trade of goods and labour between countries and the use of a single currency. However, in addition to these many advantages, there are also many problems, particularly in the field of medicine. One such problem relates to the regulation which refers to national recognition of training programs as valid in all member states, and free movement of doctors to work wherever they like without taking an examination to prove their quality.

We are all well aware of the fact that quality of training is one of the most important factors in the domain of Quality of Health Care. Unfortunately, there are numerous indications, throughout the world and within Europe that currently training programs between EU member states are not comparable in quality or content. Because of this lack of harmonization or standardization European agencies are need to guarantee to their citizens that a professional who will be taking care of them has been exposed to the best high quality training there is to offer. This training should additionally have been evaluated and shown to objectively demonstrate competence of that individual for his or her current domain of medical practice throughout Europe. For this reason there is a move towards the European Accreditation of Medical Specialties through standardised and equitable assessment tools to evaluate physicians who practice any given specialty.

The UEMS, through its publications has realized and addressed the importance of these problems. "The UEMS Charter on Visitation of Training Centres (UEMS 1997)" recommends **minimal standards** to which the training centres should conform. Its "Policy Statement on Assessment during Specialist Postgraduate Medical Training (UEMS 2006/19)" is aimed at assessing the **content** and **quality** of **training** in the EU countries and other countries who are full members of UEMS.

With the advent of the Council for European Specialist Medical Assessment (CESMA-UEMS), UEMS has come to realize that the medical care of European citizens must be held in the highest regard to ensure all patients across Europe are cared for by competent, skilled and professional physicians.

Since increasingly UEMS recognized medical specialties will choose to evaluate trained professionals with exams covering both basic knowledge coupled with skills and tests of competency, the UEMS has compiled this guide to help the various subspecialty boards with successfully writing and structuring one of the most common and frequently used methods of assessment, the Multiple Choice Question.

Example MCQ's:

As a simple exercise, examine the examples below and think about the tips you have reviewed in the preceding text. As you look at each of the 5 questions, think about whether or not the item was written correctly, whether it needs improvement and if so what improvements would you make.

1) A 32 year old woman presents to the emergency department with a 3 day history of cough and increasing shortness of breath. On examination she has a respiratory rate of 30 breaths per minute and there is an audible expiratory wheeze.

Which of the following is the most likely diagnosis?

A) Acute exacerbation of asthma

B) Diabetic ketoacidosis

C) Hypothyroidism

D) Myocardial infarction

E) Uncontrolled hypertension

The correct answer is "A".

This would appear to be a good question because it fulfils many of the criteria that have been reviewed in the text, such as: a) there is a clear, concise history followed by salient examination findings, b) there is a positively worded question and c) there are 5 distinct answers, listed in alphabetical order and all of similar length. The question is of course extremely easy with the stem including only information related to the respiratory system. Therefore based on guessing the most likely diagnosis is A as this is the response that most closely relates to the respiratory system. This means the Angoff score is likely to be very high (greater than +0.95) so the question will not adequately discriminate. The Angoff score will be improved with the use of more difficult distractors such as other respiratory diagnoses.

2) A 78 year old man presents to the emergency department with sudden onset chest pain of 2 hours duration with associated nausea. On examination he is cold and sweaty. His pulse rate is 65 beats per minute and his blood pressure is 125/80 mmHg. A resting electrocardiogram shows ST segment elevation across the anterior chest leads (V1-V5).

What is the most likely diagnosis?

A) Acute exacerbation of asthma

B) Diabetic ketoacidosis

C) Hypothyroidism

D) Myocardial infarction

E) Uncontrolled hypertension

The correct answer here is "D." Again, this would appear to be a good question for the same reasons indicated in the first question, a) there is a clear history followed by salient examination findings, b) there are no abbreviations contained within the text and units are included for all measured parameters, c) there is a positively worded question and d) there are 5 distinct answers listed in alphabetical order and all of similar length.

Again this is a very easy question and the Angoff score will be very high and therefore the question will not adequately discriminate. The use of other cardiac diagnoses as distractors would improve the question further.

3) A 65 year old man presents to the A/E with sudden onset chest pain of 2 hours duration. O/E pulse 65 and BP 110/75. An ECG shows a STEMI.

Which of the following is **NOT** appropriate?

A) Aspirin and heparin

B) Aspirin, heparin, hydrocortisone and antibiotics

C) Oxygen

D) Plavix

E) Thrombolysis

The correct answer is “B”.

This is a poorly structured question. There are several abbreviations which may not be universally understood (A/E, O/E and STEMI). Observations have no units. The question is negatively worded. The correct answer is much longer than the others. It also contains 4 drugs whereas other answers contain 2 drugs or 1 drug only. Trade names have been used for some of the drugs which may not be universally understood. Answer “A” is contained within “B” and therefore is clearly not the correct answer to the question.

4. Which of the following is true in severe AS?

A) It is always associated with a bicuspid aortic valve

B) TAVI is never a treatment

C) The incidence in Smith et al (1997) is 1.36%

D) May present as angina

E) All of the above

The correct answer is “D”.

This is a poorly structured question. There is no clinical stem and again abbreviations have been used. The question is not testing a single idea or learning objective about aortic stenosis. The way the question is presented it is more a “multiple true/false” type question, than a MCQ because different answers ask about pathology, epidemiology, symptoms and treatments. Answer “E” can be excluded by any candidate who can work out that any 2 of the other choices “A”, “B” and “C” are incorrect. One answer refers to a single paper and reference to individual studies should not be included in the distractors.

5. Lara weighs 4 kg. She has an order for Ampicillin sodium 580 mg every 6 hours. What is her daily dose of ampicillin as ordered?

A) 580 mg

B) 1160 mg

C) 1740 mg

D) 2320 mg

E) 2900 mg

The correct answer is “D”.

Overall this is a good question. Although there is one piece of information which has no bearing in selecting the answer (the weight of Lara), the example is well written and structured. The stem is clear and the question being asked is straightforward and positively worded. There are no abbreviations contained within the text. The units are included for all measured parameters. There are 5 distinct responses listed in increasing numerical order. All the numbers are somehow related to the question. For example 580 not only is the single dose but it also could represent the mg/kg daily dose that Lara is receiving (580 x 4 = 2320, divided by 4kg = 580 mg/kg). Answers “B”, “C”, “D” and “E” are 580 mg increments. The 5 numerical answers are sufficiently different. The Angoff score for this question will be high but lower than in questions 1 and 2. To further improve the question a slightly longer clinical stem with the age of Lara and the reason antibiotics are to be prescribed could be included.

Definitions:

MCQs: A form of assessment in which respondents students are asked to answer a question by selecting the correct or best possible answer (or answers) from a list of options, whose purpose is to sample medical knowledge and understanding of a defined body of knowledge, preferably not just factual or easily recalled information

Learning Objective: An intended educational outcome for an activity held by an event provider, relating to skills, knowledge and/or attitude/ behavior gained by participants at the event. These should clearly describe what the learner will know or be able to do after participating in the CPD activity.

Assessment is the measurement of the performance of an individual at a particular point in time, usually against pre-determined standards. Assessments measure progress based on relevant *curricula*, and the results of assessment may feed into *appraisal* if appropriate.

A process consisting in collecting, synthesizing, interpreting obtained information for the purpose of "decision making"

The results of an assessment should allow sound inferences about what learners know, believe and can do in defined contexts

Appraisal is an ongoing, two-way process involving reflection on an individual's performance, identification of education needs, and planning for personal development. The focus is on the appraisee and his or her professional development needs

Evaluation: Process designed to provide information that will help us make a judgment about a given situation

A guide to successfully writing MCQ's

Mark Westwood
Consultant Cardiologist
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Introduction

- Background
- The MCQ
  - Why MCQ's
  - Writing
  - Examinations
  - Examples

Types of examination

- Formative
- Summative
  - –High stakes
- Viva type examinations
  - –Highly subjective, even with set questions
- Essay type examinations
  - –Model answers, time consuming
- MCQ's
  - –Objective, least flawed

Formative vs Summative

- Formative
  - Self feedback
  - To check learning at the end of a chapter
  - Low stakes
  - Low rigour
- Summative
  - High stakes
  - Consistency
  - Accuracy

MCQ's in a wider context

- Knowledge is only part of being a good Dr!
  - Knowle
  - Compa
  - Current
  - Compe
  - Bedside

In other words:
Be a "Professional"

MCQ's can only assess knowledge

MCQ: where to start

- Curriculum
  - –Must cover all of it!
  - –Appropriate exam setting
- Question writers
- Agreed style

MCQ: Advantages

- Computer based exam
  - –Flexibility
  - –Stagger question order between candidiates
- MCQ bank
  - –Contained costs
  - –Needs to be secure
- Predetermined agreed correct answers
- Less dependent on knowledge of English
- No negative marking

MCQ: Good MCQ

- Stem
- Clear question
- 5 answers
  - 1 correct
  - 4 distractors
- Positive question
- Plausible distractors
- Same answer across Europe

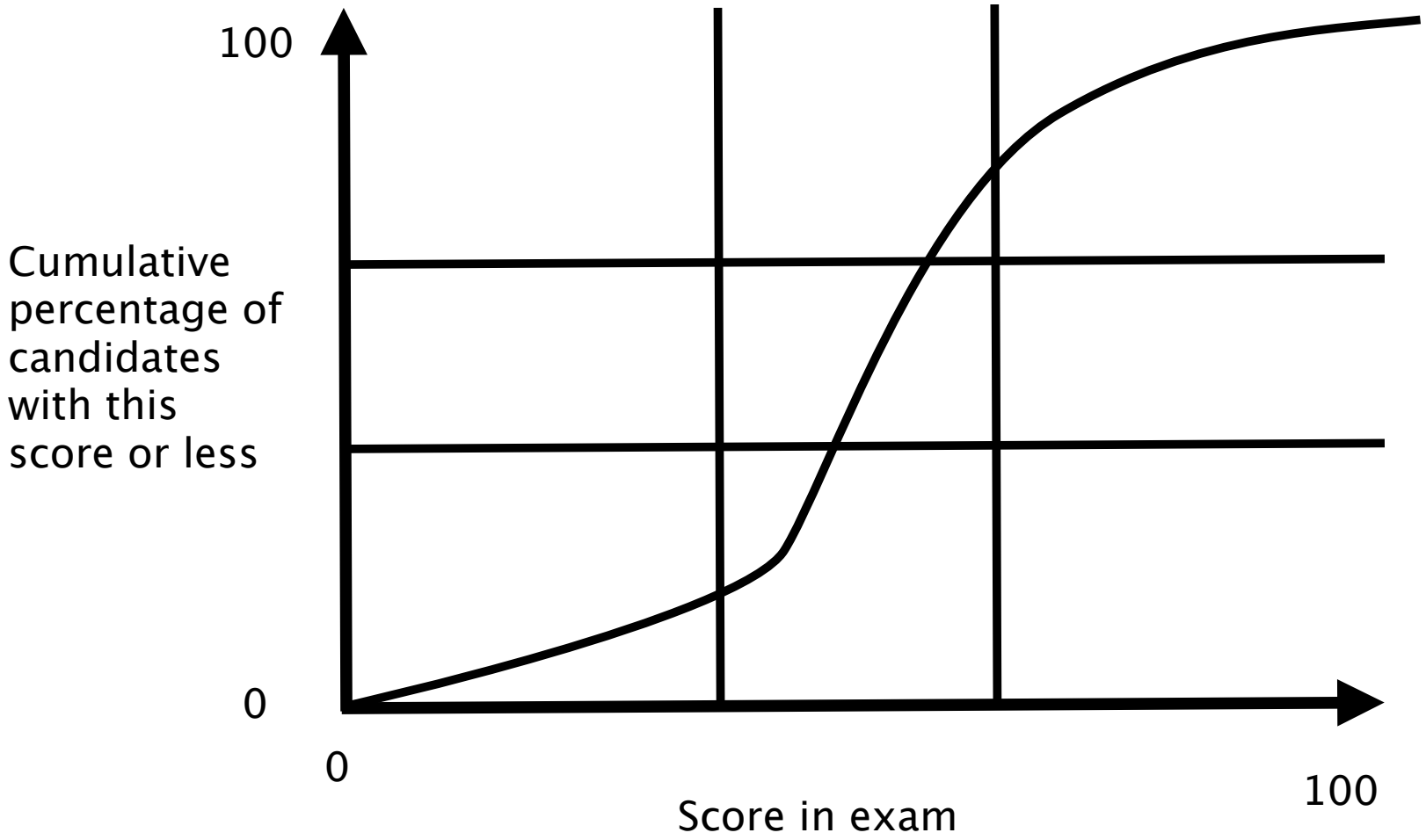
MCQ: Good MCQ

- Answers same length
- Alphabetical or random
- Must be evidence base for answer
- Avoid
  - –All of the above
  - –None of the above
- Ensure you cannot work out one question from the information in another one!

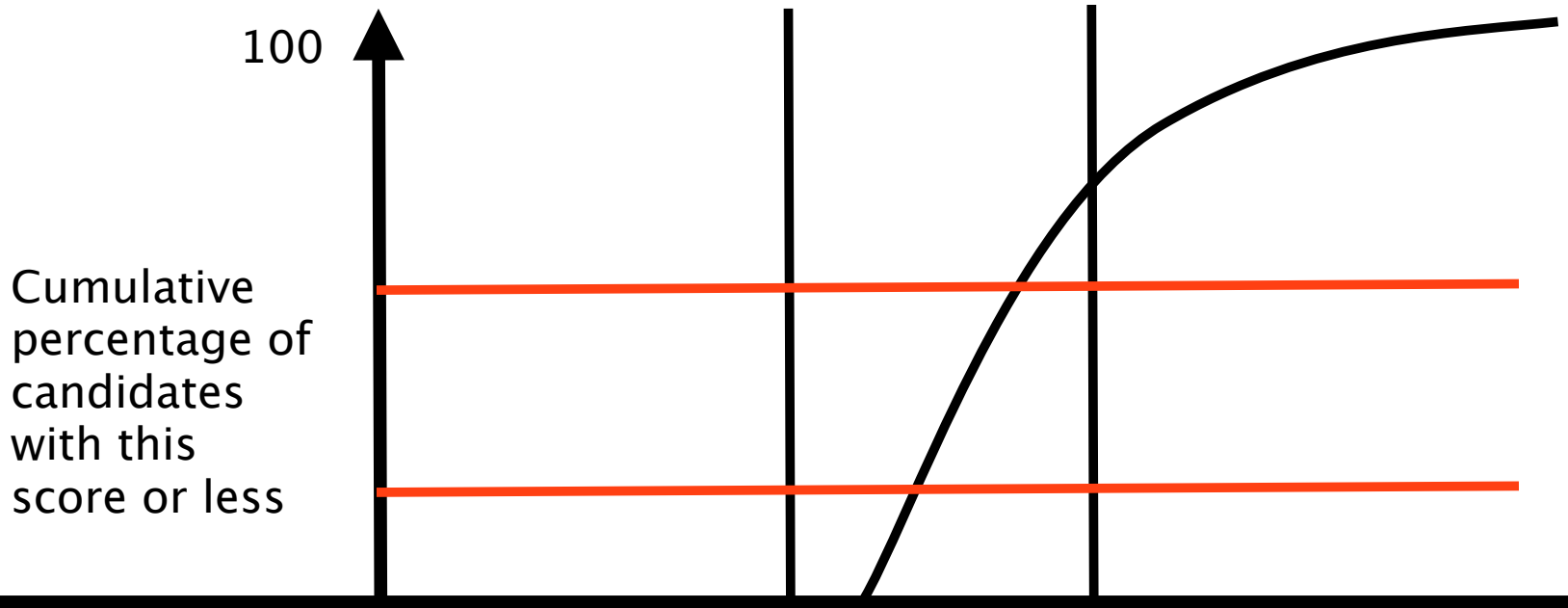
MCQ: Good MCQ

- Assessment
- Angoff score
  - How likely a borderline candidate will get this correct?
- Modified Angoff
- Correlation with overall performance
- Range of difficulty

MCQ: Setting the pass mark

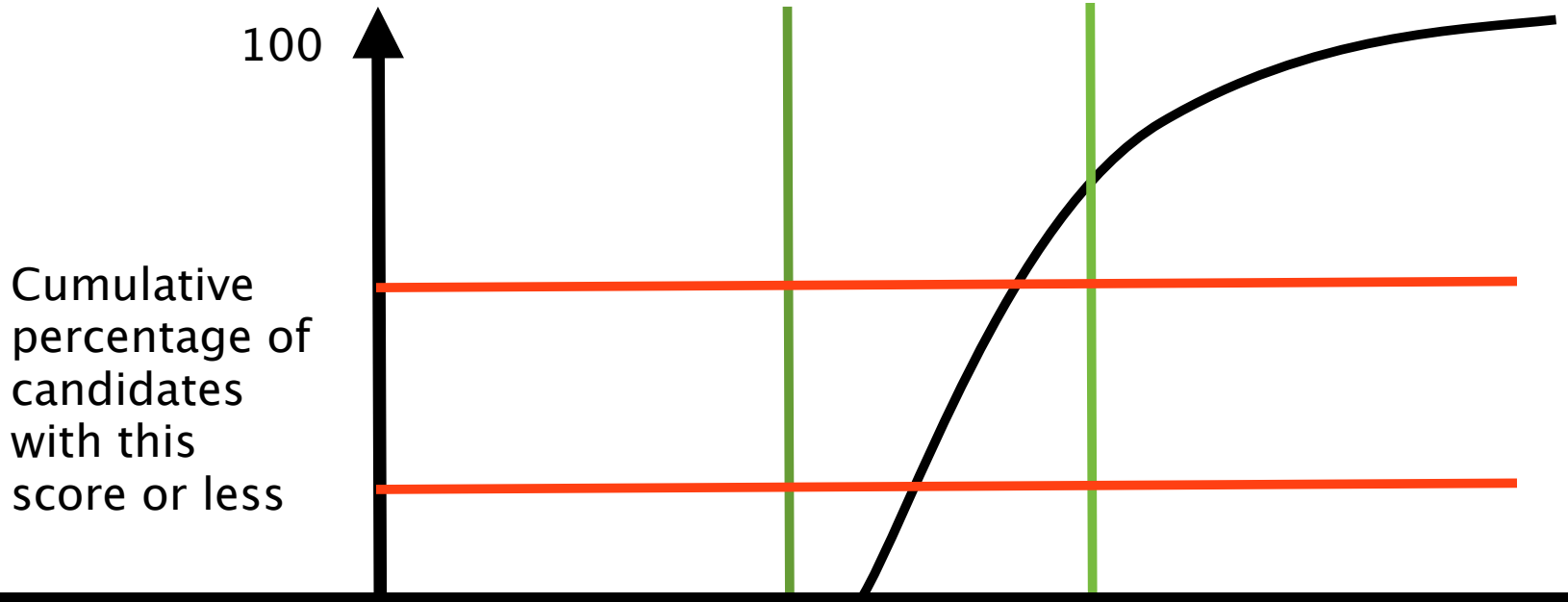


MCQ: Setting the pass mark



The Red lines are the minimum and maximum failure rates as predetermined by the standard setting group

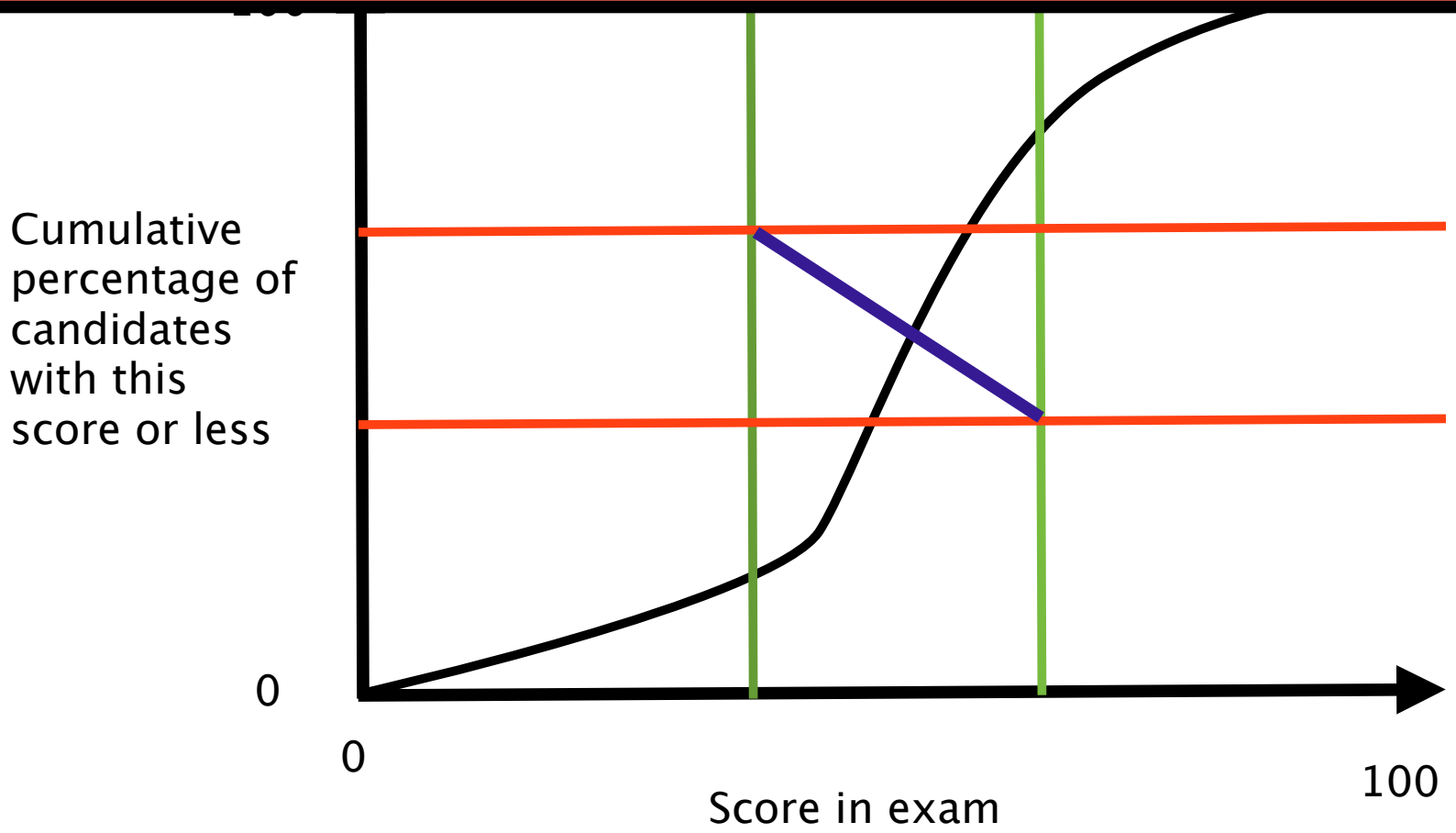
MCQ: Setting the pass mark



The Green lines are the minimum and maximum pass marks as predetermined by the standard setting group

MCQ: Setting the pass mark

Draw the blue line as shown



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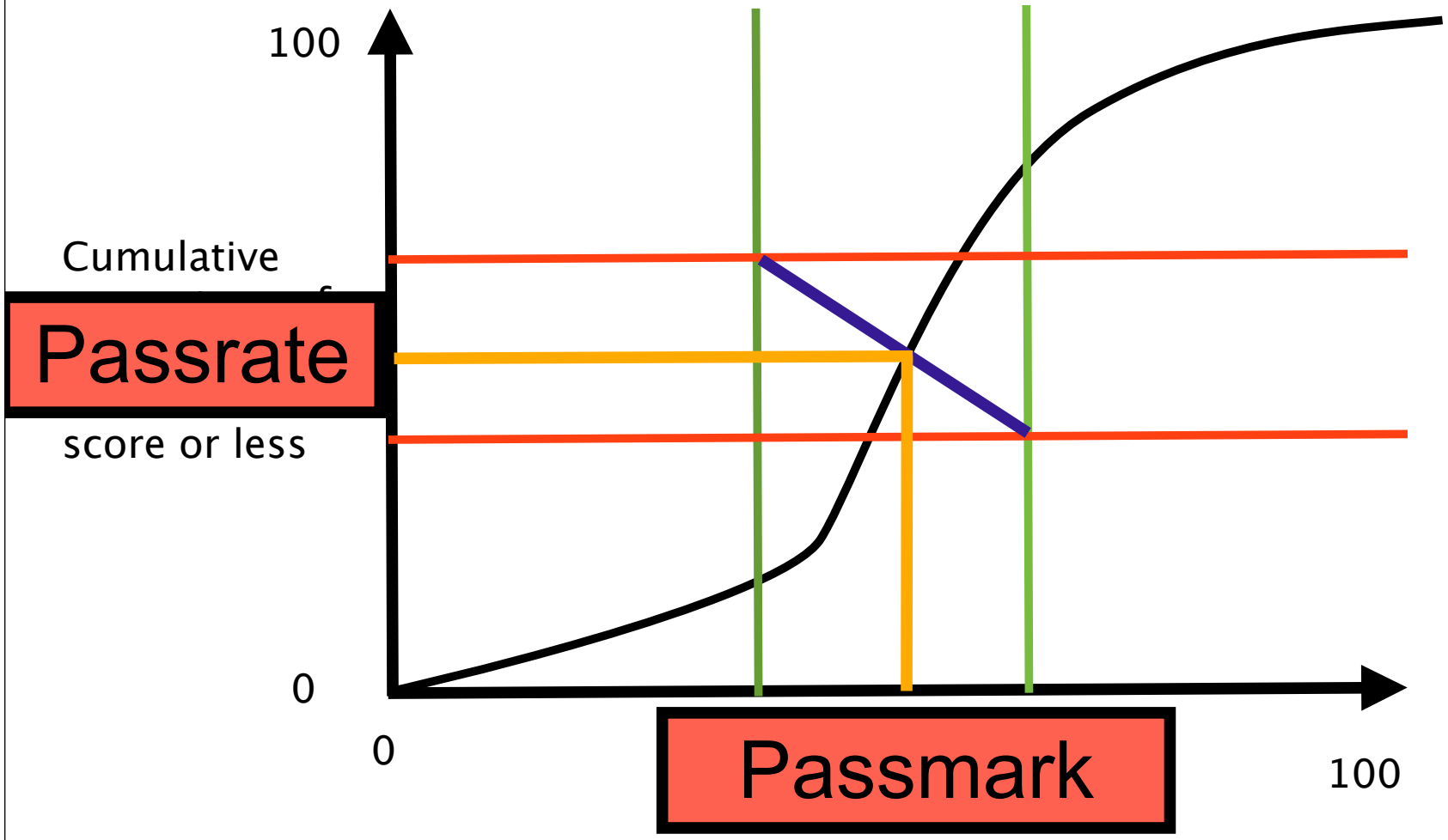
MCQ: Setting the pass mark



MCQ: Technical

- Standardised lexicon
- Standardised punctuation
- Avoid absolutes
  - Always, never etc
- Standard format
  - History
  - Examination etc
- No abbreviations

MCQ: Writing questions

- Individuals write
- Need a review group
- Standardised punctuation
- Face to face meetings best
  - Questions written beforehand
- Ensure adequate refreshments!
- Categorise the questions
- Electronic template

MCQ: Set the exam

- Exam setting group
  - Usually smaller
- Select questions from bank
  - Ensure the cover curriculum!
- Old questions
  - Longitudinal data
- Structure should be transparent

MCQ: Summary

- MCQ writing group
- Exam setting group
- Standard setting group

MCQ: Example 1

- A 32 year old woman presents to the emergency department with a 3 day history of cough and increasing shortness of breath. On examination she has a respiratory rate of 30 breaths per minute and there is an audible expiratory wheeze.
- What is the most likely diagnosis?
- A) Acute exacerbation of asthma
- B) Diabetic ketoacidosis
- C) Hypothyroidism
- D) Myocardial infarction
- E) Uncontrolled hypertension

MCQ: Example 2

- A 78 year old man presents to the emergency department with sudden onset chest pain of 2 hours duration with associated nausea. On examination he is cold and sweaty. His pulse rate is 65 beats per minute and his blood pressure is 125/80 mmHg. A resting electrocardiogram shows ST segment elevation across the anterior chest leads (V1-V5)
- What is the most likely diagnosis?
- A) Acute exacerbation of asthma
- B) Diabetic ketoacidosis
- C) Hypothyroidism
- D) Myocardial infarction
- E) Uncontrolled hypertension

MCQ: Example 3

- A 65 year old man presents to the A/E with sudden onset chest pain of 2 hours duration. O/E pulse 65 and BP 110/75. An ECG shows STEMI.
- Which of the following is NOT appropriate?
- A) Aspirin and Heparin
- B) Aspirin, heparin, Hydrocortisone and antibiotics
- C) Oxygen
- D) Plavix
- E) thrombolysis

MCQ: Example 4

- Which of the following is true in severe AS?
- A) It is always associated with a bicuspid aortic valve
- B) TAVI is never a treatment
- C) The incidence in Smith et al (1997) is 1.36%
- D) May present as angina
- E) All of the above

Conclusion

- Background
- The MCQ
  - Why MCQ's
  - Writing
  - Examinations
  - Examples