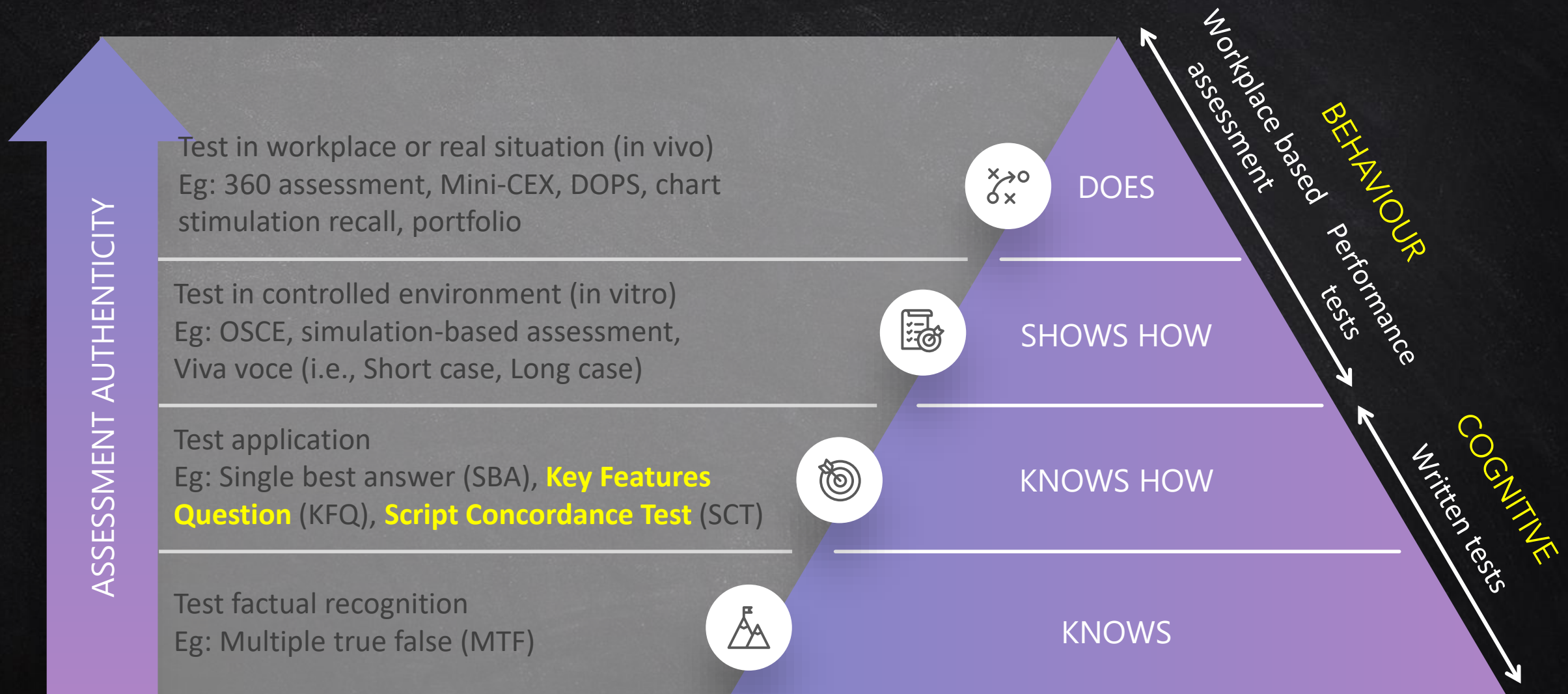# KEY FEATURES QUESTION
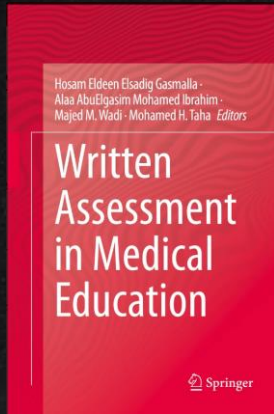# SCRIPT CONCORDANCE TEST

MUHAMAD SAIFUL BAHRI YUSOFF

Director, Center for Development of Academic Excellence (CDAE), Assoc. Prof, Department of Medical Education, School of Medical Sciences, Universiti Sains Malaysia, email: msaiful_bahri@usm.my.

Visiting Medical Education Scholar Webinar | Faculty of Medicine, Mahidol University

KFQ

- **Key Features Question (KFQ)** - a assessment tool to assess applied knowledge for clinical decision and reasoning based on specific clinical cases.
- Assesses C4-C5 in Bloom's Taxonomy

Written Assessment in Medical Education
Hosam Eldeen Elsadig Gasmalla · Alaa AbuElgasim Mohamed Ibrahim · Majed M. Wadi · Mohamed H. Taha *Editors*
Springer

Case Scenario[a]:
A 75-year-old Malay male presents to outpatient clinic complaining of distortion and blurring of vision in the right eye for 6 months. He has no other complaints. He is hypertensive and smoker. He is not diabetic. On examination, visual acuity is 6/60 in the RE and 6/9 in the LE. Anterior segments were unremarkable. Fundoscopy showed submacular hemorrhage in the right eye with presence of drusens in both macula. Optical coherence tomography (OCT) revealed presence of subretinal fluid in the macula.

Question 1	What is the most likely diagnosis for this patient?
(Write-in format)	_____ _____
Key feature	State the most likely diagnosis
Scoring key Score 1.0 0	Criteria Exudative/wet age-related macular degeneration (all components are required) Other answer or more than 1 answer
Question 2	What are the specific features based on appropriate investigations that determine the disease activity of the lesion? Select up to 3
(Short-menu format)	CNV in B-scan ultrasonography CNV in ICG Leakage in FFA Leakage in ICG Polyps in ICG Polyps in FFA Subretinal fibrosis in OCT Telangiectatic vessels in FFA *OCT—optical coherence tomography; FFA—fundus fluorescein angiography; ICG—indocyanine green angiography; CNV—choroidal neovascularization
Key feature	Determine specific features of disease activity of the lesion based on appropriate investigations
Scoring key Score 0.5 0.5 0	Criteria Leakage in FFA Polyps in ICG Other answers or more than 3 answers

SCT

- **Script concordance test (SCT)** - a standardized tool to assess data interpretation or hypothesis evaluation stage of clinical reasoning
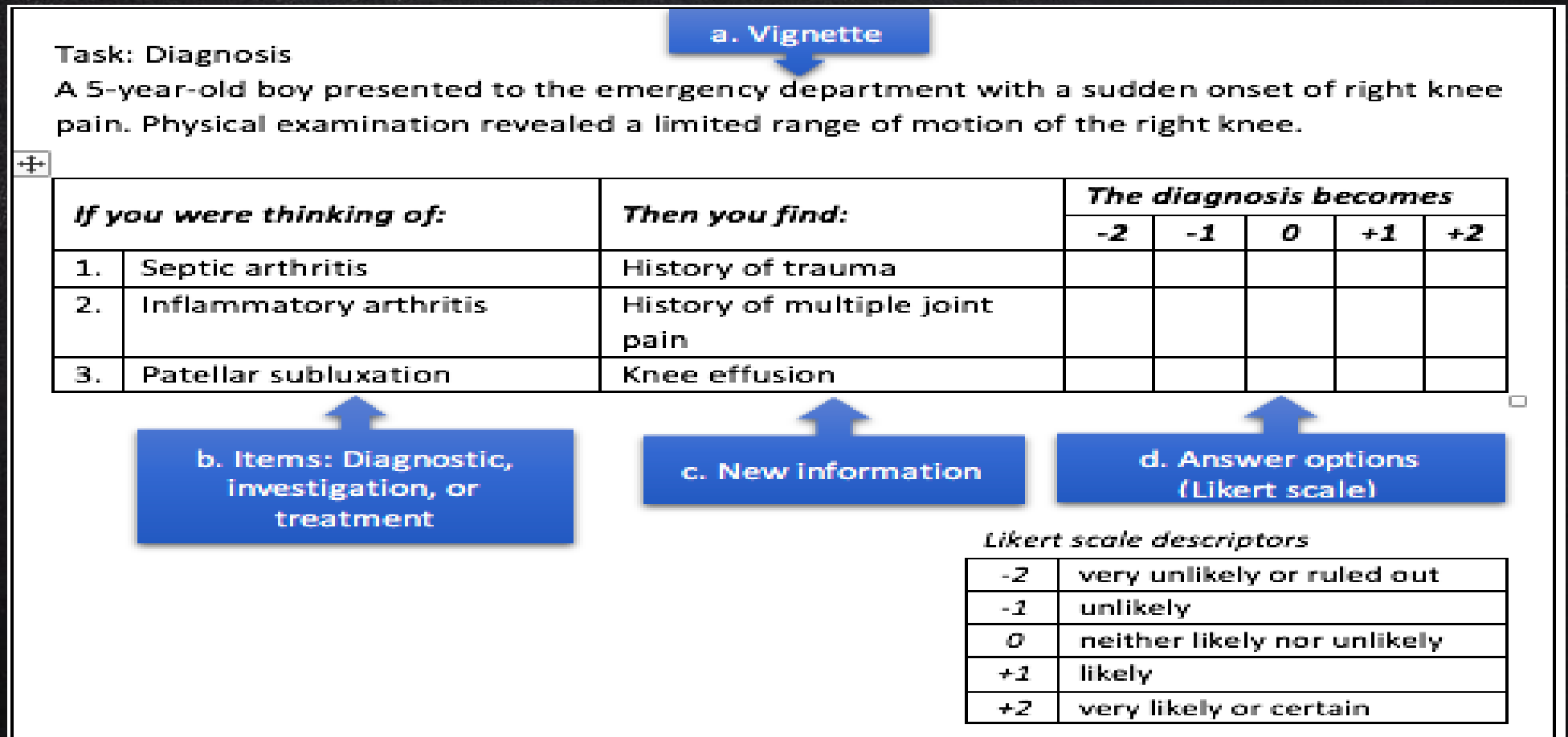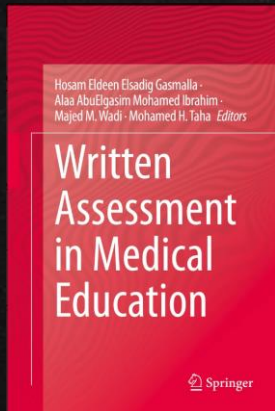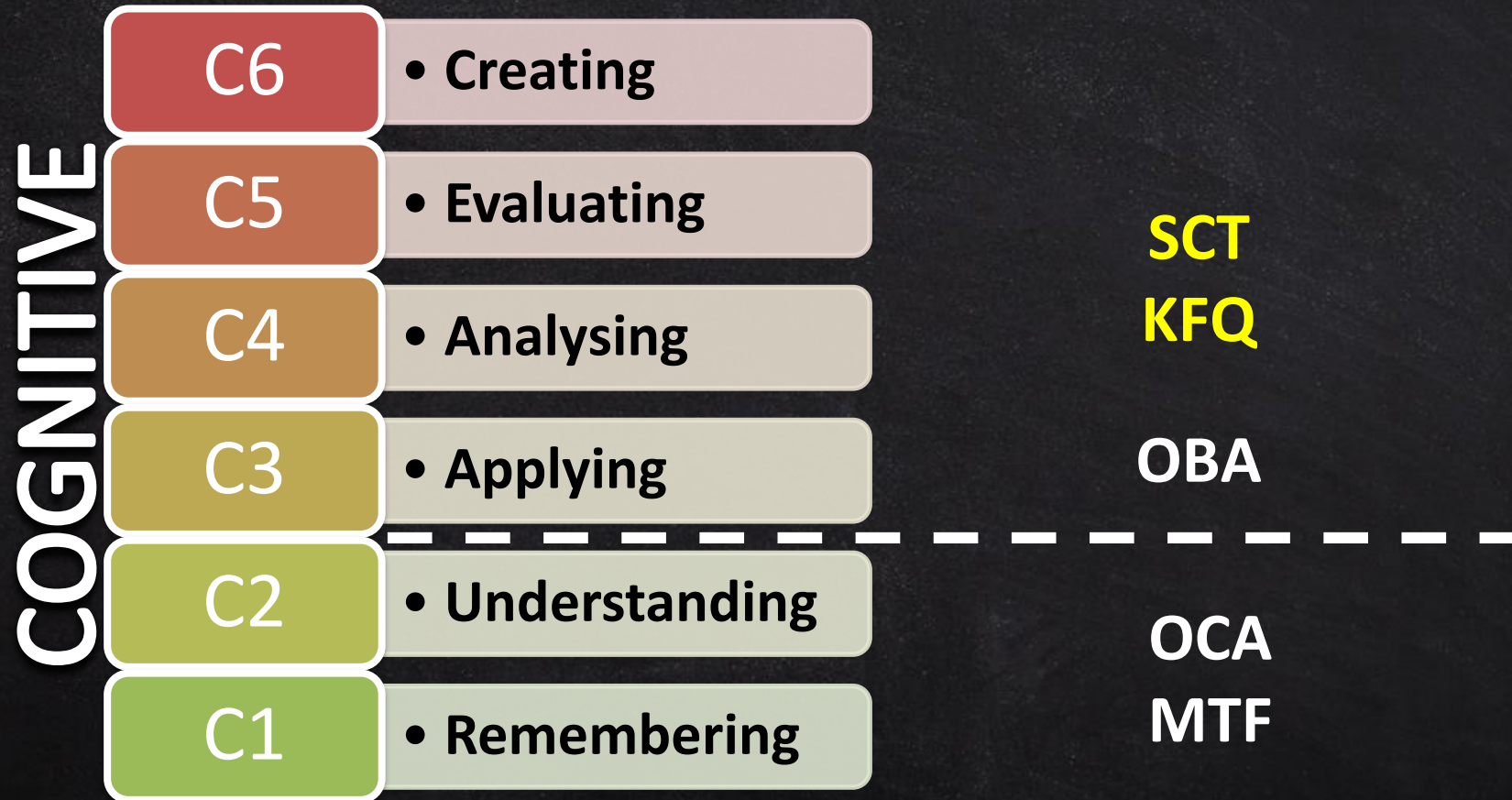- Assesses C4-C5 in Bloom's Taxonomy

Written Assessment in Medical Education

Hosam Eldeen Elsadig Gasmalla · Alaa AbuElgasim Mohamed Ibrahim · Majed M. Wadi · Mohamed H. Taha *Editors*

Springer

a. Vignette

Task: Diagnosis
A 5-year-old boy presented to the emergency department with a sudden onset of right knee pain. Physical examination revealed a limited range of motion of the right knee.

If you were thinking of:		Then you find:	The diagnosis becomes				
			-2	-1	0	+1	+2
1.	Septic arthritis	History of trauma					
2.	Inflammatory arthritis	History of multiple joint pain					
3.	Patellar subluxation	Knee effusion					

b. Items: Diagnostic, investigation, or treatment

c. New information

d. Answer options (Likert scale)

Likert scale descriptors

-2	very unlikely or ruled out
-1	unlikely
0	neither likely nor unlikely
+1	likely
+2	very likely or certain

Figure 1: Example of a script concordance test case assessing on diagnosis.

| COGNITIVE DOMAIN	ACTION VERBS for OBJECTIVES	EXAMPLE Clinical Learning Outcomes
Remembering: recall; the ability to remember information	Describe, define, identify, list, name, recognize, reproduce, state	Identify the three primary modes of HIV transmission
Understanding: understanding; the ability to interpret and explain information	Articulate, distinguish, estimate, explain, generalize, infer, interpret, paraphrase, rewrite, summarize, translate	Explain the difference between HIV and AIDS
Applying: the ability to use information in a new situation, to use knowledge and skills acquired in the classroom to solve problems and create new approaches	Apply, change, construct, demonstrate, modify, operate, predict, prepare, produce, show, solve, use	Use WHO clinical staging definitions to assist in clinical decision making
Analysing: the ability to break down information to understand its structure, to categorize, and to recognize patterns	Analyze, categorize, compare, contrast, differentiate, identify, illustrate, infer, distinguish relate, select, separate	Categorize effective strategies for managing nutrition complications in HIV-infected patients
Evaluating: the ability to make a judgment based upon evidence	Appraise, assess, compare, conclude, contrast, criticize, critique, describe, evaluate, explain, interpret, justify, summarize, support	Evaluate the risk faced by health care workers of contracting HIV on the job
Creating: the ability to bring together sets of information to create or invent solutions to problems, to illustrate relationships between parts of a whole	Compile, create, design, diagnose, diagram, discriminate, explain, generate, modify, organize, plan, relate, reorganize, separate, summarize, write	Design an HIV-prevention counselling program based on the Ministry of Health's counselling standards and guidelines

SCT
KFQ

Key Feature Items

Muhamad Saiful Bahri Yusoff ✉
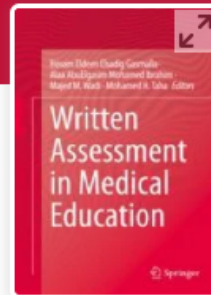
Chapter | First Online: 08 February 2023

Script Concordance Test

Nurhanis Syazni Roslan ✉ & Muhamad Saiful Bahri Yusoff

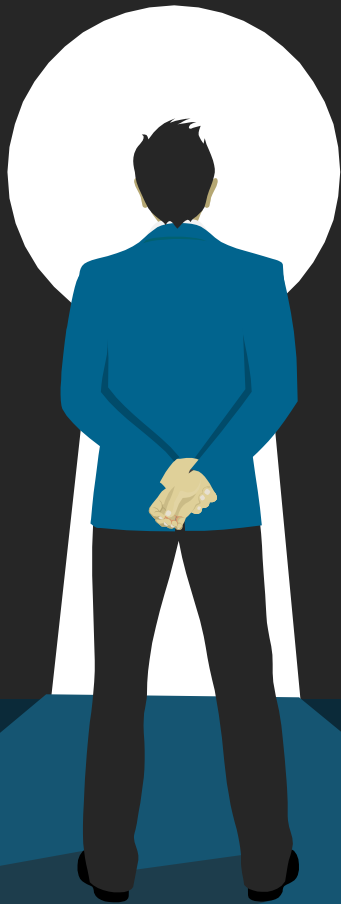Chapter | First Online: 08 February 2023

KEY-FEATURE QUESTIONS

- Key Features Question (KFQ)
- Development of Good KFQ

A Key Feature Definition

"A Key Feature is defined as a significant step in the resolution of a clinical scenario that focuses on a tricky or critical aspect in the diagnosis and management of a problem, at which candidates are most likely to make errors." (Yusoff, 2023, pg 50)

Validity of KFQ

"Studies provide **strong evidence for the content validity** of the key features."

(Bordage et al., 1995)

Acad Med. 1995 Apr;70(4):276-81.

Content validation of key features on a national examination of clinical decision-making skills.

Bordage G, Brailovsky C, Carretier H, Page G.

Author information

Abstract

Key features (KFs) represent the critical, or essential, steps in the identification and management of a clinical problem. KFs for 59 clinical problems were defined by members of a test committee for the Medical Council of Canada as part of their efforts to create a more valid written examination of clinical decision-making skills for the Canadian Qualifying Examination in Medicine. In order to evaluate the content validity of KFs that the test committee had defined for the examination, 99 physicians from outside the committee, who came from clerkship programs at all 16 of Canada's medical schools, participated in three studies conducted in 1991. The first study was retrospective and was designed to find the degree of agreement or disagreement that the outside physicians had with the KFs already defined for each problem by the committee members. The second study was prospective and was to compare the KFs generated de novo by the participants with those already defined by the committee members. The third study was to gather the outside physicians' opinions of the frequencies with which graduating students in Canada are exposed to the 59 problems used in the retrospective and prospective studies. Almost all the KFs defined by the test committee were corroborated by the outside physicians, 92% in the retrospective study and 94% in the prospective one.(ABSTRACT TRUNCATED AT 250 WORDS)

PMID: 7718059 [PubMed - indexed for MEDLINE]

Validity of KFQ

"The KFQ format provides educators with **a flexible approach to testing clinical decision-making skills** with demonstrated validity and reliability when **constructed according to the guidelines provided**."
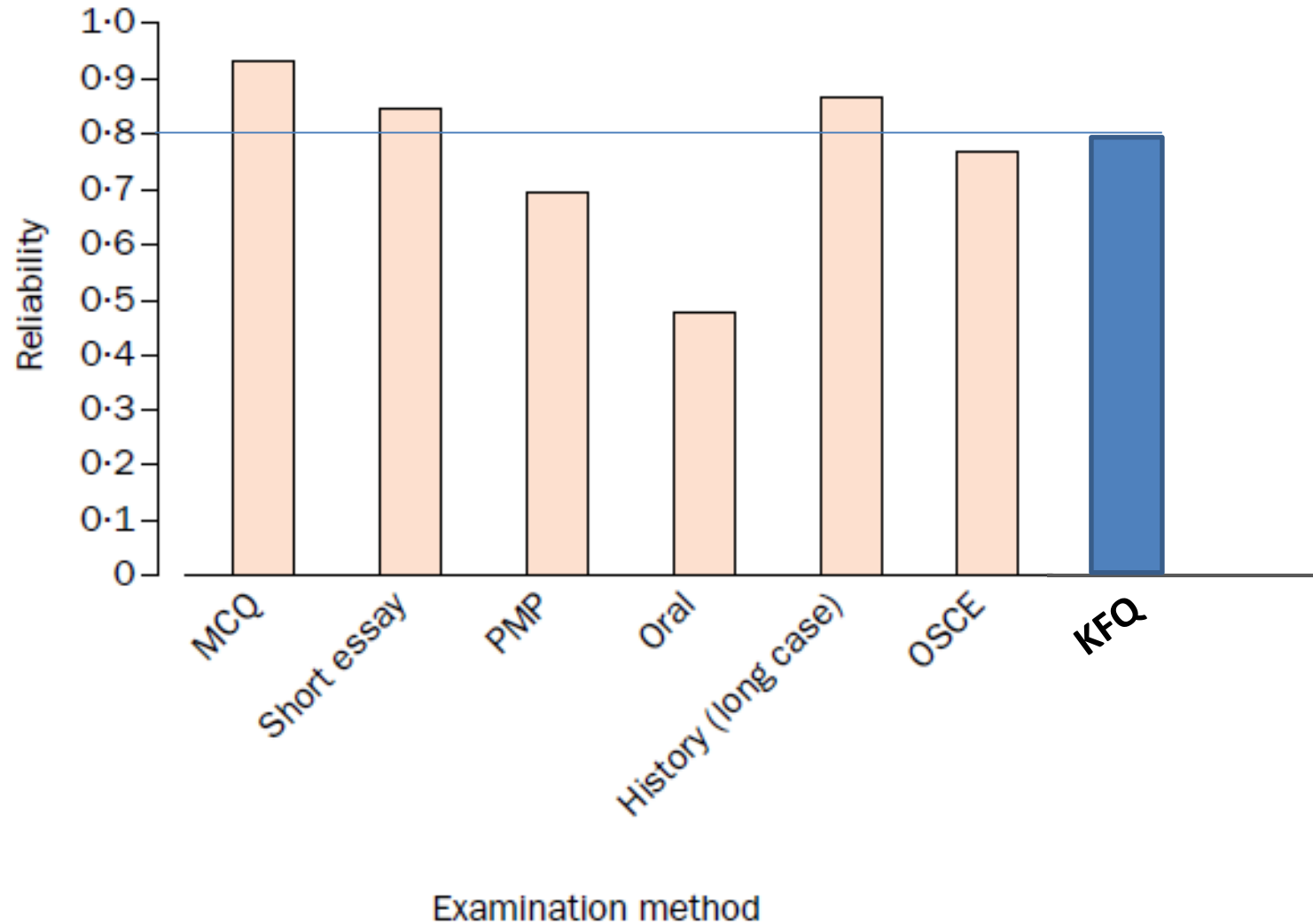
Figure 1: **Reported reliability when 4 h testing times are used for different test formats**

MCQ=multiple-choice examination; PMP=patient management problem;
OSCE=objective structured clinical examination.
KFQ = Key Features Question

(Page & Bordage, 1995; Wass et al., 2001; Yusoff, 2023)

A key feature must meet one of these criteria

01 A critical or essential step(s) in the resolution of a problem.

02 A step(s) in which examinees are most likely to make errors in the resolution of the problem.

03 A difficult or challenging aspect in the identification and management of the problem in practice.

MEDICAL COUNCIL OF CANADA / LE CONSEIL MÉDICAL DU CANADA

GUIDELINES FOR THE DEVELOPMENT OF KEY FEATURE PROBLEMS & TEST CASES

August 2012 (v3)
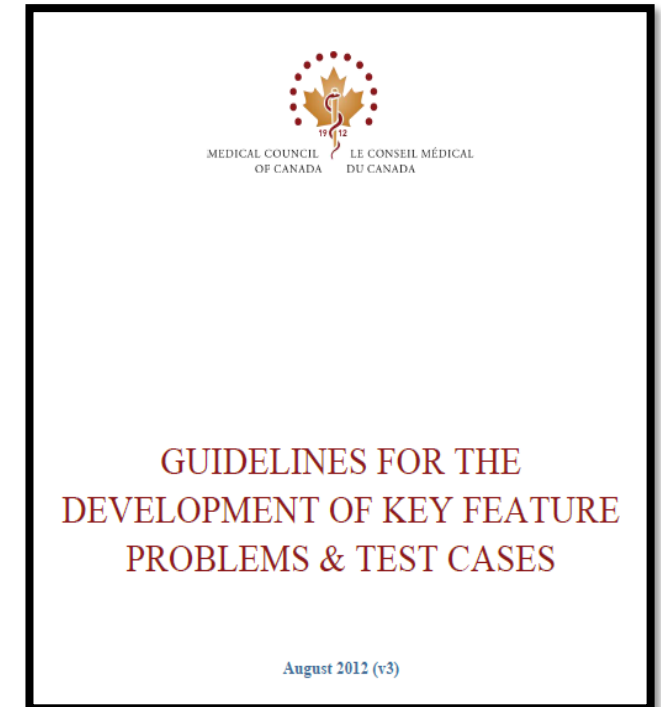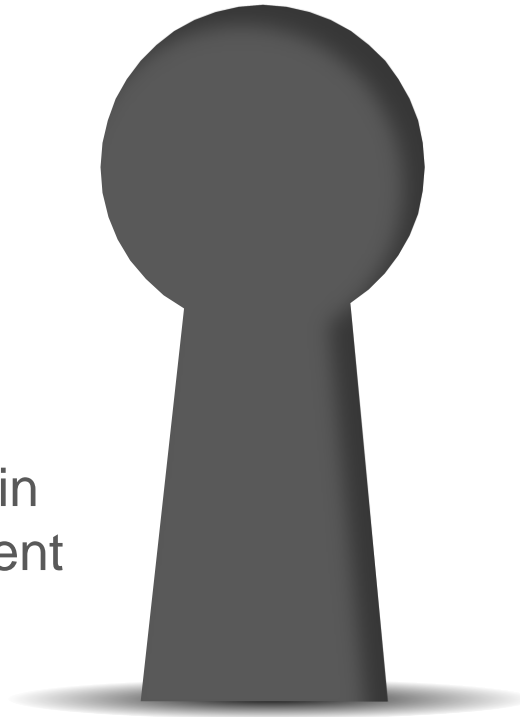
(Medical Canada Council, 2012)

1. Define the domain of clinical problems to be sampled by the examination

Developing KFQ

2. Develop an examination blueprint to guide the selection of problems for the examination

3. Develop a key feature problem for each clinical problem by some criteria.

(Page et al., 1995)

1. Define the domain of clinical problems to be sampled by the examination

Developing KFQ

3. Develop a key feature problem for each clinical problem by some criteria

2. Develop an examination blueprint to guide the selection of problems for the examination

(Page et al., 1995)

15

Priority Topics and Key Features

The College of
Family Physicians
of Canada

Priority Topics and Key Features
with Corresponding
Skill Dimensions and Phases
of the Encounter

Excerpt from
Defining competence for the purposes of certification by the College of Family Physicians of Canada: The evaluation objectives in family medicine

1. Define the domain of clinical problems to be sampled by the examination

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(Page et al., 1995)

17

Asthma

Key Feature

1. In patients of all a...
   chronic, recurren...
   a) Include ast...

   b) Confirm th...
   - history.
   - physical...
   - spirome...

2. In a child with acu...
   bronchiolitis fron...
   an appropriate hi...

3. In a known asthm...
   exacerbation or f...
   severity of the co...
   pattern of medica...
   Do not underestii...

4. In a known asthm...
   a) Treat the a...
   repeatedly and e...

   b) Rule out co...
   congestive heart...
   disease).

   c) Determine...
   (basing the decisi...
   and on the patie...

5. For the ongoing (...
   stepwise manage...
   - self-monitoring...
   - self-adjustment...
   - when to consul...

6. For a known asth...
   symptoms:
   a) Assess sev...
   regimens.

   b) Recommer...
   irritants, triggers)...
   control.

Atrial Fibrillation

Key Feature

1. In a patient who presents w...
   for an underlying cause (e.g...
   myocardial infarction, conge...
   cardiomyopathy, pulmonary...
   alcohol, etc.)

2. In a patient presenting with...
   a) Look for hemodynam...

   b) Intervene rapidly and...
   patient.

3. In an individual presenting v...
   fibrillation,
   a) Explore the need for...
   stroke with the patient,

   b) Periodically reassess...

4. In patients with atrial fibrilla...
   made to use anticoagulatior...
   and patient education, with...

5. In a stable patient with atria...
   rate control.

6. In a stable patient with atria...
   correction when appropriat...

Chest Pain

Key Feature

1. Given a patient with un...
   history to make a specif...
   factors, whether the pa...

2. Given a clinical scenaric...
   conditions (e.g., pulmor...
   pneumothorax), begin t...
   confirmed, while doing...

3. In a patient with unexp...
   heart disease.*

4. Given an appropriate hi...
   zoster infection, hiatal I...
   infections, or peptic ulc...
   a) Propose the diag...

   b) Do an appropriat...
   suspected diagnosis.

5. Given a suspected diagr...
   a) Do not rule out t...
   with low sensitivity and...

   b) Begin appropriat...

*See also the key featu...

Red Eye

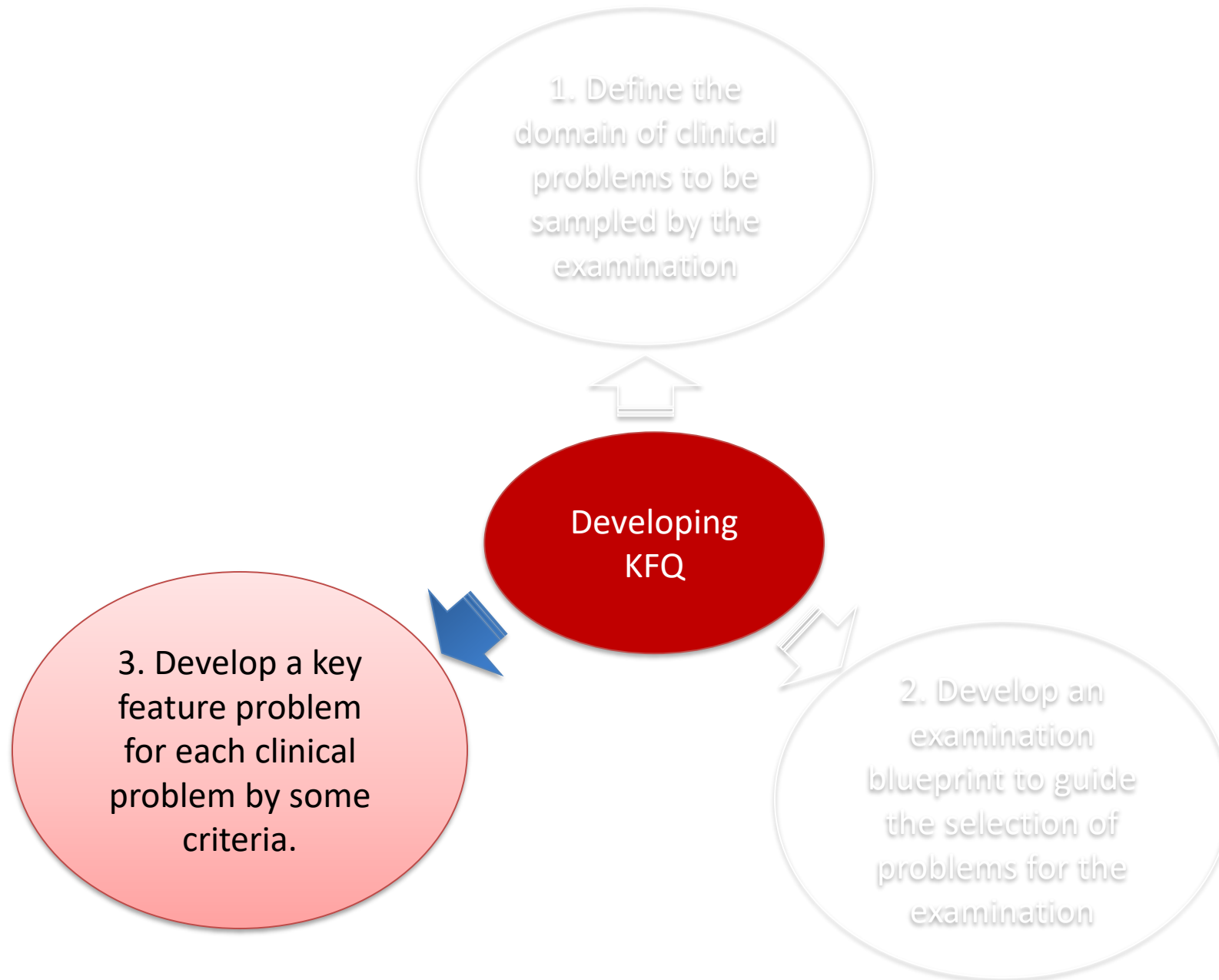| Key Feature	Skill	Phase
1. In addressing eye complaints, always assess visual acuity using history, physical examination, or the Snellen chart, as appropriate.	Clinical Reasoning	History Physical
2. In a patient with a red eye, distinguish between serious causes (e.g., keratitis, glaucoma, perforation, temporal arteritis) and non-serious causes (i.e., do not assume all red eyes are caused by conjunctivitis):		
a) Take an appropriate history (e.g., photophobia, changes in vision, history of trauma).	Clinical Reasoning	History
b) Do a focused physical examination (e.g., pupil size, and visual acuity, slit lamp, fluorescein).	Clinical Reasoning	Physical
c) Do appropriate investigations (e.g., erythrocyte sedimentation rate measurement, tonometry).	Clinical Reasoning	Investigation
d) Refer the patient appropriately (if unsure of the diagnosis or if further work-up is needed).	Clinical Reasoning	Referral
3. In patients presenting with an ocular foreign body sensation, correctly diagnose an intraocular foreign body by clarifying the mechanism of injury (e.g., high speed, metal on metal, no glasses) and investigating (e.g., with computed tomography, X-ray examination) when necessary.	Clinical Reasoning	Hypothesis generation Diagnosis
4. In patients presenting with an ocular foreign body sensation, evert the eyelids to rule out the presence of a conjunctival foreign body.	Clinical Reasoning Psychomotor Skills/Procedure Skills	Hypothesis generation Physical
5. In neonates with conjunctivitis (not just blocked lacrimal glands or "gunky" eyes), look for a systemic cause and treat it appropriately (i.e., with antibiotics).	Clinical Reasoning	Hypothesis generation Treatment
6. In patients with conjunctivitis, distinguish by history and physical examination between allergic and infectious causes (viral or bacterial).	Clinical Reasoning	Diagnosis History
7. In patients who have bacterial conjunctivitis and use contact lenses, provide treatment with antibiotics that cover for *Pseudomonas*.	Clinical Reasoning	Treatment
8. Use steroid treatment only when indicated (e.g., to treat iritis; avoid with keratitis and conjunctivitis).	Clinical Reasoning	Treatment
9. In patients with iritis, consider and look for underlying systemic causes (e.g., Crohn's disease, lupus, ankylosing spondylitis).	Clinical Reasoning	Hypothesis generation

Core clinical problem and block attachment/outcomes		Clinical skills	Practical procedures	Patient investigation	Patient management	Health promotion	Communication	Information handling	Understanding of sciences and principles	Attitudes, ethics and legal aspects	Decision making, clinical reasoning and judgement	Role of the doctor	Personal development
1	Wheezing General medicine	✓			✓		✓		✓		✓		
2/3	Tiredness General medicine	✓		✓			✓		✓				
4	Deafness ENT	✓		✓	✓		✓		✓		✓		
5	Weight loss Surgery	✓					✓		✓				
6	Preparation for 7												
7	Tremor Neurology	✓							✓		✓		
8	Collapse Emergency	✓	✓		✓				✓		✓	✓	✓

Table 1. Blueprint for the undergraduate renal course at the University of Calgary.

Column #: 1	2	3	4	5	6	7	8	9	10
Presentation	Impact	Frequency	I × F	Weight	Number of items	Diagnosis	Investigation	Treatment	Basic science
Hypernatremia	2	1	2	0.025	1.50	1	0	0	1
Hyponatremia	3	2	6	0.075	4.50	2	0	1	1
Hyperkalemia	3	3	9	0.1125	6.75	3	1	2	1
Hypokalemia	2	2	4	0.05	3.00	2	0	0	1
Acidosis	3	2	6	0.075	4.50	2	0	1	1
Alkalosis	2	2	4	0.05	3.00	2	0	0	1
ARF	3	3	9	0.1125	6.75	5	1	1	0
CRF	2	3	6	0.075	4.50	3	1	1	0
Hematuria	2	2	4	0.05	3.00	2	1	0	0
Proteinuria	2	3	6	0.075	4.50	2	0	0	2
Edema	1	3							
Scrotal mass	2	2							
Urinary retention	1	3							
Hypertension	2	3							
Polyuria	1	1							
Renal colic	1	3							
Dysuria	1	2							
Incontinence	1	2							
TOTAL									

Table 2. Weighting for impact and frequency of the clinical presentations.

Impact	Weight	Frequency	Weight
Non-urgent, little prevention potential	1	Rarely seen	1
Serious, but not immediately life threatening	2	Relatively common	2
Life threatening emergency and/or high potential for prevention impact	3	Very common	3

1. Define the domain of clinical problems to be sampled by the examination

Developing KFQ

2. Develop an examination blueprint to guide the selection of problems for the examination

3. Develop a key feature problem for each clinical problem by some criteria.

(Page et al., 1995)

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1. Defining the clinical problem situation for the problem

2. Defining the key features of each problem

3. Selecting a clinical case to represent the problem and writing the case scenario

4. Writing examination questions for each case – in general one question for each key feature

5. Selecting suitable format for each question

6. Developing a scoring key for each question

7. Pilot testing the problems to acquire test-item statistics to guide their refinement

8. Defining the minimum pass indices of the problems using standard setting procedures

3. Develop a key feature problem for each clinical problem by:

(Page et al., 1995)

Author	Dr. Z
Problem	3
Clinical Problem	Seizures
MCC Objective	Seizures (Epilepsy) (92-E)
Discipline	MED

Life Span Period

- __ pregnancy/neonatal/infant (up to 1 year)
- __ pediatric (1-11 years)
- __ adolescence (12-18 years)
- ✓ adult (19-64 years)
- __ geriatric (over 65 years)

1. Defining the clinical problem situation for the problem
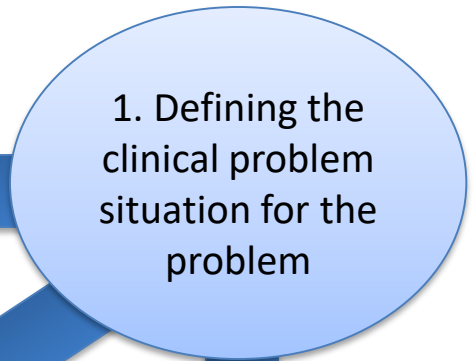
Clinical Situation

- __ undifferentiated complaint
- ✓ single typical problem
- __ multiple problem or multisystem problem
- ✓ life-threatening event
- __ preventive care and health promotion
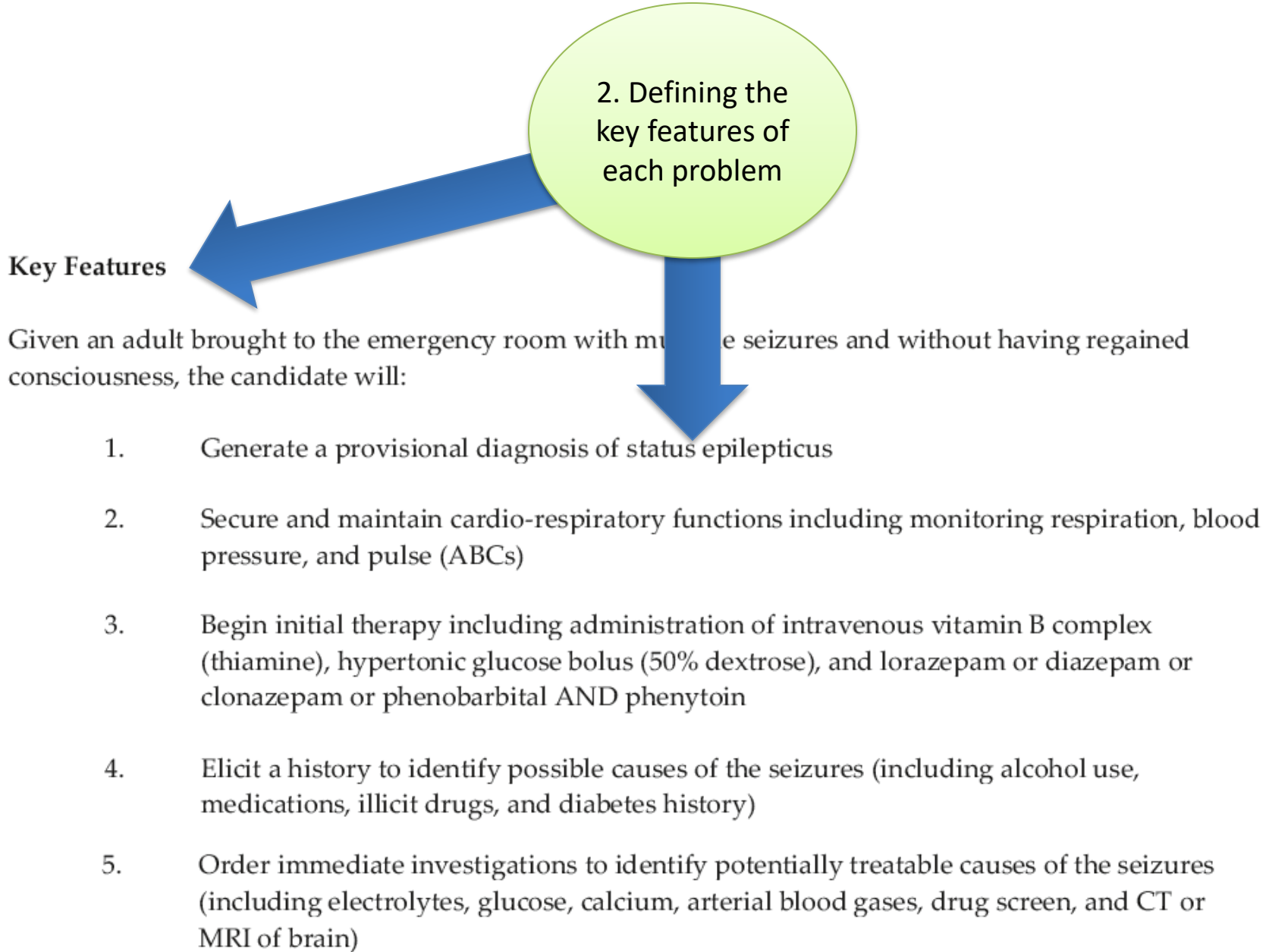
Location/Setting - Emergency Department

Patient's Age - 30-40 years

Comments

Clinical Tasks – data acquisition, management

Patient's Gender - Male (or Female)

2. Defining the key features of each problem

Key Features

Given an adult brought to the emergency room with multiple seizures and without having regained consciousness, the candidate will:

1. Generate a provisional diagnosis of status epilepticus

2. Secure and maintain cardio-respiratory functions including monitoring respiration, blood pressure, and pulse (ABCs)

3. Begin initial therapy including administration of intravenous vitamin B complex (thiamine), hypertonic glucose bolus (50% dextrose), and lorazepam or diazepam or clonazepam or phenobarbital AND phenytoin

4. Elicit a history to identify possible causes of the seizures (including alcohol use, medications, illicit drugs, and diabetes history)

5. Order immediate investigations to identify potentially treatable causes of the seizures (including electrolytes, glucose, calcium, arterial blood gases, drug screen, and CT or MRI of brain)

3. Selecting a clinical case to represent the problem and writing the case scenario

Case Scenario

A 36-year-old man is brought to the emergency room by ambulance because he fell onto a sidewalk unconscious while waiting for the bus. A witness immediately called an ambulance and reported to the ambulance crew that before falling to the ground, he seemed confused, agitated, and was arguing with some invisible person. After falling, he began to twitch for a short while, his face became blue, and then he began to have jerky movements all over his body for about a minute. He did not recover consciousness after the episode. During the 10-minute ambulance trip, he presented two other similar episodes, without recovering consciousness, and a third episode that you witnessed on arrival in the emergency room.

His temperature is 37.8 degrees C. He looks neglected and is unconscious. No relatives or friends accompanied the patient.

5. Selecting suitable format for each question

4. Writing examination questions for each case – in general one question for each key feature

Questi **Format WI** (write in)

What is (e) your leading working diagnosis(es) at this point in time? List up to two.

1. _____

2. _____

Key Feature 1. Given an adult brought to the emergency room with multiple seizures and without having regained consciousness, the candidate will generate a provisional diagnosis of status epilepticus

Scoring Key

Score **Criteria**

6. Developing a scoring key for each question

1.0 Status epilepticus (Note: both elements required)

0 Listing more than two responses

Question **Format SM (short menu)**

...s after arrival, the patient is still unconscious. The nurse found a telephone number in his ... What questions will you ask the person answering the phone – assuming that he/she knows the ...ent? Select up to six questions or select option 33 if you think that it is not appropriate to call at this ...t in time.

1. Abdominal pain
2. Alcohol history
3. Back pain history
4. Cancer history
5. Cocaine abuse
6. Coronary bypass history
7. Diabetes history
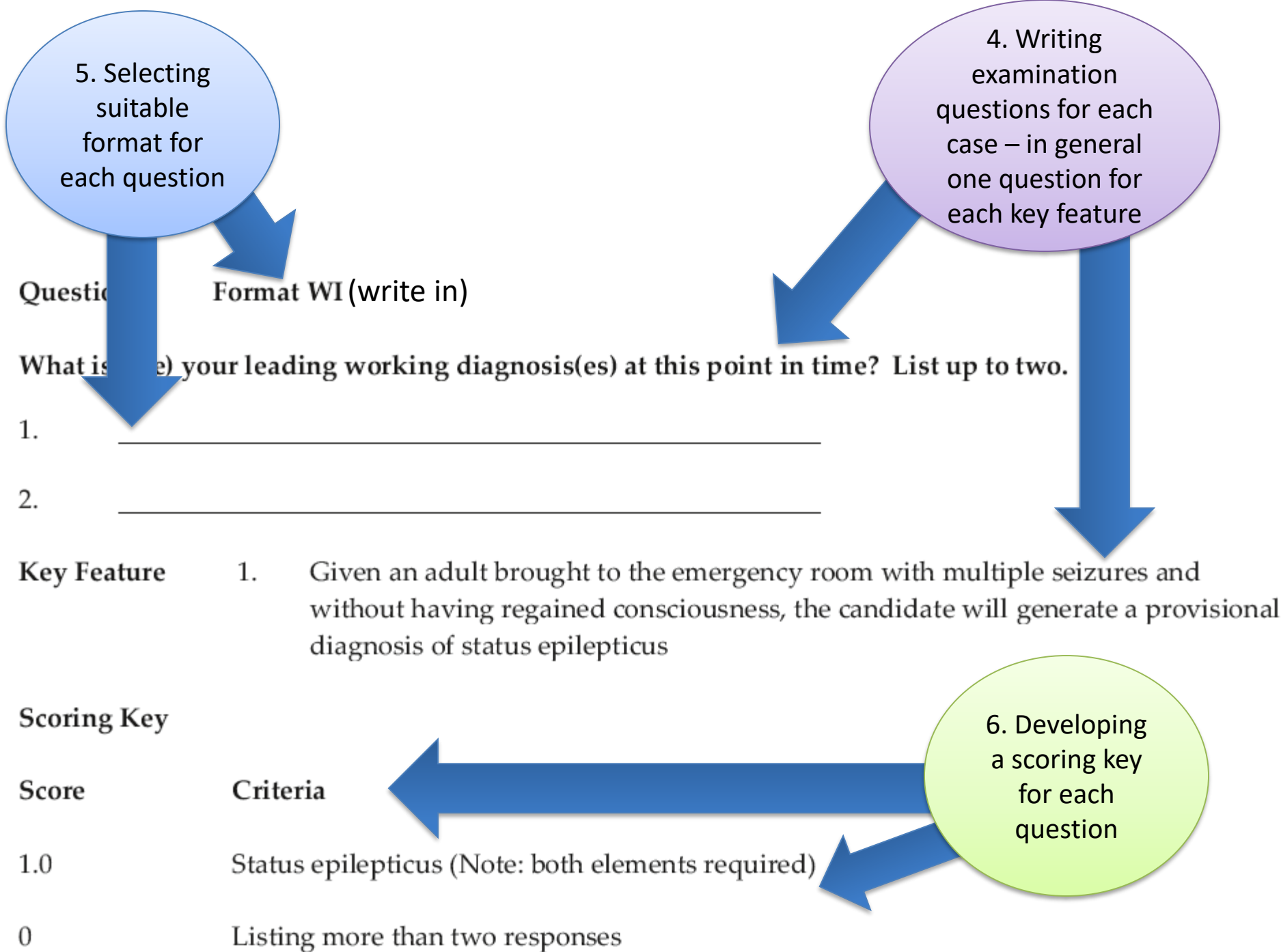8. Diarrhea
9. Dizziness
10. Drug allergy
11. Family history
12. Food allergy
13. Headache
14. Hearing disability
15. Heroin abuse

16. Joint pain
17. Lung infection
18. Medication history
19. Muscular disease
20. Nausea
21. Palpitation history
22. Pet in household
23. Previous similar problem
24. Profession
25. Sexual history
26. Smoking history
...integration difficulties

...ate to call at this point in time

Key Feature 4. Given ...gency room with multiple seizures and wi... ...ving reg... ...usness, the candidate will elicit a history to ... ...y possible causes of the ...zures (including alcohol use, medications, illicit ...ugs, and diabetes history)

Scoring Key

Score	Criteria		
		0.25	#7. Diabetes history
0.25	#2. Alcohol history	0.25	#18. Medication history
0.25	#5. Cocaine abuse	0	#33. Not appropriate to call at this point in time
	or		*or*
	#15. Heroin abuse		Selecting more than six items

5. Selecting suitable format for each question

4. Writing examination questions for each case – in general one question for each key feature

6. Developing a scoring key for each question

7. Pilot testing the problems to acquire test-item statistics to guide their refinement

With questions and answer keys defined, the next step is their validation.

Validation entails piloting the problem with discussion, review and editing by colleagues new to the problem, and confirmation of the correctness of answers through reference to suitable literature.

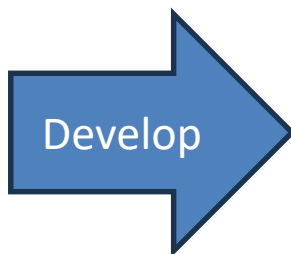(Page et al., 1995; Farmer & Page, 2005)

8. Defining the minimum pass indices of the problems using standard setting procedures

The issues of standard setting for high stakes KFP examinations are comparable to those in other written tests.

Standard setting procedure - modified Angoff method.

(Page et al., 1995; Farmer & Page, 2005)

Table 5.1 Key feature details

Authors	XYZ
Clinical problem	Age-related macular degeneration
Learning outcome	Must be specified according to the assessment/examination blueprint
Patient age group	Paediatric (1-12 years)
	Adolescence (12-18 years)
	Young adult (19-40 years)
	Middle age (40-60 years)
	Elderly (>60 years) X
Location	Ophthalmology clinic
Clinical situation	Undifferentiated complaint
	Single typical problem X
	Multiple or multisystem problem
	Visual threatening event
	Preventive care and health promotion
Comments	Critical knowledge Optional coherence tomography (OCT)—Findings Fundus fluorescein angiography (FFA)—Findings Indocyanine green angiography (ICG)—Findings
Patient's age	> 60 years old
Patient's gender	Male
Key features	Given an elderly male presented with progressive unilateral visual loss and macular edema with drusen, the candidate will
	State the most likely diagnosis Determine specific features of disease activity of the lesion based on appropriate investigations

Develop

Table 5.2 Key feature format

Case Scenario[a]:
A 75-year-old Malay male presents to outpatient clinic complaining of distortion and blurring of vision in the right eye for 6 months. He has no other complaints. He is hypertensive and smoker. He is not diabetic. On examination, visual acuity is 6/60 in the RE and 6/9 in the LE. Anterior segments were unremarkable. Fundoscopy showed submacular hemorrhage in the right eye with presence of drusens in both macula. Optical coherence tomography (OCT) revealed presence of subretinal fluid in the macula.

Question 1	What is the most likely diagnosis for this patient?
(Write-in format)	_____
Key feature	State the most likely diagnosis
Scoring key Score 1.0 0	Criteria Exudative/wet age-related macular degeneration (all components are required) Other answer or more than 1 answer
Question 2	What are the specific features based on appropriate investigations that determine the disease activity of the lesion? Select up to 3
(Short-menu format)	CNV in B-scan ultrasonography CNV in ICG Leakage in FFA Leakage in ICG Polyps in ICG Polyps in FFA Subretinal fibrosis in OCT Telangiectatic vessels in FFA *OCT—optical coherence tomography; FFA—fundus fluorescein angiography; ICG—indocyanine green angiography; CNV—choroidal neovascularization
Key feature	Determine specific features of disease activity of the lesion based on appropriate investigations
Scoring key Score 0.5 0.5 0	Criteria Leakage in FFA Polyps in ICG Other answers or more than 3 answers

Table 5.4 The 14 guidelines for constructing KFQs

Areas	Guidelines
A. Key feature foundation	(1) In order to improve the validity of the test, the objective and domain of the assessment should be defined in as much detail as possible.
	(2) It is necessary to specify the context in which the items are to be used, which includes the population to which they are oriented and the circumstances in which they will be applied.
	(3) A key feature must fulfill at least one of the criteria: A critical or essential step(s) in the resolution of a clinical problem. A step(s) in which examinees are most likely to make errors in the resolution of the clinical problem. A difficult or challenging aspect in the identification and management of the clinical problem in practice.
B. The expression of the domain and context in each assessment item	(4) The objective, domain, and context of interest should be the determining criteria in construction. Each item should cover a significant unit of this referent and form with the others test items.
	(5) Each item should clearly show the intended content. Both the syntax (i.e., arrangement of words) and the semantics (i.e., the meaning of words) should fit with those of the domain context of reference, without the addition of unnecessary difficulties
	(6) Once the items have been constructed, it must be made sure that they fit the domain and context of reference, especially as regard their distribution in the test.
C. The development of a key feature problem for each clinical problem by stated criteria	(7) Define the clinical problem situation for the case.
	(8) Define the key features of each problem.
	(9) Select a clinical case to represent the problem and write the case scenario.
	(10) Write examination questions for each case—in general one question for each key feature.
	(11) Select a suitable format for each question.
	(12) Develop a scoring key for each question.
	(13) Pilot test the problems to acquire test-item statistics to guide their refinement (optional).
	(14) Define the minimum pass indices of the problems using standard-setting procedures (optional).

Review

Table 5.3 Key feature question for candidates to answer[a]

A 75-year-old Malay male presents to outpatient clinic complaining of distortion and blurring of vision in the right eye for 6 months. He has no other complaints. He is hypertensive and smoker. He is not diabetic. On examination visual acuity is 6/60 in the RE and 6/9 in the LE. Anterior segments were unremarkable. Fundoscopy showed submacular hemorrhage in the right eye with presence of drusens in both macula. OCT revealed presence of subretinal fluid in the macula.

Question 1	What is the most likely diagnosis for this patient?
	_____ _____
Question 2	What are the specific features based on appropriate investigations that determine disease activity of the lesion? Select up to 3
	CNV in B-scan ultrasonography CNV in ICG Leakage in FFA Leakage in ICG Polyps in ICG Polyps in FFA Subretinal fibrosis in OCT Telangiectatic vessels in FFA *OCT—optical coherence tomography; FFA—fundus fluorescein angiography; ICG—indocyanine green angiography; CNV—choroidal neovascularization

(5 minutes)
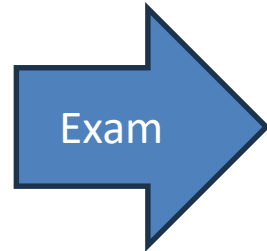
Quality Assurance Issues in Item Development

- **Problems that perform well can be maintained in an item bank** where the performance of a problem in each examination in which it is used may be recorded.

- Similarly, **question writers may receive feedback on the performance of a problem and** may be involved in review of their problems after use.

- **Candidate feedback** is another important **source of quality assurance**.

(Farmer & Page, 2005)

Essential Practical Points

- 25-40 clinical cases tested within 3 to 4 hours (6-10 mins per case) to achieve reliability of 0.70 to 0.95.
  - Recommended for high stake examination
- Each case is recommended to have 2 to 3 questions.

Key-feature questions for assessment of clinical reasoning: a literature review

Patricia Hrynchak,[1] Susan Glover Takahashi[2] & Marla Nayer[2]

OBJECTIVES Key-feature questions (KFQs) have been developed to assess clinical reasoning skills. The purpose of this paper is to review the published evidence on the reliability and validity of KFQs to assess clinical reasoning.

METHODS A literature review was conducted by searching MEDLINE (1946–2012) and EMBASE (1980–2012) via OVID and ERIC. The following search terms were used: key feature; question or test or tests or testing or tested or exam; assess or evaluation, and case-based or case-specific. Articles not in English were eliminated.

RESULTS The literature search resulted in 560 articles. Duplicates were eliminated, as were articles that were not relevant; nine articles that contained reliability or validity data remained. A review of the references and of citations of these articles resulted in an additional 12 articles to give a total of 21 for this review. Format, language and scoring of KFQ examinations have been studied and modified to maximise reliability. Internal consis-

tency reliability has been reported as being between 0.49 and 0.95. Face and content validity have been shown to be moderate to high. Construct validity has been shown to be good using vector thinking processes and novice versus expert paradigms, and to discriminate between teaching methods. The very modest correlations between KFQ examinations and more general knowledge-based examinations point to differing roles for each. Importantly, the results of KFQ examinations have been shown to successfully predict future physician performance, including patient outcomes.

CONCLUSIONS Although it is inaccurate to conclude that any testing format is universally reliable or valid, published research supports the use of examinations using KFQs to assess clinical reasoning. The review identifies areas of further study, including all categories of evidence. Investigation into how examinations using KFQs integrate with other methods in a system of assessment is needed.

SUMMARY OF KFQ

KFQ is a valid and reliable tool to assess clinical decision making.

KFQ focus on a challenging aspect in the diagnosis and management of a clinical problem where the candidates are most likely to make errors
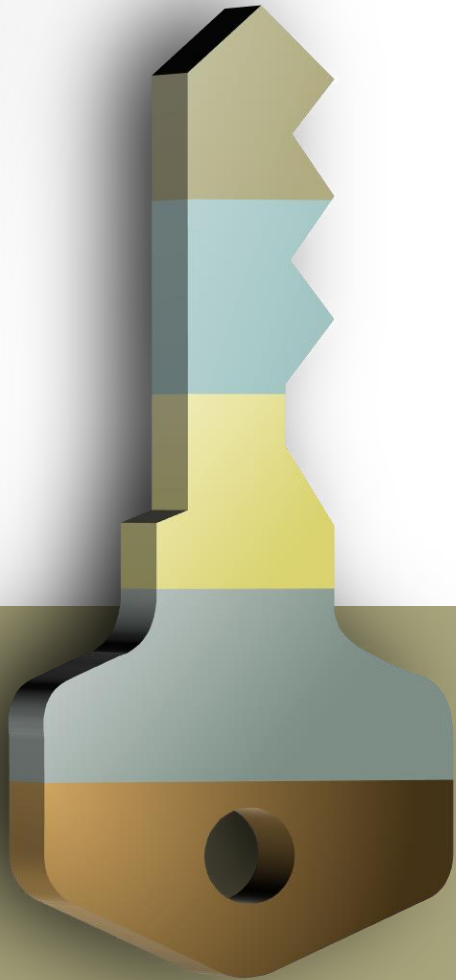
SCRIPT CONCORDANCE TEST
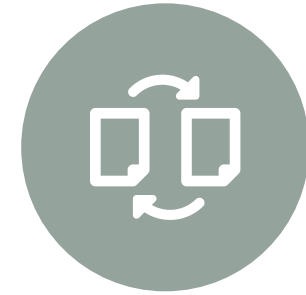
- Script Concordance Test (SCT)
- Development of Good SCT

Why SCT?

Address problem that professional practice is not always straightforward or algorithmic

(Charlin et al, 2000)

Clinician, for example…

HYPOTHETICO-DEDUCTIVE THEORY

When listening to patients, they mobilize their organized knowledge (Script Theory)

Use the script to process information

Progress to find best solution

EXPERIENCE

(Charlin et al, 2007)

Why SCT?

Address problem that professional practice is not always straightforward or algorithmic

(Charlin et al, 2000)

Competence is judgment and rest on tacit knowledge

(Charlin et al, 2000)

NOT EASILY ASSESSED BY MCQ

(Charlin et al, 2000)

Why SCT?

Address problem that professional practice is not always straightforward or algorithmic

(Charlin et al, 2000)

+

Competence is judgment and rest on tacit knowledge

(Charlin et al, 2000)

=

SCRIPT CONCORDANCE TEST

SCT: Paper or Computer Based

A Vignette describes an authentic situation representing a problem, even for an expert

Credits on each item are derived from the answers given by a panel of experts

A diagnostic hypothesis, an investigative action, or a treatment option that is relevant to the situation

Clinical Vignette :
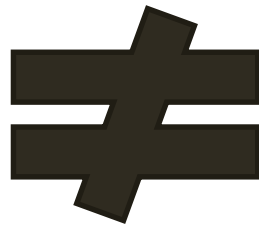A 25 year-old male patient is admitted to the emergency room after a fall from a motorcycle with a direct impact to the pubis. Vital signs are normal. The X-ray reveals a fracture of the pelvis with a disjunction of the pubic symphysis.

If you were thinking of... becomes:	And then you find...	This hypothesis				
Urethral rupture	Urethral bleeding	-2	-1	0	+1	+2
Retroperitoneal bladder rupture	Bladder distension	-2	-1	0	+1	+2
Urethral rupture	Upward and bulging prostatic apex at the digital rectal examination	-2	-1	0	+1	+2
Intra-peritoneal bladder rupture	Spontaneous micturition after the accident	-2	-1	0	+1	+2
Urethral rupture	Perineal haematoma	-2	-1	0	+1	+2

New information, e.g., a sign, a condition, or a result, that may have effect on the option

A 5-Likert scale that records the test taker answer

-2 = the hypothesis is much less probable;
-1 = the hypothesis is less probable;
0 = the information has no effect on the probability of the hypothesis;
+1 = the hypothesis is becoming more probable;
+2 = this hypothesis is much more probable.

A Vignette describes an authentic situation representing a problem, even for an expert

A researcher would like to explore on the effect of late comers in professional groups. He has a time of 6 months to complete the study in a private institution.

Credits on each item are derived from the answers given by a panel of experts

A diagnostic hypothesis, an investigative action, or a treatment option that is relevant to the situation

New information, e.g., a sign, a condition, or a result, that may have effect on the option

If you were thinking of (method)	And you find that	This method				
In-depth interview	Participants are too many and have limited time	-2	-1	0	1	2
Ethnography	Participants are busy throughout office hours.	-2	-1	0	1	2
Focus group discussion	Participants freely interact with superiors.	-2	-1	0	1	2
Narrative	Participants are not many and can be shadowed in their work.	-2	-1	0	1	2

A 5-Likert scale that records the test taker answer

-2	-1	0	1	2
This method is much less suitable	This method is less suitable	Information has no effect on method	This method is becoming more suitable	This method is much more suitable

How To Construct

EXPERT GATHERS

Select relevant problem that represent the field

- Relevant hypotheses
- Question to ask or related additional information to illustrate the problem
- More information (positive or negative) that they would look for
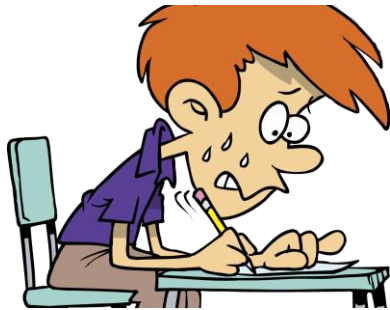
ITEM CONSTRUCTION

- Vignettes
- Item Format
  - Diagnostic Hypothesis
  - New information
  - Likert scale (5 point)

How To Construct

SUBMIT TO EXPERT

- Remove or rewrite confusing or irrelevant questions
- 5-10 experts try to answer to develop scoring system

ADMINISTER IN REAL EXAM

Developing Scoring System

Clinical Vignette :
A 25 year-old male patient is admitted to the emergency room after a fall from a motorcycle with a direct impact to the pubis. Vital signs are normal. The X-ray reveals a fracture of the pelvis with a disjunction of the pubic symphysis.

If you were thinking of... becomes:	And then you find...	This hypothesis				
Urethral rupture	Urethral bleeding	-2	-1	0	+1	+2
Retroperitoneal bladder rupture	Bladder distension	-2	-1	0	+1	+2
Urethral rupture	Upward and bulging prostatic apex at the digital rectal examination	-2	-1	0	+1	+2
Intra-peritoneal bladder rupture	Spontaneous micturition after the accident	-2	-1	0	+1	+2
Urethral rupture	Perineal haematoma	-2	-1	0	+1	+2

CONSTRUCTED ITEM SUBMITED TO EXPERT (5-10)

Confusing or irrelevant items are rewritten or removed.

EXPERTS ANSWER INDIVIDUALLY TO SEE VARIABILITY

Table 2. *Example of the Scoring Grid Obtained for Items With a Set of 10 Experts*

Clinical Vignette: Joyce, 20 years old, is consulting at your office for a "vaginal discharge" she has been experiencing for the past week.

She has had a new sexual partner for the past 3 months, and she is worried about getting a sexually transmitted disease.

If You Were Thinking of (Infection)	And Then the Patient Reports or You Find on Clinical Examination	This Hypothesis Becomes				
		-.2	-1	0	+1	•2
Yeast	She had a sexually transmitted disease a few years ago	0	0.1	0.8	0.1	0
Chlamydia	She is taking a contraceptive pill	0	0.1	0.8	0	0.1
Herpes	She has an itchy vulvae	0	0.5	0.1	0.4	0
Herpes	She has dysuria	0.1	0.1	0.2	0.5	0.1
Yeast	Her discharge is greenish and itchy	0.1	0.5	0.1	0.3	0

Note: The group was composed of general practitioners.

DEVELOP SCORING SYSTEM

SAY THERE ARE 10 EXPERTS....

A researcher would like to explore on the effect of late comers in professional groups. He has a time of 6 months to complete the study in a private institution.

If you were thinking of (Method)	And you find that	This method
In-depth interview	Participants are too many and have limited time	-2 -1 0 1 2

SCORING GRID: **0.6** **0.3** **0.0** **0.1** **0.0** ← **TOTAL OF 1**

ALL ANSWER MUST BE COUNTED AS IT REFLECTS AN EXPERT VIEW.

6 experts answer this   3 experts answer this   1 expert answer this

-2	-1	0	1	2
This method is much less suitable	This method is less suitable	Information has no effect on method	This method is becoming more suitable	This method is much more suitable

SAY THERE ARE 10 EXPERTS....

A researcher would like to explore on the effect of late comers in professional groups. He has a time of 6 months to complete the study in a private institution.		
If you were thinking of (Method)	And you find that	This method

Ethnography	Participants are busy	-2	-1	0	1	2
	SCORING GRID:	**0.1**	**0.0**	**0.2**	**0.4**	**0.3**

1 expert answer this

2 experts answer this

4 experts answer this

3 expert answer this

-2	-1	0	1	2
This method is much less suitable	This method is less suitable	Information has no effect on method	This method is becoming more suitable	This method is much more suitable

SAY THERE ARE 10 EXPERTS....

A researcher would like to explore on the effect of late comers in professional groups. He has a time of 6 months to complete the study in a private institution.		
If you were thinking of (Method)	**And you find that**	**This method**
In-depth interview	Participants are too many and have limited time	-2 -1 0 1 2 (0.6) (0.3) (0.0) (0.1) (0.0)
Ethnography	Participants are busy throughout office hours.	-2 -1 0 1 2 (0.1) (0.0) (0.2) (0.4) (0.3)
Focus group discussion	Participants freely interact with superiors.	-2 -1 0 1 2 (0.0) (0.2) (0.4) (0.3) (0.1)
Narrative	Participants are not many and can be shadowed in their work.	-2 -1 0 1 2 (0.0) (0.0) (0.1) (0.1) (0.8)

MARKS 2/4

-2	-1	0	1	2
This method is much less suitable	This method is less suitable	Information has no effect on method	This method is becoming more suitable	This method is much more suitable

We collected answer from 4 experts.

In-depth interview	Participants are too many and have limited time	-2	-1	0	1	2
		1	3	0	0	0
		(0.25)	(0.75)	(0.00)	(0.00)	(0.00)

Ethnography	Participants are busy throughout office hours.	-2	-1	0	1	2
		0	0	2	0	2
		(0.00)	(0.00)	(0.50)	(0.00)	(0.50)

Focus group discussion	Participants freely interact with superiors.	-2	-1	0	1	2
		0	0	0	1	3
		(0.00)	(0.00)	(0.00)	(0.25)	(0.75)

Narrative	Participants are not many and can be shadowed in their work.	-2	-1	0	1	2
		0	0	1	1	2
		(0.00)	(0.00)	(0.25)	(0.25)	(0.50)

-2	-1	0	1	2
This method is much less suitable	This method is less suitable	Information has no effect on method	This method is becoming more suitable	This method is much more suitable

What Does Evidence Say

Able to capture skills that are difficult to measure (Perception & Interpretation Skills)

(Brazeau-Lamontagne, Charlin, Gagnon, Samson, & van der Vleuten, in press)

Increasing mean scores of candidate with increasing level of clinical expertise
(Charlin, Brailovsky, Brazeau-Lamontagne, Samson, & Leduc, 1998; Charlin, Brailovsky, Leduc, & Blouin, 1998)

Construct validity proved across different learning environment.

(Sibert et al., 2002)

Good predictive validity for clinical reasoning test

(Brailovsky et al, 2001)

Cronbach's alpha: 0.79 to 0.82 even with small numbers of item (29-80)

(Brailovsky et al., 2001; Sibert et al., 2002; Charlin, Brailovsky, Brazeau-Lamontagne, et al., 1998;)

Aggregate method (as in SCT) is more superior than consensus method in the context of uncertainty.

(Charlin, Desaulniers, Gagnon, Blouin, & van der Vleuten, 2002)

How many experts are enough?

Expert (n)	Reliability
5	0.62
10	0.70
20	0.74
38	0.76

(Gagnon, Blouin, & van der Vleuten, 2002)

SUMMARY OF SCT

SCT is a valid and reliable standardised tool to assess clinical decision making.

SCT is designed to measure the degree of concordance that exists between examinees' scripts and scripts of a panel of experts.

Thank You

MUHAMAD SAIFUL BAHRI YUSOFF, MD, MSC, PHD

Department of Medical Education, School of Medical Sciences,

Universiti Sains Malaysia, email: msaiful_bahri@usm.my.

https://www.researchgate.net/profile/Muhamad_Saiful_Bahri_Yusoff