

The background of the slide is a solid light orange color. It is decorated with abstract geometric patterns in various shades of orange. In the top-left corner, there is a cluster of overlapping triangles and squares. A similar, though less dense, pattern appears in the bottom-right corner. The central text is white and stands out against the light orange background.

의료 방사선 정당화의 의미와 실행 방법

CONTENTS

1. 정당화 (justification) 란?
2. 의료 방사선의 정당화
3. 의료 방사선 정당화의 실행:
의료영상 가이드라인 (clinical imaging guideline) 의 개발
4. 의료영상 가이드라인의 활용에 대한
문제점 및 해결방안

justification



“판정”

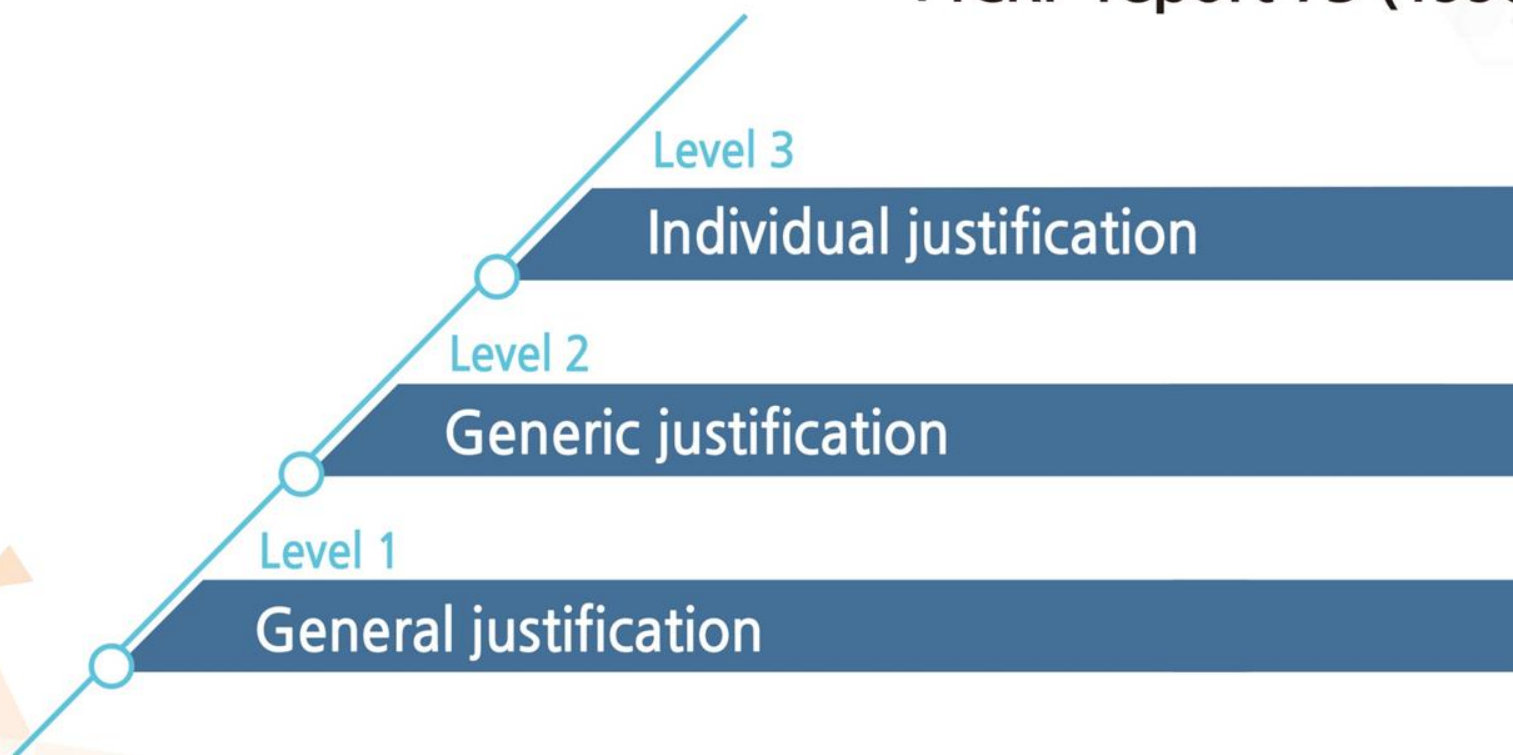
행위가 올바른가 (적절한가)



득과 실을 비교
“득이 충분히 큰가”
공리주의적 사고

Level of justification

3 levels of justification
: ICRP report 73 (1996)



Level 1: general justification

- **In general:** is medical radiation exposure appropriate?
- **의료영역에서 방사선 활용**
(단순촬영, CT, 투시, 유방촬영, 치료용 방사선 등)이 정당한가?
- **의료피폭은 정당하다.** (득이 실보다 훨씬 크다)

Level 2: generic justification

- A particular radiological medical procedure for patients with a given clinical condition
- (referral) guideline
(단순촬영, CT, 투시, 유방촬영, 치료용 방사선 등)이 정당한가?
- ex.) 배액술을 위한 영상유도는 초음파가 적절 (appropriate)

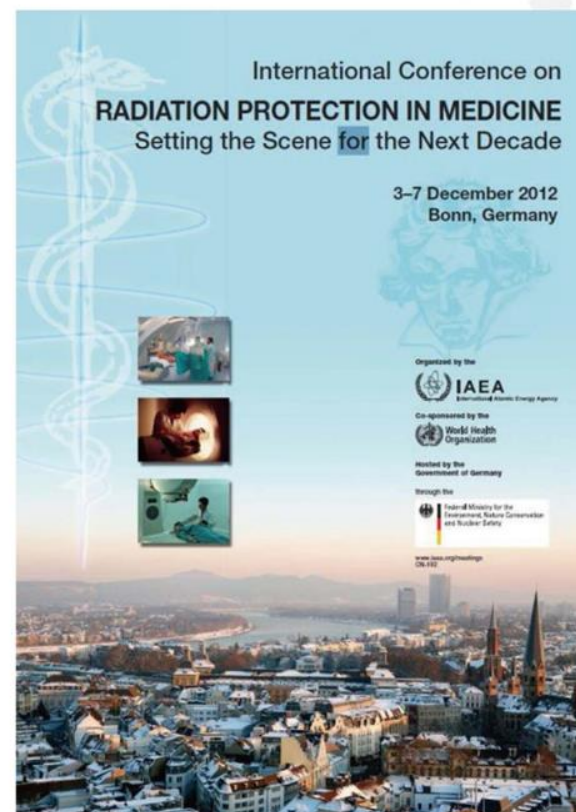
Level 3: individual justification

- Judge to do better to a particular patient- “personalized medicine”
- Assigned to individual professionals involved in the patients' care
- **Guidelines:** helpful decision support tools
- ex.) 농양의 위치가 초음파 길을 막고 있어 CT유도 하 배액술을 시행해야 하는 경우

의료 피폭에서의 정당화

ICRP: 의료방사선 영상분야 검사

- Bonn Call for Action (2012)
- 환자의 진단과 치료를 위한
이득이 손해보다 크다고 간주
– 득이 크다고 해서 unnecessary
exam이 정당한가?
- Appropriately prescribed
- “Do the right procedure”

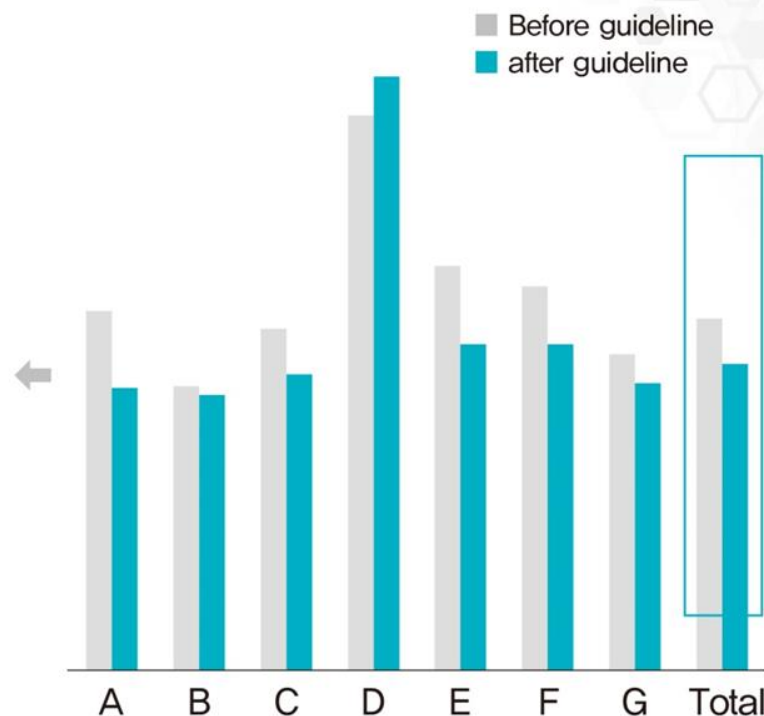


Reasons for unnecessary imaging

- 01. Reasons for unnecessary imaging
- 02. Low confidence of clinical (non-imaging) diagnosis
- 03. Consumer (patient) demand
- 04. Self-referral, opportunistic screening
- 05. Lack of communication between doctors
- 06. Defensive medicine

Effect of justification

- Justification: “all or nothing”
- Reduce unnecessary exposure
- A research by RCR (1993)
 - number of referral reduced to 12.6%(average)



BMJ 1993;306:110–111

민간검진에서의 정당화

무증상 환자에서의 의료피폭

01

“민간검진에 포함된 방사선 검사는 반드시 영상 의학과 의사와 의뢰의사가 **적절한 진료지침에 의거한 특별한 정당화**가 필요하다.”

02

- ▶ “검사를 받는 개인에게 반드시 **기대이익**과 **위험** 그리고 **검사의 제한점**에 대해 충분히 알려야 한다.”

IAEA Safety Standards

for protecting people and the environment

Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards

Jointly sponsored by
EC, FAO, IAEA, ILO, OECD/NEA, PAHO, UNEP, WHO



General Safety Requirements Part 3 No. GSR Part 3



Clinical imaging guidelines = referral guidelines

01. A practical method for enhancing justification

Level 2 (and 3)

02. Background: evidence-based radiology (very objective)

Integrates the best available clinical evidence from systematic research

03. Indicate appropriate (radiologic) examinations

Decision-support tools

04. Radiation exposure level

Evidence-based radiology

- Radiology version of EBM
 - Specialized EBM

- Different point of view

Development of evidence-based guideline is not easy
(especially, radiology)

(intervention)
Subjective judgement about imaging feature

02. Diverse protocols



Clinical imaging guidelines

영국

The Royal College of Radiologists

- 1989년 개발
- “Making the Best Use of a Department of Clinical Radiology”
- Adopted to many countries

미국

American College of Radiology

- 1995년 개발
- To be used by the Agency for Healthcare Research and Quality (AHRQ)

Development of CIG: UK

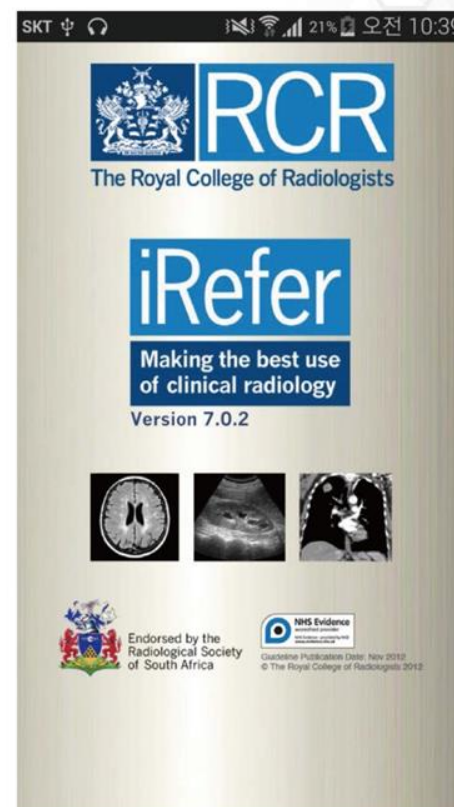
306 guidelines of 12 systemic sections

Available to PC, mobile ...

Level of evidence: Oxford centre of EBM

Level of recommendation

- Indicated,
- specialized investigation,
- indicated only in specific circumstance,
- not indicated



Development of CIG: UK



Guideline title

Colon cancer: diagnosis

Bibliographic source(s)

The Royal College of Radiologists. Colon cancer: diagnosis. In: *iRefer: Making the best use of clinical radiology* [Internet]. London: The Royal College of Radiologists; 2012.

Guideline status

This is the current release of the guideline.

Scope

Clinical/diagnostic problem

Colon cancer: diagnosis

Guideline category

Diagnosis

Evaluation

Treatment

Clinical specialty

Radiology

Intended users

GPs, radiographers, other referring clinicians and healthcare professionals, specialist trainees, foundation doctors, medical students, commissioners, radiologists

Guideline objective(s)

iRefer: Making the best use of clinical radiology collects, summarises, and updates the core clinical knowledge to help clinicians, radiologists, radiographers and other healthcare professionals to determine the most appropriate imaging procedures for a wide range of clinical problems. The guidelines also describe the scientific evidence underlying the given recommendations.

Target population

Symptomatic patients with suspected colon cancer



Development of CIG: UK

Recommendations

Major recommendations

The levels of evidence [A-C] supporting the recommendations are defined at the end of the 'Major Recommendations' field.

Colonoscopy	None	Indicated [A]	Colonoscopy is the investigation of choice for younger patients and allows tissue diagnosis.
-------------	------	------------------	--

CT colonography		Indicated [A]	CT colonography is of comparable sensitivity to colonoscopy for detection of polyps and tumours. Where available, it is used in some screening programmes.
Barium enema		Indicated [B]	Barium enema is a less sensitive alternative investigation which is largely being replaced by colonoscopy and CT colonography.

Related evidence

The RCR holds an archive of evidence on which the guidelines are based.

Development of CIG: USA

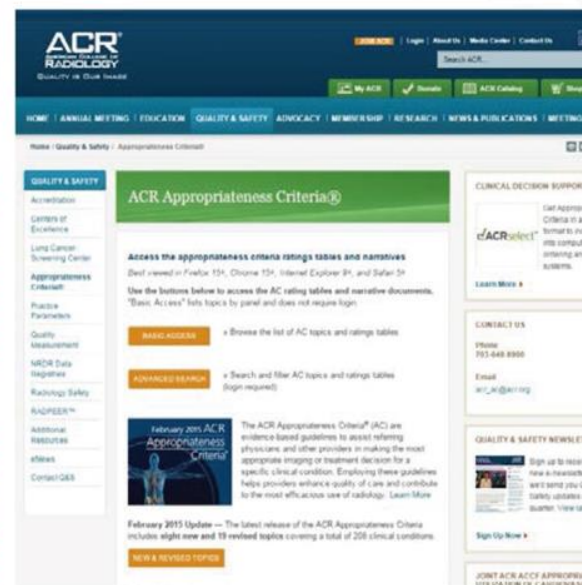
188 clinical conditions with over 908 variants and over 1670 clinical scenarios

Evidence level

- 4 categories (quality element의 조합)

Recommend level (1 to 9 rating)

- 1,2,3: usually not appropriate
- 4,5,6: may be appropriate
- 7,8,9: usually appropriate



Development of CIG: USA

https://acsearch.acr.org/list

Appropriateness Criteria

AC List

Panel Type: Panels:

Select ALL Select ALL

Diagnostic			
Breast			
Topic Name	Narrative & Rating Table	Evidence Table	Lit Search
Breast Cancer Screening	Narrative & Rating Table	Evidence Table	
Breast Pain	Narrative & Rating Table	Evidence Table	Lit Search
Evaluation of the Symptomatic Male Breast	Narrative & Rating Table	Evidence Table	Lit Search
Nonpalpable Mammographic Findings (Excluding Calcifications)	Narrative & Rating Table	Evidence Table	
Palpable Breast Masses	Narrative & Rating Table	Evidence Table	
Stage I Breast Cancer: Initial Workup and Surveillance for Local Recurrence and Distant Metastases in Asymptomatic Women	Narrative & Rating Table	Evidence Table	
Cardiac			
Topic Name	Narrative & Rating Table	Evidence Table	Lit Search
Acute Chest Pain — Suspected Aortic Dissection	Narrative & Rating Table	Evidence Table	
Acute Chest Pain — Suspected Pulmonary Embolism	Narrative & Rating Table	Evidence Table	
Acute Nonspecific Chest Pain — Low Probability of Coronary Artery Disease	Narrative & Rating Table	Evidence Table	
Asymptomatic Patient at Risk for Coronary Artery Disease	Narrative & Rating Table	Evidence Table	
Chest Pain Suggestive of Acute Coronary Syndrome	Narrative & Rating Table	Evidence Table	
Chronic Chest Pain — High Probability of Coronary Artery Disease	Narrative & Rating Table	Evidence Table	
Chronic Chest Pain — Low to Intermediate Probability of Coronary Artery Disease	Narrative & Rating Table	Evidence Table	
Dyspnea — Suspected Cardiac Origin	Narrative & Rating Table	Evidence Table	
Imaging for Transcatheter Aortic Valve Replacement	Narrative & Rating Table	Evidence Table	
Known or Suspected Congenital Heart Disease in the Adult	Narrative & Rating Table	Evidence Table	
Nonischemic Myocardial Disease with Clinical Manifestations (Ischemic Cardiomyopathy Already Excluded)	Narrative & Rating Table	Evidence Table	
Suspected Infective Endocarditis	Narrative & Rating Table	Evidence Table	
Gastrointestinal			

American College of Radiology ACR Appropriateness Criteria[®]

Date of origin: 1995
Last review date: 2011

Clinical Condition: Acute Chest Pain — Suspected Pulmonary Embolism
Variant 1: Adult.

Radiologic Procedure	Rating	Comments	RRL*
X-ray chest	9	To exclude other causes of acute chest pain. Complementary to other examinations.	☹
CTA chest with contrast	9	Current standard of care for detecting PE.	☺☺☺
Tc-99m V/Q scan lung	8		☺☺☺
US lower extremity with Doppler	7	If chest x-ray is negative and index of suspicion is high.	○
CTA chest with contrast with CT venography lower extremities	6		☺☺☺
Arteriography pulmonary with right heart catheterization	5	If suspicion is high and CTA is inconclusive, or if intervention is needed. If patient is unable to receive iodinated contrast, may be alternative to V/Q scan. See statement regarding contrast in text under "Anticipated Exceptions."	☺☺☺☺
MRA pulmonary arteries without and with contrast	4		○
MRA pulmonary arteries without contrast	3		○
US echocardiography transesophageal	2	Limited experience. Has been used for central pulmonary emboli.	○
US echocardiography transthoracic resting	2	To assess for RV strain or failure in the presence of major pulmonary embolism.	○
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate			*Relative Radiation Level

Variant 2: Pregnant patient.

Radiologic Procedure	Rating	Comments	RRL*
X-ray chest	9		☹
US lower extremity with Doppler	8		○
CTA chest with contrast	7		☺☺☺
Tc-99m V/Q scan lung	7	Ventilation done only if necessary.	☺☺☺
Arteriography pulmonary with right heart catheterization	4	Rarely indicated. For clarification or catheter-directed intervention.	☺☺☺☺
CTA chest with contrast with CT venography lower extremities	3		☺☺☺
MRA pulmonary arteries without and with contrast	3	May be used as a problem solver or if intervention is planned. Concern for fetal exposure to contrast.	○
MRA pulmonary arteries without contrast	3		○
US echocardiography transesophageal	2		○
US echocardiography transthoracic resting	2		○
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate			*Relative Radiation Level

Difference between 2 guidelines

	iRefer (UK)	ACR Appropriateness Criteria (USA)
First version	Since 1989	Since 1995
Number of guidelines	12 categories, 306 guidelines	Diagnostic part: 11 system, 168 guidelines (excluding radiologic oncology)
Grading of evidence	Based on Oxford center for evidence based medicine: A to C	Based on the method developed by ACR: category 1 to 4
Grading of recommendation	4-grade system Indicated Specialized investigation Indicated only in specific circumstance Not indicated	9-degree systems 1-3 usually not appropriate 4-6 may be appropriate 7-9 usually appropriate
Radiation exposure	5 grades (0 to 4+)	6 grades (0 to 5+)
Accessibility	Less accessible (access after purchase) Booklet, online, and application for mobile Evidence tables are not opened	More accessible (open access via web for free) Online version Evidence tables are opened

Clinical Decision Support: USA

- Protecting Access to Medicare Act (PAMA):
 - consult appropriate use criteria (AUC) prior to ordering advanced diagnostic imaging services (ADIS)
- 2018.7~2019.12 : voluntarily
- 2020.1~ : AUC program begins with one year Educational & Operations testing period



Development of Radiologic Guideline: Korea

Korean Society of Radiology (KSR)

Collaborating groups	Health Insurance Review and Assessment Service of Korea (HIRA)	National Evidence-based Healthcare Collaborating Agency of Korea (NECA)
Developers of guidelines	KSR High-Cost Radiologic Examination Guideline Committee	Clinical Practice Guideline Committee
Guidelines	Guidelines for repeated CT examination	Korean Clinical Imaging Guidelines
Survey and audit	Survey for actual condition and demonstration project of guideline for repeated imaging	

Korean Clinical Imaging Guidelines 소개

Home

Patient Information

Search by symptoms

Search by disease

Search by subspecialty

Grades of recommendation

Level of evidence

Radiation dose

About CDSS

Search by Department

Brain head and neck

Thyroid

Chest

Cardiovascular

Breast

Abdomen

Genitourinary

Musculoskeletal

Intervention

Pediatric

Details

Chest

KQ 1. What is the appropriate imaging test in adult patient with hemoptysis?

Recommendation 1-1. Chest X-ray is recommended as an initial imaging test in patients with hemoptysis

Grades of recommendation

Level of evidence





Radiation dose

Examination Chest X-ray

사용방법: <http://cdss.or.kr> 접속

Grades of recommendation		
Grading	Contents	Meaning
A	Recommended	This intervention (examination) has enough evidence to support desired effect, and therefore, is recommended.
B	(Conditional) Recommended	This intervention (examination) has intermediate to enough level of evidence to support desired effect. provide intervention (examination) selectively, or for specific individuals based on expert's judgment.
C	Not recommended	This intervention (examination) has enough evidence to support non-desired effect, and therefore, is not recommended (use of this examination is not recommended).
I	No recommendation	This intervention (examination) dose not have enough evidence to either support or reject effectiveness, and needs further research. This intervention (examination) has very low level of certainty for desired effect, and decision based on recommendation grading has no meaning.

Overall evidence level	
Overall Evidence Level	Definition
High <I>	Results are from appropriately designed experiments with low risk of bias
Moderate <II>	Results are from appropriately designed experiments with intermediate risk as bias
Low <III>	Results are from inappropriately designed experiments, or risk of bias is high
Very low <IV>	Results are from inappropriately designed experiments, or risk of bias is high

Radiation dose		
Symbol	RRL	Examples
0	0	Ultrasonography, MRI
	< 1 mSv	Chest PA, plain radiography, mammography
	1-5 mSv	IVU, UGIS, low dose chest CT, brain CT, brain CTA
	>5 -10 mSv	Routine Chest CT, Abdominal CT, Coronary CT
	> 10 mSv	3 phase dynamic CT (abdomen)

황달로 내원한 환자



검색하기

황달

KQ 1. 황달증상이 있는 환자의 진단을 위한 적절한 영상검사는 무엇인가? (MRCT를 포함하는 조영증강 MRI)

권고 1. 황달 증상이 있는 환자의 첫 번째 검사로 초음파를 권고한다. 악성 담관 폐쇄가 의심되는 환자의 경우에는 조영 증강 복부 CT 또는 MRCP를 포함하는 조영 증강 복부 MR를 권고한다.

KQ 1. 황달증상이 있는 환자의 진단을 위한 적절한 영상검사는 무엇인가? (이중시기 채담도 CT)

권고 1. 황달 증상이 있는 환자의 첫 번째 검사로 초음파를 권고한다. 악성 담관 폐쇄가 의심되는 환자의 경우에는 조영 증강 복부 CT 또는 MRCP를 포함하는 조영 증강 복부 MR를 권고한다.

복부

KQ 1. 황달증상이 있는 환자의 진단을 위한 적절한 영상검사는 무엇인가?

권고 1. 황달 증상이 있는 환자의 첫 번째 검사로 초음파를 권고한다. 악성 담관 폐쇄가 의심되는 환자의 경우에는 조영 증강 복부 CT 또는 MRCP를 포함하는 조영 증강 복부 MR를 권고한다.

권고등급



근거수준



방사선량



검사부위 MRCT를 포함하는 조영증강 MRI

복부

KQ 1. 황달증상이 있는 환자의 진단을 위한 적절한 영상검사는 무엇인가?

권고 1. 황달 증상이 있는 환자의 첫 번째 검사로 초음파를 권고한다. 악성 담관 폐쇄가 의심되는 환자의 경우에는 조영 증강 복부 CT 또는 MRCP를 포함하는 조영 증강 복부 MR를 권고한다.

권고등급



근거수준



방사선량



검사부위 이중시기 채담도 CT

Implementation of CIG

01. Development of evidence-based guidelines

Too much effort and money

02. Accessibility for guidelines

Booklet, web, mobile...

03. Implementation of radiology

“산 넘어 산”

Too much ‘conflict of interest’

Partnership: communication

Provider (radiologist, radiographer)

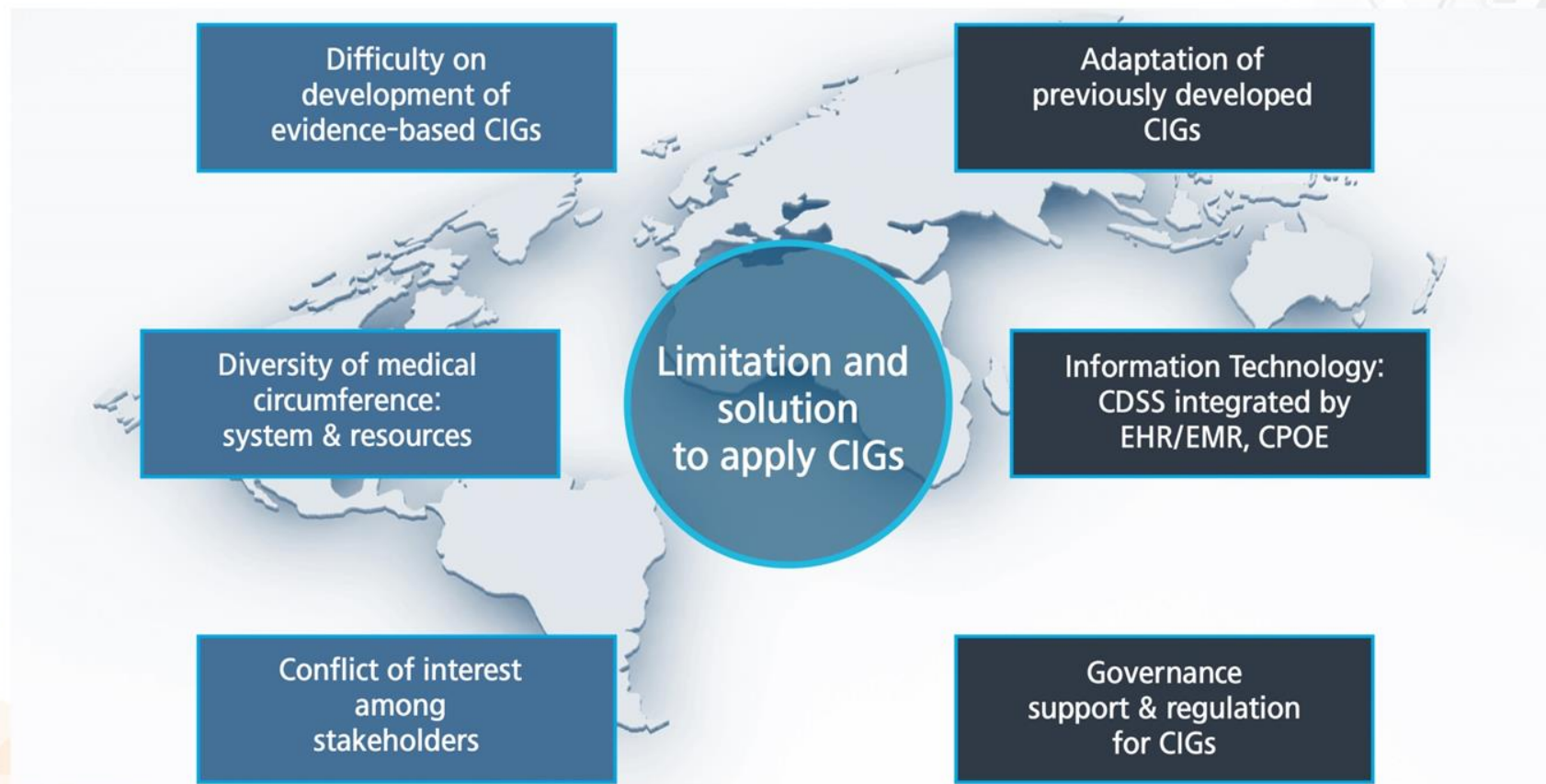
Referrer (GP, other physician)

Consumer (patient)

Regulator (government)

Payer (국민건강보험)

Hurdles for implementation



Adoption vs. Adaptation

Adoption

- 01 입양
- 02 적은 비용
- 03 원 guideline과 비슷한
의료수준/의료환경

Adaptation

- 01 변경 후 도입
- 02 상대적으로 많은 비용
(새로 개발하는 것 보다는 적음)
- 03 의료수준과 의료환경을
반영하여 적용가능
- 04 기 개발된 가이드라인을 검색하여
근거를 확보한 후, 현 상황에 맞는
가이드라인을 작성

Summary

Justification: all or nothing

- Effective to reduce unnecessary radiation exposure

Clinical Imaging Guidelines

- Helpful to decide radiologic exam
- Very objective (evidence-based)
- Adoption and adaptation
- Hurdle for implementation: diversity of medical circumstance and conflict of interest