JUSTIFICATION AND OPTIMISATION IN PRACTICE

DR. G. SOUVERIJNS
Jessa Hospital

Campus Virga Jesse
Hasselt

Campus Salvator
Hasselt

Campus St-Ursula
Herk-de-Stad

981 beds, 220 day hosp, > 400 doctors, > 3,000 employees
3 radiology departments, 24 radiologists, 1 consultant, 2 residents
Justification and optimisation

› Increased use of ionizing radiation in medicine

› US: 600% increase in one generation

› Enormous benefits: 1. accuracy diagnosis

› Risk: linear dose relation radiation induced cancers

› Reasons: 1. better en more techniques
  2. increase in knowledge
  3. more frequent follow-up needed
     -> expensive cancer therapies
     -> longer survival
  4. Legal
     ...
Justification and optimisation

Increased use of ionizing radiation in medicine

But...

The radiation protection of Patients Unit of the International Atomic Energy Agency (IAEA):

1. ‘significant level of inappropriate usage’
2. ‘poor level of awareness of dose and risk among some key groups involved’

The British journal of Radiology, 85 (2012), 523-538
Justification of Medical Exposure in Diagnostic Imaging, IAEA 2-4 Sept 2009
Justification and optimisation

Increased use of ionizing radiation in medicine

But...

1. ‘significant level of inappropriate usage’
2. ‘poor level of awareness of dose and risk among some key groups involved’

And...

3. Budget needed for reimbursement of new techniques (full body MRI, interventional oncology), better reimbursement for existing techniques (cardiac-CT and -MRI,...)

4. Budget constraints
Justification and optimisation
Justification and optimisation

› ICRP: International Commission for Radiation Protection

› The ICRP system of radiation protection:
  3 fundamental principles:
  1. justification
  2. optimisation
  3. dose limitation

Justification?

1. risk/benefit balance

2. Even if benefits outweigh risk, the test is unnecessary when US/MRI could provide an accurate diagnosis.

3. Cost, local expertise, available resources, accessibility and patient values have to be considered in addition to efficacy.
Appropriateness in imaging: ‘best test first’

1. risk/benefit balance

Benefit outweighs risk when:
- appropriately prescribed (Evidence based guidelines) will improve diagnosis
  Provide management information
- properly performed = Optimisation (ALARA)

Do the right procedure
Do the procedure right
Best matches for Justification of radiological examinations:
- **Justification of radiographic examinations: What are the key issues?**
- **Radiological Examinations in Pediatric Ages.**
- **Russian practical guidance on radiological support for justification of X-ray and nuclear medicine examinations.**

Switch to our new best match sort order

Search results
Items: 1 to 20 of 48

1. **Cost risk-benefit analysis in diagnostic radiology with special reference to the application of referral guidelines.**
   PMID: 31329996
   Similar articles

2. **Overdiagnosis and overtreatment: an ethical issue for radiological protection.**
   PMID: 30900132
   Similar articles

3. **Is the diagnostic radiological image an undervalued resource? Exploring the literature.**
   PMID: 30725267
   Free PMC Article
   Similar articles

4. **The risk of cancer attributable to diagnostic medical radiation. Estimation for France in 2015.**
   PMID: 30537057
   Similar articles

5. **The present state of radiation exposure from pediatric CT examinations in Japan: what do we have to do?**
   PMID: 26428748
   Free PMC Article
- In past: attention for optimisation / dose reduction tech.
- Actual: worldwide attention for justification
Current status of medical radiation exposure in Korea - recent efforts to develop a radiation exposure control system focussed on justification and optimisation.

Do KH1, Jung SE2.

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Abstract
Radiation exposure from diagnostic medical imaging has increased in Korea. Radiological societies play a key role in radiation safety issues in Korea, including guidelines, accreditation, advocacy, scientific activity, and education. Any medical radiation exposure must be justified, and examinations using ionising radiation must be optimised. Education of referring physicians and radiologists is also important for justification. Medical physicists and radiographers have an important role to play in quality management and optimisation. Regulations are essential to control medical radiation exposure. Therefore, national organisations have made a significant effort to regulate and monitor medical radiation exposure using guidelines, accreditation, and even the law. Medical radiation exposure must be controlled, and this could be achieved by continuous interest from health professionals and organisations.

Radiation risks: what is to be done?
Huda W1.

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Abstract
OBJECTIVE: What is currently known about radiologic risks is reviewed, policies that should be adopted based on our current knowledge are proposed, and how these policies can be applied to adequately protect patients in everyday clinical practice is described.

CONCLUSION: All activities in life (e.g., driving automobiles) are associated with risks, and medical imaging is no different, so the most important message to convey to patients is whether a proposed examination is justifiable. Our collective goal should be ensuring that all radiologic examinations are justified and are as low as reasonably achievable (ALARA), which maximizes the benefits of medical imaging for our patients.
Clinical justification of dental radiology in adult patients: a review of the literature.

Martínez Beneyto Y', Alcaraz Banos M, Pérez Lajarin L, Rushton VE.

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Analysis of radiological examination request forms in conjunction with justification of X-ray exposures.

Trianthropoulou Ch', Tsalafoutas I, Maniatis P, Papavdis D, Rais G, Siafas I, Velonakis S, Kouletianos E.

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Critical issues in radiology requests and reports.

[Article in English, Italian]


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- Why worldwide attention for justification?

- 3-7 dec 2012 IAEA, WHO, Government of Germany Intnl Conference on RP in medicine

  80 countries
  16 organizations

-> reviewed advances, challenges and opportunities:

Result: Call for Action => enhancing implementation of justification
IAEA Call for Action 2012 => enhancing implementation of justification:

1. Introduce and apply the **3A’s** (awareness, appropriateness and audit),

2. Develop **evidence-based** criteria

3. Implement imaging **referral guidelines** globally, keeping local and regional variations

4. Strengthen the application of **clinical audit** in relation to justification

5. Introduce information technology solutions, such as **decision support tools** in clinical imaging, and ensure that these are available and freely accessible at the point-of-care;

6. Further develop criteria for justification of health **screening programmes** for asymptomatic populations (e.g. mammography screening) and for medical imaging of asymptomatic individuals who are not participating in approved health screening programmes.
Justification: How?

Why representative of Jessa Hospital Hasselt?

We started and improved our justification process in 2012-2016 through internal and external (Quaadril - Niaz – Fanc – DGEC) audit; we tested BQUAADRIL.
Justification: How?

1. How did we start and improve our justification process?

2. Practical steps in justification
Justification

1. How did we start and improve our justification?

“Accreditation”

2008 - 2012- 2016: Jessa received NIAZ – Qmentum accreditation

Qmentum:
2012->2016 more demanding standards !

2020 - ...
Qmentum Global:
even more demanding, patient involvement
Justification

NIAZ-Qmentum transition 2012->2016: gap-analysis

NIAZ-Qmentum // JCI for radiology

=~ Quaadril
QUAADRIL
Quality Assurance Audit For Diagnostic Radiology Improvement and Learning

- Comprehensive Clinical Audits of Diagnostic Radiology Practices: A tool for quality improvement
Chapter 5 QUAADRIL: Patient Related procedures

5. Patient related procedures .................................................................
   5.1 Referral of patient for examination .............................................
      5.1.1 Appropriateness of examination/justification......................
   5.1.2 Quality of referral ................................................................
   5.1.3 Referal education .................................................................
   5.1.4 Patient education/consent ......................................................
   5.1.5 Pre-procedure screening and preparation .............................
   5.1.6 Scheduling .......................................................................

5.2 Identification of the patient ...........................................................

5.3 Examinations ............................................................................
   5.3.1 Patient confidentiality and physical privacy .........................
   5.3.2 Imaging techniques .............................................................
   5.3.3 Clinical care, patient sedation/anaesthesia and contrast agents
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5.8 Record and film/image retention ............................................... 48
Justification

**Q-team problems:**

- gap:
  
  -> written improvements, but bringing it into practice?

  -> what is the current level of knowledge with our employees?

  -> where to find procedures / how to communicate?

  -> how to stimulate continuous improvement?
Justification

Q-team solutions:
- gap
  - written improvements, but bringing it in practice?
  - what is the current level of knowledge with our empl.?

- internal audits: 2012-2013

but no expertise nor pressure

=> need for external audit
The need for Clinical Auditing is supported by several organizations

- White paper on radiation protection, 2011
- ESR Clinical Standards and Audit templates, 2015

- European Commission Guidelines for Clinical Audit for Medical Radiological Practices No 159

- International Atomic Energy Agency: Quality Assurance Audit For Diagnostic Radiology Improvement and Learning (QUAADRIL)
Clinical Audit

The ESR believes that all radiology departments should have a Clinical Audit Programme in order to assure users of the quality of the service and to promote continual quality improvement.
QUAADRIL: Quality Assurance Audit For Diagnostic Radiology Improvement and Learning

• Quaadril is 100% in line with EC Guidelines No 159

By comparing the practice of the service against the standards of good practice, clinical audits can inform the staff of the health care service, as well as all other stakeholders, about the essential elements of quality and the weak points of the overall clinical service.

The audits will indicate areas for improvement and provide reassurance on issues such as safety and efficacy, all of which are essential to creating an environment of continuous development.
Clinical audit in terms of the EC Directives/EURATOM 97 and 13

The European council has adopted the Euratom Directive laying down basic safety standards for protection against the dangers arising from exposure

Whereas the establishment of
– quality assurance
– and audit programmes,
– and inspections by the competent authorities are necessary to ensure that medical exposure is delivered under good radiation protection conditions;
Het **technisch reglement van 19/07/2019** maakt de klinische audits **verplicht** vanaf 1 september 2019.

- alle radiologie diensten en alle connexe diensten waar gebruik wordt gemaakt van röntgentoeepassingen.
- In een eerste fase zijn enkel **zelfevaluaties** een verplichting.
- minimaal **tweejaarlijks** volgens de criteria beschreven in het **B-QUAADRIL** dat opgesteld werd door BELMIP.

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<td>Zelfevaluatiereport</td>
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<td>Intern auditrapport</td>
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<td>Extern auditrapport</td>
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Verbeterpunten ➔ Verbeteracties
Quaadril Audit april 2014

Qaelum: dose-monitoring

Dr. J. Schillebeeckx
Nelly Ilcheva

Report: 34p with ‘areas for improvement’
LEVEL 1 CLINICAL AUDIT TEMPLATES

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Justification

Q-team solutions:
- gap
  -> where to find procedures / how to communicate
  -> how to stimulate continuous improvement?

- need for ‘document management system’
  -> + tools for continuous improvement
  -> + overview accreditations needs
  -> + tools for communication

=> Bought a ‘total quality system’, integrated dose and document management system with auditing possibilities
3. Arriving at the radiology department

All procedures / working instructions can be found in Q-book
5. Probleemoplossingen
- Probleemoplossing CT SAS U Spuitpomp Medtron
- Probleemoplossing CT SA (HD750 GE)
- Probleemoplossing CT SA Bracco CO2 Insufflator
- Probleemoplossing CT SA CBCT New Tom
- Probleemoplossing CT SU (Lightspeed 16 slice)
- Probleemoplossing CT VJ Bracco CO2 Insufflator
- Probleemoplossing CT VJ Spuitpompen
- Probleemoplossing CT VJ Toshiba Aquilion one en Toshiba rx!
- Probleemoplossing Jessa Netwerk
- Probleemoplossing Jessa Impax

6. Handleidingen
- Handleiding CO2 pomp
- Handleiding CT stripverhaal kinderen
- Handleiding CT stripverhaal ouders
- Handleiding SA CBCT low dose
- Handleiding SA CBCT user manual
- Handleiding SA CT contrastoven (CBM Panacea)
- Handleiding SA CT HD750
- Handleiding SA CT Spuitpomp Medtron accutron
- Handleiding SU CT contrastoven
- Handleiding SU CT Lightspeed series manual

7. Formulieren
- Aanvraagformulier Radiologie
- Informed consent CT-geleide punctie of -drainage
- Medicatie stickers telebrix 30ml in fles H2O
- Medicatie stickers adrenaline
- Medicatie stickers buscopan colonografie
- Medicatie stickers drinken fles ct van tot
- Medicatie stickers iomeron spuitpomp
- Medicatie stickers NaCl spuitpomp
Justification
Justification

Role – Reader (everyone on department)
Triggered by: manual question or automatic notification
Objective: everyone can participate in quality and is stimulated to think along with department

Role – Reviewer
Triggered by: notification for demand for revision
Objective: persons with high level of expertise are demanded for opinion before approval

Role – Publisher
Triggered by: notification for approval of revision
Objective: person who are given the responsibility to publish a new procedure or to publish the procedure which is approved for revision
Follow up:
   How many new procedures do I have to read?

admin: who reads new procedures?
Opportunity:
  tested AI interfacing in total management system:
  => new leap forward
1. How did we start and improve our justification process?

- accreditation
  => audit: baseline info and areas for improvement
  => awareness / need for change

- tools for registration, communication
Justification

1. How did we start and improve our justification process?

2. Practical steps in justification
Justification

Cfr several chapters in (B-)Quadril and JCI/Qmentum:

- Knowledge of:
  B-Q
  - Availability/knowledge of guidelines
  - Rad Order is complete
  - Appropriateness or substitution (registration)
  - Contraindications
  - Inform the patient

Q
  - Indications for available examinations
  - Advantages and limitations of examination options
  - Complementary nature of other examinations
  - Results of prior examinations
  - Risk-benefit considerations including adverse effects

⇒ Information = key => task not only for radiologist

J. Vom et al., Justification of Radiographic examinations: What are the key issues? Journal of medical radiation sciences; 64 (2017) 212-219
Justification

Practical: domains to work on

1. Referral by doctor

2. Making an appointment

3. Arriving at the radiology department
   Tasks for secretary, nurses/technicians, radiologists
Justification

Practical: domains to work on

1. **Referral by doctor**
2. Making an appointment
3. Arriving at the radiology department
   - Tasks for secretary, nurses/technicians, radiologists
Justification

Practical: domains to work on

1. Referral by doctor

Steps taken:

- set of **training sessions** for general drs (LOK)
  - Guidelines in general
  - Guidelines for lower back pain
  - Guidelines for abdominal imaging
  - Risks in a radiology department
Justification

Practical: domains to work on

1. Referral by doctor

Steps taken:

- **Rad Call center**: separate nr for referring drs
  - Very High SLA: 95% < 15” => redirected to Radiologist with subspeciality they ask for
    * communication: we prefer a phone call to avoid suboptimal referrals (general drs feel hampered to do so)
Justification

Practical: domains to work on

1. Referral by doctor

Steps taken:
- **Website: Belgian guidelines** available
Justification

Practical: domains to work on

1. Referral by doctor

Steps taken:
- **Radiology = no commodity => radiologists need to play a role**
  - Improved visibility of radiology in our hospital
  - Take part in oncology handbook workshops!
  - Organ focussed radiologists = contact person
  - Take part in multidisciplinary oncology meetings
    - Better relations with referring colleagues; appreciation
    - Easier communication, avoiding wrong exams
Justification

Practical:

1. Referral

Opportunity - Electronic

NDSC helps bring the best available imaging guidelines to referrers

ESR guidelines are structured into digital content...

...and seamlessly delivered in real-time to ordering physicians at the point of care within the native EHR

The art of CDS delivery

- Localisation and translation
- Integrate seamlessly into EHRs
- Create user-centric ‘actionable’ workflow with minimal ‘extra clicks’
- Avoid alert fatigue
- Meaningful statistical reporting on appropriate utilisation

Confidential (c) 2012-2016 National Decision Support Company
Justification

Practical: domains to work on

1. Referral by doctor

Opportunity:
- Planning of regular feedback conversations with ER colleagues
  - Ex. Focus on Medical Imaging: renal stones
  - FUO: Chest XR and Ultrasound Abdomen for pneumonia
- Lump sum financing: responsibilities!
  - Although: ‘Right fossa pain: dd cc-itis, app-itis, colitis, renal stone?’ -> ct/US?
Justification

Practical: domains to work on

1. Referral by doctor
2. **Making an appointment**
3. Arriving at the radiology department
   - Tasks for secretary, nurses/technicians, radiologists
Justification

Practical: domains to work on

2. Making an appointment

Steps taken:
- List of examinations are flagged for secretary in booking software
  -> no appointment possible
  -> unless radiologist approves

  (MRI chest, MRI ribs, XR Sinus, XR skull, mammotomy,...)
Justification

2. Making an appointment

Steps taken:
- Dynamic MRI planner:
  - Emergency Room has free semi-urgent MRI time slots available
    - Planned < 1wk
    - Ex. To avoid ultrasound or XR-Knee
  - Block of MRI time-slots reserved for urgent planning
    - Available for substitution from CT
  - Active monitoring of MRI waiting time / anatomy
    - Remediation possible with free blocks each week
Justification

Practical: domains to work on

2. Making an appointment

Opportunity:
- Refusal of CT brain
  - Often ambulatory due to ‘headache’
  - But: legal – medical responsibility

-> training of med.students !!!
Justification

Practical: domains to work on

2. Making an appointment

Opportunity:
- Refusal of CT spine
- But:
  - Claustrophobia
  - Operated ("surgeon knows better")
Justification

Practical: domains to work on

1. Referral by doctor
2. Making an appointment
3. Arriving at the radiology department
   Tasks for secretary, nurses/technicians, radiologists
3. Arriving at the radiology department

Tasks for:

1. secretary,
2. nurses/technicians,
3. radiologists

No electronic ordering; every order is digitalised; workflow is digital.

All procedures / working instructions can be found in our total management system according to your profession:

important: ‘at your fingertips’
Justification

3. Arriving at the radiology department

1. Written tasks for secretary:
   
a. Is Rad-order compliant to the RIZIV/INAMI directions?
   If not: follow the written working instructions:
   ex. Urgent telephone orders
   ex. Missing item (not signed) -> contact referring dr.
   ex. Pt forgot his/her Rad-order
Justification

3. Arriving at the radiology department

1. Written tasks for secretary:

   - What if non-compliant to the RIZIV/INAMI directions?
     Each working instruction describes specific tasks to do, if examination can be performed or not and how to follow up on these non-compliant orders.
Justification

3. Arriving at the radiology department

1. Tasks for secretary:

a. Is Rad-order compliant to the RIZIV/INAMI directions?
b. Is the contraindications - safety list completed? (MRI/CT/contrast)
c. Is requested examination part of the ‘don’t book list’?
d. Scan the Rad-order (documentation)
Justification

3. Arriving at the radiology department

2. Tasks for nurses/technicians:

**X-Ray**
1. Is examination compliant to the guidelines?
   ex. XR Sinus => ask radiologist for substitution
2. Is examination compliant to our working instructions?
   ex. XR comparing sides => ask radiologist
3. General training: XR 'whole body': get's picked up by tech
4. Write down additional clinical information
5. Safety: pregnancy status: modality can't be started without written registration

Make Tech responsible ! (last barrier)

3. Arriving at the radiology department

2. Tasks for nurses/technicians:

Contrast examination (non-CT, non-MRI), CT, MRI, interventional radiology (ultrasound):

=> Always check written justification by radiologist
Justification

3. Arriving at the radiology department

2. Tasks for nurses/technicians:

Execution examination

a. Pt identification: ‘active’

b. Check safety list on the order => Always verify by asking

c. Pregnancy status: mandatory by digital way: can’t start modality if not asked (and registration who asked the patient)

d. Select correct working instruction according to justification process by radiologist
Justification

3. Arriving at the radiology department

3. Tasks for radiologists

a. Written justification of each MRI, CT, contrast examination
   * if exam is correct ordered
   => check safety: renal function / allergy
   => selection of appropriate working instruction
   ex. Multifasic CT or not
5. Abdomen

05.01 CT Totaal Abdomen
05.02 CT Abdomen Ischämie-Bloeding
05.03 CT Bovenbuik Art. Ven
05.04 CT Bovenbuik Art. Abdomen Ven
05.05 CT Hematurie
05.06 CT Blennorragie
05.07 CT Urethrose (uro a blanc)
05.08 CT Pre-Op Endoprothese
05.09 CT Controle Endoprothese
05.10 CT Angio-CT OL
05.11 CT Colongrafie
05.12 CT Deep Flap (Dr. Vangenechoten)
05.13 CT Peritoneografie
05.14 CT Hepatorenale polycystose sa
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**Informatie**

Let op --> Patient heeft ook onderzoek(ak) op andere locatie!
Justification

3. Arriving at the radiology department

3. Tasks for radiologists

   a. Written justification of each MRI, CT, contrast examination
   b. If substitution was mandatory
      => contact referring dr: is training!
      => registration in RIS and report
Justification

3. Arriving at the radiology department

3. Tasks for radiologists

opportunity:
self-referral: non-radiologists need to do justification
radiologist: ‘please follow-up with MRI’
Justification

Conclusion:

Justification: Not only a task for the radiologist!

Pitfalls:
- interpretation of guidelines
- quality of clinical question
- psychological pressure (‘pt expects’) -> re-education
- legal reasons
- need for electronic ordering (CDS)