What is Evidence-based imaging process?
What is evidence-based imaging?

The concept **evidence-based medical imaging** (e.g. Smith 2007) is still complex and contradictory. Imaging informed and based on the combination of clinical expertise and the best available research-based evidence, patient preferences and resources available. (Hafslund et al. 2008)

Also terms **evidence-based radiography** (e.g. Keenan et al. 2001, Ebrahim 2005) **evidence-based practice** (e.g. Pitt 2004, Pickersgill 2007), **evidence-based clinical practice** (e.g. Bonnetti et al. 2006) and **evidence-based medical practice** (e.g. Omorphos & Kontos 2003, Banerjee & Van Dam 2006)
According to Ahonen (2007) the concept of radiography in health sciences has been determined as expertise of radiographers in the use of radiation, which is dual, dynamic, social and situation-related in nature, and typically based on versatile synthesis and it has both similarities and differences between health sciences, physics and technology.
Evidence-based imaging results

- Better diagnostic testing
- Better competency
- Cost-effectiveness
- Safety
- Client satisfaction
- Quality in radiation use – dose optimisation
The process

1) Recognizing the need for information or improvement
2) Formulating the clinical question
3) Identifying the literature
4) Evaluating the literature
5) Summarising the data
6) Applying the evidence.
Formulating the clinical question

Question components:

- The patient group or population
- The intervention or clinical situation
- Outcomes

E.g. In pediatric patient for six to 15 years is CT or MRI better to exclude hemorrhage in severe headache?
<table>
<thead>
<tr>
<th></th>
<th><strong>High level systematic reviews</strong></th>
<th><strong>Traditional descriptive reviews</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Startpoint of the review</strong></td>
<td>Startpoint a clearly defined question or a hypothesis to be tested.</td>
<td>Startpoint general question about the topic without hypothesis.</td>
</tr>
<tr>
<td><strong>Litterature search</strong></td>
<td>The aim is to find all publications about the topic – also unpublished ones. Aim is to minimize publication and other biases.</td>
<td>Search not systematic.</td>
</tr>
<tr>
<td><strong>Selecting the studies for the review</strong></td>
<td>Accurate description of the selection process and criteria to minimize subjective selection bias.</td>
<td>No clear description about litterature search, process and intake/exclusion criteria of the studies.</td>
</tr>
<tr>
<td><strong>Assessment of studies</strong></td>
<td>Systematic evaluation of the design, methodology and biased of the studies.</td>
<td>Often inadequate evaluation of methodology And quality of the studies.</td>
</tr>
<tr>
<td><strong>Combinig results</strong></td>
<td>Conclusions are based on the best studies.</td>
<td>Conclusions are based on all the studies found, not just on the best evidence.</td>
</tr>
</tbody>
</table>

Making inclusion/exclusion criteria

Before any search done

- Patients or population groups
- Interventions, clinical situations
- Outcomes
- Study designs

: which are included, which excluded

Makes search more invisible and it is much easier to make a summary.
Identifying the literature

- Identifying relevant databases
- Identifying relevant keywords
- Making inclusion/exclusion criteria
- Final evaluation on the basis of full texts
Some most common health care databases

- **Open access:** PubMed

- **With licence:** Cochrane libraries
  Science Direct, Cinhal, Medline, Ovid...
In true systematic reviews two independent reviewers are used to exclude bias. Calculating Kappa index between reviewers.

- In addition to electronic database search also: reference lists of relevant articles, volumes of relevant journals published just as hard copies, conference abstract books, doctoral thesis...
Assessing bias

- A **bias** is a systematic error, or deviation from the truth, in results or inferences. Biases can operate in either direction: different biases can lead to underestimation or overestimation of the true intervention effect.

- It is important to assess risk of bias in all studies in a review irrespective of the anticipated variability in either the results or the validity of the included studies. For instance, the results may be consistent among studies but all the studies may be flawed. In this case, the review’s conclusions should not be as strong as if a series of rigorous studies yielded consistent results. (Higgins et al. 2008)
Level of evidence

- Best: Systamtic reviews, **Randomised Controlled Clinical Trials**
- 2nd best: Cohort study
- 3rd best: Case-control studies
- 4rd best: Cross-sectional
- 5th best: Case-series, Case reports
- Lowest level evidence: Expert opinion without explicit critical appraisal, or based on **physiology**, bench research or first principles.
Making the summary

- Qualitative summary or meta-analysis.

- Qualitative summary: tabulation for great help. Tabulate: population or patient group, intervention, outcome, design, methods and level of evidence.
Meta-analysis

- Combines results of studies statistically
- Is based on the results of individual studies (not individual subjects inside the studies)
- The studies must be similar in relation to res. questions, patient groups/populations, interventions, outcomes and designs – otherwise not comparable
- One way to evaluate sensitivity and specificity of studies
Applying the evidence

- The type of evidence/outcome that is applicable depends on the type of information need.

- The form of summary must be suitable to answer the question.

- On the basis of clinical decision making, QA and patient care...
References

References