



The true impact of imaging

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Hierarchical model of efficacy:

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Fryback DG, Med Decis Making 1991;11:88-94

Level 1. Technical efficacy

- Resolution of line pairs
- Modulation transfer function change
- Gray-scale range
- Amount of mottle
- Sharpness

Level 2. Diagnostic accuracy efficacy

- Yield of abnormal or normal diagnoses in a case series
- Diagnostic accuracy (percentage correct diagnoses in case series)
- Predictive value of positive or negative examination (in a case series)
- Sensitivity and specificity in a defined clinical problem setting
- Measures of ROC curve height (d') or area under the curve A_z

Level 3. Diagnostic thinking efficacy

- Number (percentage) of cases in a series in which image judged "helpful" to making the diagnosis
- Entropy change in differential diagnosis probability distribution
- Difference in clinicians' subjectively estimated diagnosis probabilities pre- to posttest information
- Empirical subjective log-likelihood ratio for test positive and negative in a case series

Level 4. Therapeutic efficacy

- Number (percentage) of times image judged helpful in planning management of the patient in a case series
- Percentage of times medical procedure avoided due to image information
- Number or percentage of times therapy planned pretest changed after the image information was obtained (retrospectively inferred from clinical records)
- Number or percentage of times clinicians' prospectively stated therapeutic choices changed after test information

Level 5. Patient outcome efficacy

- Percentage of patients improved with test compared with without test
- Morbidity (or procedures) avoided after having image information
- Change in quality-adjusted life expectancy
- Expected value of test information in quality-adjusted life years (QALYs)
- Cost per QALY saved with image information

Level 6. Societal efficacy

- Benefit-cost analysis from societal viewpoint
- Cost-effectiveness analysis from societal viewpoint

True impact

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1. Technical efficacy
2. Diagnostic accuracy
3. Diagnostic thinking
4. Therapeutic efficacy
5. Patient outcome
6. Social outcome

True impact

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1. Technical efficacy ✓
 2. Diagnostic accuracy ✓
 3. Diagnostic thinking ✓
 4. Therapeutic efficacy ✓
 5. Patient outcome ✓
 6. Social outcome ✓
- + 1: research

Suicidal mission...?

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- 😊 Our achievements induce a permanently increasing need for our services
- 😞 Which we are not able to satisfy
- 😞 And in the meanwhile we are permanently blamed for the cost explosion



Solution?

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- ▶ Commoditisation?
- ▶ Re-integration?
- ▶ Giving up turf battles?
- ▶ AI?
- ▶ ...?

Solution?

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- ▶ Commoditisation?
- ▶ Re-integration?
- ▶ Giving up turf battles?
- ▶ AI?
- ▶ ...?



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