Overdiagnosis: The Solutions

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Can the Arsonists become firefighters?
Gateway – Reservoir – Treatment
Gateway

Pre test probability

Biomarkers (d-dimer)

Size thresholds
Probability patient with known pulmonary hypertension has pulmonary artery diameter > 29 mm is not same as probability that someone with pulmonary diameter of 29 mm has pulmonary hypertension

\[ P(H|DX) = \frac{P(H|X) \times P(D)}{P(D|X)} \]
If quantifying is problem, quantifying is solution

More research on broader coastline of normality. More controls!

UK Biobank project. MESA study

Gaussian trap & thresholds unavoidable

Thresholds in ranges. Define the gray zone (no man’s land)

Explicit with trade-offs
“Pulmonary artery diameter of 2.9 – 3.2 cm is found in _% of healthy people, and characterizing this as pulmonary hypertension will lead to a _% false positive rate”
Size Thresholds

Incidental thyroid nodules (Hoang, JACR, 2015)

• 1.5 cm > 35 yrs
• Bury in body of report

Lung RADS:

• 6 mm, not 4 mm
• GGO < 2 cm without solid features not biopsied
Manage the Reservoir

• Increase thresholds for defining disease

• Express Blackstone Ratio (numbers needed to harm)

• Better data, **novel substrates**, better statistics
New substrates

Obstructive coronary artery disease: > 50% stenosis in the left main and > 70% stenosis in other arteries (planimetric)

Fractional flow reserve

T1-mapping. Cardiac MRI for hypertrophic cardiomyopathy
Better substrates

- Genotype positive phenotype negative hypertrophic cardiomyopathy
  - Substrate for sudden cardiac death
  - Any cut off for myocardial thickness will misclassify athlete’s heart
  - Genetic testing before, not after anatomical imaging?
How to define disease?

Outcomes, not appearance!
Rose by another name

Bronchoalveolar cell carcinoma renamed “adenocarcinoma in situ” (Travis, J Thorac Onc, 2011)

Encapsulated follicular variant of papillary thyroid carcinoma (EFVPTC) renamed “noninvasive follicular thyroid neoplasm with papillary-like nuclear features” (NIFTP) (Nikiforov, JAMA Oncology, 2016)

DCIS?

VOIR
Diffusion Tensor Imaging (DTI) and Chronic Traumatic Encephalopathy (CTE)

- Concussion injures axons and alters water diffusion
- Abnormal DTI seen in normals & PTSD
- No independent verifier
- Misclassification & overdiagnosis
- Symptoms of post concussive syndrome non-specific
- Symptoms of CTE non-specific
- CTE at pathology (tau) seen with sub-concussive injuries
DTI could be Mother of Overdiagnosis

“there is insufficient evidence that DTI can be used for routine clinical diagnosis and/or prognostication at the individual patient level. There remains insufficient evidence at the time of writing to suggest that individual-level analytic methods are valid, sensitive, and specific for routine clinical evaluation of TBI at the individual patient level”

Wintermark, ACR White Paper
Barriers to reducing overdiagnosis (1)

Dr. Cooper "I think that it is inappropriate and paternalistic for a radiologist to observe an incidentally discovered thyroid nodule and then not mention it at all in the impression or even in the body of the report”

“ATA president:"I think the report should mention the nodule and leave up to the clinician to decide what to do next. Omission could be confusing and possibly unethical."
“Save the Thyroid” week
“Overtreatment is the Monday morning quarterbacking of cancer care: You can only know it only retrospectively.”
Barriers to Reducing Overdiagnosis (2)

“It’s overtreatment, not overdiagnosis”

“Overdiagnosis is a statistic”

“Overdiagnosis is a population issue”

“Overdiagnosis is nebulous, like free will”
Consensus

Can we all agree to ignore sub segmental pulmonary emboli?
If you don’t take a temperature you can’t find a fever