OVER-TESTING, OVER-DIAGNOSIS & EMERGENCY MEDICINE: DOES IT EXIST AND DOES IT MATTER?

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“Preventing Over-Diagnosis” History and Definitions

Emergency physicians (EPs) face challenges in 2015 that the founders of Emergency Medicine (EM) confronted with far less frequency. EMTALA, resident work hour rules, and the Accountable Care Act represent a few of these challenges. Now add to the list the concepts of over-testing with the downstream consequences of over-diagnosis and over-treatment that potentially create patient harm. “Overdiagnosis” occurs when people without symptoms are diagnosed with a disease that ultimately will not cause them to experience symptoms or early death” (Welch). In this month’s issue of Emergency Medical Abstracts, we discussed five manuscripts related to the concepts of either over-testing or over-diagnosis:

- High sensitivity troponin and ACS
- Harms of CT scanning prior to appendectomy
- Pre-test probability of PE in pregnant ED patients with concerning symptoms
- Trauma pan-scan – what else do we find?
- Protecting trauma patients from duplicate CT scans

For over a decade, EMA’s Jerry Hoffman has unequivocally been the voice of over-reliance on (expensive, “new-fangled”) tests at the expense of clinical intuition using history, physical exam, and re-evaluation in the emergency department (ED) (Hoffman 2012). Similarly, Rick Bukata laments that modern EM residency programs teach young EPs how to order tests, but not how to not order tests (Bukata 2014). Think back to your residency training in which you were encouraged not to miss the elusive diagnosis Grand Rounds or Morbidity & Mortality conferences. Was anybody ever complimented or rewarded for not ordering a test? On the other hand, the clinician who did not order the RPR and misses the case of tertiary syphilis is held up as a model of what not to do for colleagues. Contrarians argue “What’s the harm? We’ve got
access to the tests, patients expect and reward thoroughness, and I don’t want to get sued for missing the zebra?” Answer: More testing and more treatment are not consistently linked to better outcomes, longer life, or faster recovery. In fact, more spending and more testing are often linked to worse outcomes. (Moynihan) Over-testing represents the first-step in the slippery slope leading to over-diagnosing and over-treating. The intellectual and ethical debate of “Preventing Overdiagnosis” challenges clinicians and guideline developers to execute effective application of new diagnostic technology in order to derive improved patient-centric value.

The annual “Preventing Overdiagnosis” conference [http://www.preventingoverdiagnosis.net/] was born from this paradigm shift and debuted in 2013 by bringing together key stakeholders, including the British Medical Journal, Dartmouth Institute, and Consumer Reports.

How Does Over-diagnosis Occur?

Increased reliance on testing, which manifests as increasing test-ordering, is only one path to over-diagnosis. Here are a few examples of other paths to over-testing and over-diagnosis. Evolving definitions of disease change the denominator of “disease” usually by lowering the numerical threshold that defines hypertension, diabetes, or high cholesterol. For example, diabetes was diagnosed by a fasting blood sugar of 140 mg/dL prior to 1997, but by a value of 126 mg/dL thereafter. Better technology improves our ability to visualize or capture anatomic or pathologic deviation from the norm. Multiple examples of more refined technology that results in a larger denominator of “disease,” including: CT to capture ever-smaller PEs; MRI to visualize non-specific cerebral lesions, bulging discs, or damaged knee cartilage; and high-sensitivity troponin assays that lower the threshold to detect cardiac biomarkers in the serum. Look harder for some diseases, which certainly occurs in primary care (breast cancer, prostate cancer), but is also a measurable phenomenon in emergency medicine (PE, ACS).

Is “Preventing Over-diagnosis” Relevant to Emergency Medicine?

Absolutely! During a clinical encounter up to 42% of ED patients have at least one blood test, often ordered as “routine” or protocol-based pathways from triage. The number of advanced imaging tests like computed tomography (CT) or magnetic resonance imaging (MRI) increased 3- and 9-fold between 2001 and 2010. (Lee) These tests cost time and money. The average cost for an ED visit increased from $560 to $1354 between 2003 and 2011 in the United States, representing a 240% increase. In many situations lab and imaging testing is necessary to rule-in or rule-out potentially life-threatening or disabling disease or injury. Sometimes more testing is not necessary or beneficial. Furthermore, the overall benefits of increasing use of advanced imaging or common labs are sometimes difficult to measure. For example,

  o Despite the increased use of CT to diagnose PE, mortality remains unchanged. (Wiener)
  o False-positive appendectomy rates have not improved in the post-CT era. (Coursey)
  o Diagnosis of UTI in febrile children by urine dipstick or urine microanalysis misses other treatable causes of acute illness (Coon)
In response to a growing tide of pressure from organized medicine, patient advocacy groups, and payers to eliminate wasteful medical practice, the American College of Emergency Physicians (ACEP) identified five low-value clinical actions as part of the Choosing Wisely campaign (http://www.choosingwisely.org/) in 2013 and another five in 2014. Half of these ten ACEP Choosing Wisely items are diagnostic, all relating to CT imaging of low-risk patients.

- Avoid CT scans of the head in ED patients with minor head injury who are at low risk based on validated decision rules.
- Avoid CT of the head in asymptomatic adult patients in the ED with syncope, insignificant trauma, and a normal neurological evaluation.
- Avoid CT pulmonary angiography in ED patients with a low-pretest probability of PE and either a negative Pulmonary Embolism Rule-Out Criteria (PERC) or a negative D-dimer.
- Avoid lumbar spine imaging in the ED for adults with non-traumatic back pain unless the patient has severe or progressive neurologic deficits or is suspected of having a serious underlying condition (such as vertebral infection, cauda equina syndrome, or cancer with bony metastasis).
- Avoid ordering CT of the abdomen and pelvis in young otherwise healthy ED patients (below age 50) with known histories of kidney stones or ureterolithiasis, presenting with symptoms consistent with uncomplicated renal colic.

**Synopsis of the Preventing Overdiagnosis Conferences**

The first “Preventing Overdiagnosis” conference was held in Hannover New Hampshire in September 2013 and was attended by about eight emergency physicians from over 400 attendees. The majority of attendees were in the sub-specialty fields of Internal Medicine and their focus was over-testing in the scenario of longitudinal cancer or other chronic illness care. The conference concluded by splitting attendees into one of four groups to prioritize next steps in research, education, communication, and policy (Boxes 1-4 below). Understanding how much we still need to learn about the concepts of over-testing and over-diagnosis is eye-opening. In order for EPs to voice an opinion about what attributes indicate over-testing vs. standard-of-care testing and if over-diagnosis is even a measurable issue in the chaotic, data-deprived ED, EPs will need to stay engaged in these conversations, conferences, and research discussions. Otherwise, payers and governmental bodies will do so on our behalf.

The 2nd Preventing Overdiagnosis conference was in Oxford UK in Sep 2014 and was attended by fewer EPs. Attendees devoted an entire post-conference day to high-level debates – two hours alone to defining “over-diagnosis” (Carter). As described on https://soundcloud.com/bmjpodcasts/how-to-diagnose-overdiagnosis, they concluded that defining, measuring, and understanding “over-diagnosis” probably needs to be done condition-by-condition. In other words, terms and methods used to describe “over-diagnosis” in sepsis probably won’t apply to PE, stroke, or scaphoid fractures.

**What Can You Do?**
Assuming that over-testing and over-diagnosis are real phenomena, are measurable, and can somehow be safely reduced, EPs should explore their clinical practice to understand the roots and the scope of the problem. One reason that the use of advanced imaging has increased is that ED providers often face potentially complex or atypical patients with limited access to reliable follow-up. Another reason is that ED providers lack confidence in validated clinical decision rules for PE or mild head injuries.

In addition, misses are penalized in our “never-miss” society, while ordering more tests often reaps financial benefits in our current healthcare model. Value-based purchasing is likely to alter the perspective that more tests = better care (Pines). One driver for inter-physician variability is individual risk aversion and lack of safe harbors to offer legal protection for clinicians who follow guidelines in diagnostic decision making when misses occur. Slow and uncertain tort reform is a constant threat to the concept that “less is more,” but in this month’s EMA compelling data indicate that up to seven years after tort reform no detectable trend in reduced test ordering is apparent (Waxman). Putting tort reform aside (as most of the politicians have done), other problems limit the safe and efficient reduction of over-testing: anticipated patient expectations; insufficient awareness of radiation risks; alternative diagnostic strategies or applicable clinical decision instruments; and uncertainty about if, when, and how to use Shared Decision Making.

Unfortunately, definitive diagnostic research for history, physical exam, labs and diagnostic imaging is lacking for many ED scenarios (Pines). The NIH, CDC and AHRQ have no “Institute for Diagnostic Excellence” so much diagnostic research is funded by the biomedical industry. In addition, existing diagnostic research suffers from many forms of often unrecognized bias (Kohn). The 2015 Academic Emergency Medicine Consensus Conference (http://www.saem.org/annual-meeting/education/2015-aem-consensus-conference) addresses the highest yield research items needed to more effectively use diagnostic imaging in the ED. With each issue of EMA, the evidence is accumulating that EM over-testing is real and is measurable, but who are the patients in which over-testing leads to over-diagnosis and preventable harm? How do we identify them real-time rather than retrospectively? Will payers provide time for EM to understand the scope of these issues and palatable alternatives? Will policy-makers incorporate malpractice safe harbors into practice recommendations, or will they leave early adopters exposed to increased liability risk? Paving the path forward to the ED of the future in which over-testing related harms are a rarity is a daunting challenge.


Coon ER, Quinonez RA, Moyer VA, Schroeder AR; Overdiagnosis: how our compulsion for diagnosis may be harming children, Pediatrics 2014; 134: 1013-1023. PubMed ID: 25287462


Box 1
2013 Preventing Overdiagnosis Conference Top 5 RESEARCH Priorities

- Standardize taxonomy and research methods
- Define population indicators of overuse
- Obtain meaningful clinical decision thresholds via systematic reviews and/or re-analysis of prior study data
- Prioritize comparative effectiveness trials of alternative diagnostic strategies and less aggressive treatment options
- Engage patients to derive patient-centric informed decision analyses
Box 2
2013 Preventing Overdiagnosis Conference Top 5 EDUCATION Priorities

- Identify and engage key stakeholders (AAMC, ACGME, professional societies)
- Develop assessment methods and outcome measures
- Develop effective decision support
- Collate existing educational resources, stratified by learner level, context, and access to resources
- Integrate education across undergraduate, graduate, and post-graduate medical education

Box 3
2013 Preventing Overdiagnosis Conference Top 5 COMMUNICATION Priorities

- Collate evidence of and tools for over-diagnosis within the context of over-treatment
- Carefully balance messaging to convey potential harms and uncertainties around over-testing/over-diagnosis weighing risks of under-diagnosis and under-treatment
- Develop communication strategies & resources for consumers and journalists, perhaps including narrative medicine approach
- Produce freely accessible primer to over-diagnosis using short, evidence-based synopses condition-by-condition (example BMJ's “Too Much Medicine” series), perhaps using Wikipedia
- Provide mechanism for ongoing discussions to sustain momentum using Social Media and internet conferencing

Box 4
2013 Preventing Overdiagnosis Conference Top 5 POLICY Priorities

- Review and revise all specialist-directed guidelines using a broader constituency, using GRADE to explicitly recognize, describe, and quantify the potential harms of over-diagnosis and consequential over-treatment
- Derive mutually agreeable measures of over-use, over-testing, over-diagnosis, and over-treatment
- Dissociate physician payments from test-ordering
- Provide incentives for “appropriate” testing
- Regulate direct-to-consumer advertising