WHY DID I DO THAT?

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Conflict of Interest Declaration: Nothing to Disclose

Presenter: Malvinder S. PARMAR
Title of Presentation: Why did I do that?

I have no financial or personal relationships to disclose
DISCLAIMER

Cartoons used in this presentation are for humorous purposes and are not to offend any group, race, sex or size.

Please Read Carefully
OBJECTIVES:

At the end of this session, the attendees will be able to:

- Describe
- Appraise
- Acknowledge
- Advocate
- Choose

From polyformacy to formacology

Davina Allen

What is the Problem?
Unnecessary care in Canada tops 1 million tests and treatments a year

Fifth Estate | Billions wasted on drug spending in Canada, research shows

Hidden camera investigation reveals questionable drug company marketing practices
WHAT IS THE PROBLEM?

- **Medicaliz(s)ation**
  - Ageing issues
  - Broadening definitions
  - Expanding indications

- **Over-Investigations**
  - Screening
  - Rule-out Medicine
  - Over-sensitive tests,
    - often used inappropriately
    - Sensitivity trumps specificity
OVER-INVESTIGATIONS

“We’ve found a mass. The good news is we have weapons of mass destruction.”
Overdiagnosis Occurs When screen-detected cancers are either non-growing or so slow-growing that they never would cause medical problems.
Few common tests, examples

- Troponin
- D-Dimer
- Ferritin
- eGFR
- Imaging studies
Troponin Characteristics

- **Troponin C** (18 kd)
  - Calcium-binding subunit
  - No cardiac specificity
- **Troponin I** (26.5 kd)
  - Actomyosin-ATP-inhibiting subunit
  - Cardiac-specific form
- **Troponin T** (39 kd)
  - Anchors troponin complex to the Tropomyosin strand

The troponin complex consists of three different proteins (TnC, TnI, and TnT) that regulate the calcium-mediated contractile process of striated muscle.
Troponin

- Troponin C – same in all muscles
- Troponin I & T – have cardiac specific isoforms
- Levels rise 3-6 hours after injury
- Insensitive within 6 hours of symptoms
- **Negative troponin >8 hours after symptom onset – effectively rules out MI**
- Peaks ~ 20 hours
- May remain elevated for 7-14 days
- Helpful in making a diagnosis of symptoms within past 3-7 days
- Not helpful in making a diagnosis of infarct extension or re-infarction.
# Troponin

<table>
<thead>
<tr>
<th>Troponin T [cTnT]</th>
<th>Troponin I [cTnI]</th>
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</thead>
<tbody>
<tr>
<td><strong>For ACS:</strong></td>
<td><strong>For ACS:</strong></td>
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<tr>
<td>- Sensitivity:</td>
<td>- Sensitivity:</td>
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<tr>
<td>71 - 100%</td>
<td>43 - 94%</td>
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<tr>
<td>- Specificity:</td>
<td>- Specificity:</td>
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<tr>
<td>31 - 86%</td>
<td>48 - 100%</td>
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<tr>
<td><strong>Advantages:</strong></td>
<td><strong>Advantages:</strong></td>
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<tr>
<td>- Highly sensitive for detecting ischemia</td>
<td>- More specific than cTnT</td>
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<td>- Helps stratify risk later [Prognostic value]</td>
<td>- Helps stratify risk later [Prognostic value]</td>
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<tr>
<td><strong>Disadvantages:</strong></td>
<td></td>
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<tr>
<td>- Less specific than cTnI</td>
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<td>- Increased in CKD</td>
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</table>
Non-ACS causes of Troponinemia

- **Cardiac**
  - CHF, Myocarditis, pericarditis, procedures, arrhythmias, cardioversion, cardiac contusion, CABG

- **Pulmonary**
  - PE, pneumonia

- **Neurologic**
  - Stroke, SAH

- **Renal**
  - Renal failure

- **Misc**
  - HIV, thermal injury, cirrhosis, hypothyroidism, sepsis
  - Pregnancy
  - Strenuous exercise
Cardiac troponins in young marathon runners.

Traiperm N1, Gatterer H, Wille M, Burtscher M.

Abstract

Cardiac troponin increases are common in adult marathon finishers. However, data on troponin values for young marathon runners are scarce. Forty young runners (20 healthy male and 20 female) 13 to 17 years old participated in this study. Blood samples were taken before, immediately after, and 24 hours after the race for determination of cardiac troponin T (cTnT) and troponin I (cTnl). Thirty-seven runners completed the race with a mean finishing time of 4 hours 53 minutes. No participant developed an adverse medical event during or after the race. In 30 of 37 participants, levels of cTnT and/or cTnl exceeded upper reference limits of 0.01 and 0.1 ng/ml immediately after the race, and in 3 participants these levels were even higher than the reference range for acute myocardial infarction (>0.1 and >0.5 ng/ml for cTnT and cTnl, respectively). Twenty-four hours after the race no participant had troponin levels exceeding the upper reference limits. Average increases of troponin levels did not differ between sexes. In conclusion, this is the first study to show that cardiac troponin levels increase to a similar extent in male and female adolescent marathon runners as observed in adults. Rapid recovery of troponin levels after a race is indicative of a physiologic rather than a pathologic response.

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PMID: 22579084 [PubMed - indexed for MEDLINE]
Troponin - summary

- Both cTnT and cTnI – are specific markers of myocardial injury, but
- Elevated Troponin is not always a marker of ischemic injury
  - may be due to cardiac injury associated with chronic structural heart disease rather than acute ischemia
- Clinical challenge is differentiating ischemic from non-ischemic myocardial injury
- There are many conditions where Troponin levels can increase, but data exist for CHF, PE and renal failure.
- Elevated troponin levels portend a worse prognosis

P. MIBI (2006, 2016) – LVEF 58%, inferolateral ischemia, no interval change from 2006

Patients are often told that they had a “small heart attack” and some of the patients may have had these so many times that they outlive their cats, as “cats have nine-lives.”

Is clopidogrel (Plavix) required in this patient?
D-Dimer

- For thrombosis:
  - Sensitivity – 93%
  - Specificity – 25%

- Negative Predictive Value – 99.5% [if low probability]

- **ELISA is more sensitive** [than rapid latex agglutination test]
What is D-Dimer?
Coagulation

- Thrombin
- Fibrinogen
  - Soluble fibrin
  - FpA, FpB
  - FXIIIa
    - Cross-linked fibrin

Action of Plasmin (DD) E complex

- D-Dimer
- Fragment E

D-Dimer is a specific fragment of cross-linked fibrin clot that is released into the blood when clot is lysed by plasmin.
Elevated D-Dimer

- Thrombo-embolic disorders
  - DVT/PE
  - MI
- Infection/Sepsis
- DIC
- Malignancy
- Trauma
- Systemic disease – inflammation
- Anticoagulation
- After surgery
- Pregnancy
Pulmonary embolism

Wiener, R. et al: Archives of Internal Medicine 2011;171(9):831-7

<table>
<thead>
<tr>
<th></th>
<th>Before CT pulmonary angiography</th>
<th>After CT pulmonary angiography</th>
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<tr>
<td></td>
<td>Annual % change</td>
<td>P value</td>
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<tr>
<td>Incidence (any diagnosis)</td>
<td>0.5</td>
<td>0.64</td>
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<td>Incidence (primary diagnosis)</td>
<td>3.3</td>
<td>0.05</td>
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<td>Mortality</td>
<td>-1.9</td>
<td>0.01</td>
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Multidetector row CT pulmonary angiography introduced

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<th>Case fatality (%)</th>
<th>Year</th>
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<td>Any diagnosis</td>
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Pulmonary Embolism in US

Wiener, R. et al: Archives of Internal Medicine 2011;171(9):831-7

- True increase in disease:
  - Increase in risk factors results in more pulmonary emboli, with no change in disease severity.

- Effective test:
  - More sensitive test detects more pulmonary emboli, and new cases benefit from treatment → fewer deaths.

- Overdiagnosis:
  - More sensitive test detects more pulmonary emboli, and new cases do not benefit from treatment (mild disease).
Mr. Ferritinemia

- 45-year old man with history of generalized aches and pains [Fibromyalgia x 5 years] and fatigue, had ‘vague’ abdominal pain.
- Noted to have **elevation of ALP and GGT [200-250]** with **normal AST, ALT**
- **Ferritin of 1030**
- Abdominal ultrasound – Liver 18.6 cm, spleen 13.5 cm
- CT abdomen – Liver 18.8 cm, spleen 13 cm
- Diagnosis – **Hemochromatosis?**
What to do next?

- **Liver biopsy [already done]:** preserved hepatic architecture, minimal inflammation, no portal or parenchymal fibrosis, increased iron deposition – could be early hemochromatosis
- **Hfe genetic testing** – heterozygous for Cys282Tyr mutation
- Do you agree with the diagnosis?
Missing Links

- When **Ferritin 1030, CRP 86, T-sat 0.19**
- Saw geneticist – told him ‘not sure’, not c/w hemochromatosis – but, didn’t agree with my impression of being ‘reactive’
- 3-months later,
  - Ferritin 121, ESR 2, CRP <3, T-sat 0.21
- Elevated ferritin - not always hemochromatosis, often reactive
- The episode of vague abdominal pain was diverticulitis that resolved with time and as the inflammation resolved, CRP and ferritin normalized.
Picture is worth ... $$$!

“Well, as we thought, it’s something gross.”
Playing it safe! Making sure!

“Off hand, I’d say you’re suffering from an arrow through your head, but just to play it safe, I’m ordering a bunch of tests.”
Thyroid cancer
Lung cancer screening

Huo J. et al JAMA Internal Medicine March 2017;3(177):440

Figure 1. Weighted Analysis of the Rate of Lung Cancer Screening in the National Health Interview Survey by Screening Technology and Risk for Lung Cancer
Important Questions About Lung Cancer Screening Programs When Incidental Findings Exceed Lung Cancer Nodules by 40 to 1

Rita F. Redberg, MD, MSc; Patrick G. O’Malley, MD, MPH
Chasing MIRANDaS

- Chasing **Multiple Incidental Radiological Abnormalities of No or Doubtful clinical Significance**
Type 1 error (significance level)

- Probability of finding an effect that isn’t real (false positive), is 1 in 20 (p=0.05)
  - If you do 20 tests/investigations, chance of finding a false positive test is $1-(0.95)^{20} = 0.64$ [64%]
  - If you do 50 tests/investigations, the chance of finding a false positive test is $1-(0.95)^{50} = 0.92$ [92%]
“If you torture some(one)thing long-enough, it will confess to something!”

Probability of a false +ve test = 1 - (0.95)^n
& cost to the system

The misuse of a test is exponentially proportional to its non-invasiveness.
Why do we do what we do?

We do things, because

Malvinder S. Parmar, Medical Director, Internal Medicine Timmins & District Hospital, Timmins, Ontario, Canada

We [doctors] do things, because other doctors do so and we don’t want to be different, so we do so;

Send response to journal: Re: We do things, because

Competing interests: None declared
Why do we do what we do?

We do things, because

Malvinder S. Parmar,
Medical Director,
Internal Medicine
Timmins & District
Hospital, Timmins,
Ontario, Canada

..... or because we were taught so [by teachers, fellows and residents]; or because we were forced [by teachers, administrators, regulators, guideline developers] to do so, and think that we must do so;

Competing interests: None declared
Application of Evidence/Guidelines/Protocols without using “common-sense” is like driving with a professional license without thinking.
DATA == EVIDENCE
Guidelines – for the obedience of fools

Abstract
Guidelines for medical management are now part of medical life. A fool—loosely defined as someone who does not know much about a particular area of medicine—will do well to follow guidelines when treating patients, but a wise man (again, loosely defined as someone who does know about the disease in question) might do better not to follow them slavishly. The problem is that the evidence on which guidelines are based is seldom very good. Clinical trials have a variety of problems which often make their relevance to 'real world' medicine dubious. The interpretation of trial results depends heavily on opinion, and a guideline that purports to be evidence based is actually often opinion based. A guideline will depend on the opinions of those who wrote it, and the wise man will use his judgement and give due weight to his own opinions and expertise.
Good judgment comes from experience.

Experience comes from bad judgment. -Bob Packwood

#cmgsays
Why do we do what we do?

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Malvinder S. Parmar,  
Medical Director,  
Internal Medicine  
Timmins & District  
Hospital, Timmins,  
Ontario, Canada

Send response to journal:  
Re: We do things, because

or because patient wants so, and  
think we should do so; or because of more incentives [unnecessary  
tests (especially by procedure oriented physicians) and visits], we  
think we should do so; or because of the fear [by the legal system,  
audits] we feel that we should do so [so called covering oneself];

Competing interests: None declared
Diaper Medicine: *No matter what!
One Can not cover all the time!*

[Images of diapered individuals]
In your opinion, #defensivemedicine effects the overall cost of medicine:

- 4% No effect
- 7% Little effect on cost
- 11% Some effect on cost
- 78% Major cost effect

72 votes - Final results
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Malvinder S. Parmar,
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Ontario, Canada

Send response to
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Re: We do things,
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because we need some time [to let the nature takes its course], so we do so; finally and more commonly, that we have to do something [justification] and we fail to apply common sense, so we do so.

Competing interests: None declared
Why do we do what we do?

We do things, because

Malvinder S. Parmar, Medical Director, Internal Medicine, Timmins & District Hospital, Timmins, Ontario, Canada

We [doctors] do things, because other doctors do so and we don’t want to be different, so we do so; or because we were taught so [by teachers, fellows and residents]; or because we were forced [by teachers, administrators, regulators, guideline developers] to do so, and think that we must do so; or because patient wants so, and think we should do so; or because of more incentives [unnecessary tests (especially by procedure oriented physicians) and visits], we think we should do so; or because of the fear [by the legal system, audits] we feel that we should do so [so called covering oneself]; or because we need some time [to let the nature takes its course], so we do so; finally and more commonly, that we have to do something [justification] and we fail to apply common sense, so we do so. **and, at times to cure ailments**

Competing interests: None declared

Cited in: TESTING TREATMENTS, 2nd ed. *Imogen Evans, Hazel Thornton, Ian Chalmers and Paul Glasziou*
FACTORS RESPONSIBLE

FEAR OF LITIGATION
OVER-INVESTIGATIONS
NEW IS BETTER
EVIDENCE MADE MEDICINE
PSYCHOLOGY OF REGRET
PUBLICATION "BIAS"
POOR TRAINING
GOING WITH THE FLOW
RULE OUT MEDICINE
LOOKING FOR ZEBRAS!
DIVERSIONAL MEDICINE
CHASING MIRANCIAS
OVER-SENSITIVE ASSAYS
PROTECTING THE "TURF"
UNTESTED TECHNOLOGIES
LITTLE KNOWLEDGE IS DANGEROUS
"TOO MANY COOKS SPOILS THE BROTH"

MAKING SURE!
"PEACE-OF-MIND"
AGEING FEAR
EXPLOITING FAMILY HISTORY
FASHION BASED MEDICINE
CHART OVERLOAD SYNDROME
PREVENTION IS BETTER THAN CURE!
MEDIA TENTALISATIONS
EMR SILOS
GUIDELINES
IMPROPER AUDITS
PROTOCOLISATIONS
IT LIMITATIONS
SCREENING INCENTIVES
BROADENING DEFINITIONS
LOCUM PROVIDERS

Confused

"Too many cooks spoils the broth"
OVER-DIAGNOSIS: A SYSTEMATIC EVALUATION OF FACTORS

- Culture-based
- Receiver-based
- System-based
- Provider-based
OVER-Investigations: 
*Culture-based*

Related to culture of practice of medicine, universal
OVER-Investigations: **Culture-based**

- Fear of litigation
- Psychology of regret
- “**Prevention is better than cure**” – Often Equating Early diagnosis and treatment to Prevention.
- “**New is Better**”
- Medicalisation of various ageing issues
- Evidence-made medicine – often the evidence is created under industry influence
- Publication bias - Journals publishing/promoting newer technologies, rare cases
- Media tentalizations - promoting new technologies
- Industry **expanding the markets** for tests/treatments
OVER-Investigations: System-based

Result of local/regional health policies, governed by political decisions, specialty societies and disease-groups
OVER-Investigations: System-based

- **IT limitations** – archiving of older films, difficult to retrieve
  - Electronic Medical Record (EMR) silos – EMRs not linked together
- **Untested technologies** – No RCTs for implementing technologies
- **Guidelines/Protocolization**
  - Screening: guidelines, incentives
- **Audits assessing application of guidelines than outcomes/utilization**
- **Speciality societies**
  - ‘protecting the turf’
  - Broadening of definitions
  - Recommending/endorsing over-sensitive assays, without clarity
- **Nurse-practioners ordering diagnostic studies**
- **Locum providers**
- **Poor training** - lack of clinical skills, dependence on Imaging
  - Maintaining skills/justifying positions at smaller centers
  - Repeat studies at tertiary care centers
OVER-Investigations: Receiver-based

Based on the individual beliefs, needs and anxiety
OVER-Investigations: Receiver-based

- User-demand
- “peace-of-mind”
- Stressed populations
- Ageing fear
- Deconditioning
- Exploiting “Family history” or blaming “genes”
If you're fat, it may not be your fault. You may have the 'couch potato gene.'

Who says there's no good news.
Diabetes: Rising Prevalence

Is it genetics?

“Genes didn’t change much in the past 50 years, it’s the external factors that are responsible for this.”
OVER-Investigations: *Provider-based*

Influenced by the beliefs, attitudes and needs of the health-care providers - PCP’s, specialist(s) and Radiologists.
OVER-Investigations: Provider-based (1)

- **Over-sensitive test(s)** in inappropriate clinical context
- Inappropriate timing of studies – eg., Protein C/S in acute DVT
- Practicing **“Rule-out Medicine”** – Trying to find out, “What you don’t have?”, “Making-sure!”
- **Looking for Zebras**, when clearly hearing hoofs!
- Substitute for lack of knowledge/confidence
- Don’t want to be “Odd-man out” – **Fashion-based medicine**
- Exploiting **“Family history”**
- Confirming what is obvious – “**A picture worth a thousand words**’, but then Chasing **MIRANDaS** (Multiple Incidental Radiological Abnormalities of No or Doubtful clinical Significance)
- **Inability to separate wheat from the chaff** – unable to differentiate what is significant and what is not significant.
OVER-Investigations: Provider-based (2)

- Chart over-load syndrome
- Buying time
- **Diversional Medicine**
- Failure to practice “Masterly inactivity” – has to do “something”
- **Specialists:**
  - asking/requesting for imaging studies before clinical assessments
  - Specialists advising or ordering studies beyond their field
  - Specialists suggesting unnecessary Imaging studies, especially during a telephone or corridor consult
  - Lifestyle- work balance
- **Radiologists** suggesting further imaging studies (self-referral), when they do not have complete clinical information about the patient or their co-morbidities
- Treating thy-self
A systematic evaluation of factors contributing to over-investigations and over-diagnosis

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Medical Director, Nephrology & Internal Medicine, Timmins & District Hospital, Timmins, ON, Canada²

Medical student, Class of 2013, University of Queensland, Brisbane, Australia³

[Oral presentation, September 10th 2013]

### Culture-based

- Related to the culture of practice of Medicine (universal)

### System-based

- Result of local/regional health policies, governed by political decisions, specialty societies and disease-groups

### User-based

- Based on the individual beliefs, needs and anxiety

### Provider-based

- Influenced by the beliefs, attitudes and needs of the health-care providers, PCP’s, specialist(s) and radiologists.

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<th>System-based</th>
<th>User-based</th>
<th>Provider-based</th>
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<td>Fear of litigation</td>
<td>Electronic Medical Record (EMR) silos - Different users, different EMRs, not linked together</td>
<td>User-demand</td>
<td>Sensitivity trumps specificity - Using over-sensitive test(s) in inappropriate clinical context</td>
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<td>Psychology of regret</td>
<td>Incentives - Procedure based</td>
<td>“peace-of-mind”</td>
<td>Practicing “Rule-out Medicine” – Trying to find out, “What you don’t have?”</td>
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<td>“Prevention is better than cure” – Equating Early diagnosis and treatment to Prevention.</td>
<td>Screening populations/guidelines</td>
<td>Stressed populations</td>
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<td>“New is Better”</td>
<td>Repeating studies at tertiary care centers</td>
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<td>Medicine as a BUSINESS than Care</td>
<td>Audits assessing utilization of guidelines than outcomes</td>
<td>Chart over-load syndrome – Rather than the primary care provider (PCP) going through a thick chart, orders the investigation again, when they often spend couple of minutes for each clinical encounter with the patient</td>
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<td>Quality measures – remuneration incentives</td>
<td>Buying time – when nature often would take care of the issue at hand</td>
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<td>Specialty societies ‘protecting the turf’</td>
<td>Failure to practice “Masterly inactivity” – has to do “something”</td>
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<td>Broadening of definitions</td>
<td>Specialists asking/requesting for imaging studies before clinical assessments, eg., CT/MRI before Neurologist appointment and ECHO/Stress test before Cardiologists appointment etc.</td>
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<td>Specialties recommending/endorsing over-sensitive assays without understanding their long-term implications</td>
<td>Specialists advising or ordering studies beyond their field</td>
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<td>Team-work – “Going with the flow” than asking questions</td>
<td>Diversional Medicine – Specialist suggesting PCP to refer to another specialist for non-specific symptoms eg., respirologer suggesting cardiac assessment in a deconditioned patient</td>
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<td>Nurse-practioners ordering diagnostic studies</td>
<td>Specialists suggesting unnecessary Imaging to PCP, especially during a telephone or corridor consult</td>
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<td>Locum physician providers</td>
<td>Incomplete information on Imaging requitions, resulting in inappropriate testing</td>
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</tbody>
</table>

**References**

1. Northern Ontario School of Medicine
2. Timmins, ON, Canada
3. University of Queensland, Brisbane, Australia

**Table:**

- **Culture-based**
  - Related to the culture of practice of Medicine (universal)
  - Fear of litigation
  - Psychology of regret
  - “Prevention is better than cure” – Equating Early diagnosis and treatment to Prevention.
  - Medicalisation of various ageing issues
  - Evidence-made medicine – often the evidence is created under industry influence
  - Publication bias - Journals publishing/promoting newer technologies, rare cases
  - Media tentalizations - promoting new technologies
  - Industry expanding the markets for tests/treatments
  - “New is Better”
  - Medicine as a BUSINESS than Care

- **System-based**
  - Electronic Medical Record (EMR) silos – Different users, different EMRs, not linked together
  - Incentives – Procedure based
  - Screening populations/guidelines
  - Screening incentives
  - IT limitations – archiving of older films, difficult to retrieve, hence repeating studies
  - Untested technologies – Technology often doesn’t go through a RCT, like drugs
  - Guidelines Protocolisation
  - Maintaining skills/justifying positions at smaller centers
  - Repeating studies at tertiary care centers
  - Audits assessing utilization of guidelines than outcomes
  - Quality measures – remuneration incentives
  - Specialty societies ‘protecting the turf’
  - Broadening of definitions
  - Specialties recommending/endorsing over-sensitive assays without understanding their long-term implications
  - Team-work – “Going with the flow” than asking questions
  - Nurse-practioners ordering diagnostic studies
  - Locum physician providers

- **User-based**
  - User-demand
  - “peace-of-mind”
  - Stressed populations
  - Ageing fear
  - Deconditioning
  - Exploiting “Family history”

- **Provider-based**
  - Sensitivity trumps specificity - Using over-sensitive test(s) in inappropriate clinical context
  - Practicing “Rule-out Medicine” – Trying to find out, “What you don’t have?”
  - Looking for Zebras, when clearly hearing hoofs!
  - Substitute tests for lack of knowledge/confidence
  - Don’t want to be “Odd-man out” – Fashion-based medicine
  - Exploiting “Family history”
  - “Making-sure!”
  - Confirming what is obvious – “A picture worth a thousand words’, but when chasing incidental findings
  - Chasing MIRANCaS (Multiple Incidental Radiological Abnormalities of No Clinical Significance)
  - Chart over-load syndrome – Rather than the primary care provider (PCP) going through a thick chart, orders the investigation again, when they often spend couple of minutes for each clinical encounter with the patient
  - Buying time – when nature often would take care of the issue at hand
  - Failure to practice “Masterly inactivity” – has to do “something”
  - Specialists asking/requesting for imaging studies before clinical assessments, eg., CT/MRI before Neurologist appointment and ECHO/Stress test before Cardiologists appointment etc.
  - Specialists advising or ordering studies beyond their field
  - Diversional Medicine – Specialist suggesting PCP to refer to another specialist for non-specific symptoms eg., respirologer suggesting cardiac assessment in a deconditioned patient
  - Specialists suggesting unnecessary Imaging to PCP, especially during a telephone or corridor consult
  - Incomplete information on Imaging requitions, resulting in inappropriate testing
  - Radiologists suggesting further imaging studies (self-referral), when they do not have complete clinical information about the patient or their co-morbidities
  - Toys or Tools! – Radiologist suggesting other imaging studies as if these are toys!
  - Inability to separate wheat from the chaff – unable to differentiate what is significant and what is not significant.
### Some common examples

<table>
<thead>
<tr>
<th>Condition</th>
<th>Overdiagnosis</th>
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</thead>
<tbody>
<tr>
<td>Asthma</td>
<td>30% may not have asthma 66% may not require medications</td>
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<tr>
<td>Breast cancer</td>
<td>Upto 1/3 of mammographically detected “cancers” may be overdiagnosed</td>
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<tr>
<td>Chronic kidney disease (CKD)</td>
<td>1 in 10 classified as CKD under present criteria Overdiagnosis in the elderly</td>
</tr>
<tr>
<td>High BP</td>
<td>Substantial overdiagnosis</td>
</tr>
<tr>
<td>High cholesterol</td>
<td>Up to 80% of people with near normal cholesterol treated for life may be overdiagnosed</td>
</tr>
<tr>
<td>Prostate cancer</td>
<td>Overdiagnosis of 60% in those detected using the prostate specific antigen (PSA) test</td>
</tr>
</tbody>
</table>
Spine Imaging

Brinjiljki et al. AJNR April 2015

[Bar chart showing the percentage of asymptomatic individuals with CT or MRI findings at different age groups.

Bar chart details:
- Disk Degeneration
  - 20 years old: 0.37
  - 80 years old: 0.3
- Disk Bulge
  - 20 years old: 0.96
  - 80 years old: 0.84
- Disk Protrusion
  - 20 years old: 0.29
  - 80 years old: 0.43
- Annular Fissure
  - 20 years old: 0.19
  - 80 years old: 0.29

Information obtained from AJNR Apr 2015 Brinjiljki et al]
What could be done?
THE RECEIVERS!

Why?
CHOOSING WISELY

- Do I really need this test, treatment or procedure?
- What are the downsides?
- Are there simpler, safer options?
- What happens if I do nothing?
THE PROVIDERS!

- Don’t be a blind follower!
  - Guidelines/protocols/Evidence
- Is this test/therapy **really** required for this individual?
- Am I **really** going to make a difference in this individual?
- Stop treating thy-self
Choosing Wisely

- Choosing Wisely - ABIM Foundation (www.choosingwisely.org)
- Preventing Overdiagnosis (www.preventingoverdiagnosis.net)
- Too Much Medicine!
- **Canada** (www.choosingwiselycanada.org)
- Right Care (Lown Institute – www.rightcarealliance.org)
Infoxication

- Information intoxication
- Like trying to get a drink from a firehose
- Like a giant tsunami washing over the American public every day

- Health care marketing messages
- DTC drug ad disease mongering
- News & Talk shows
- Journals competing for public attention
- Medical center/industry news releases
- Editorial cartoons
- Patient advocacy groups
- Social media messages
THE SYSTEM

- Public education
- Auditing utilization
- Improve IT issues
- Stop incentives!
- RCTs before implementing untested technologies
- Limit legal liabilities
- Think Long-term consequences
CHALLENGES

- Interactions between illnesses
- Interactions between treatments
- Changing guidelines
- Multiple providers
- Tension between therapeutic goals
Does number of providers help?
Or, they Spoil the broth!

One Patient, Too Many Doctors: The Terrible Expense of Overspecialization
Out-Of-Control Physicians: Too Many Doctors Are Doing Too Many Things To Too Many Patients

Peter Ubel, CONTRIBUTOR
Indeed, 40% of patients expected to live five or fewer years received PSA tests from experienced physicians, versus only 25% receiving care from trainees.

So what’s going on with all these questionable tests and treatments? It’s not just about the money.
THE PERILS OF OVERDIAGNOSIS & OVERTREATMENT

Cured yesterday of my disease, I died last night of my physician.

Matthew Prior, 1714
Breast Cancer Early Detection

by mammography screening

Numbers for women aged 50 years or older who participated in screening for 10 years or more

1000 women without screening:
- Women who died from breast cancer: 5
- Women who died from all types of cancer: 21
- Women who learned after a biopsy that their diagnosis was a false-positive: –
- Women who were diagnosed and treated for breast cancer unnecessarily: –
- Remaining women: 979

1000 women with screening:
- Women who died from breast cancer: 4
- Women who died from all types of cancer: 21
- Women who learned after a biopsy that their diagnosis was a false-positive: 100
- Women who were diagnosed and treated for breast cancer unnecessarily: 5
- Remaining women: 874

Source:
Numbers in the facts box are rounded. Where no data for women above 50 years of age are available, numbers refer to women above 40 years of age.
www.harding-center.mpg.de
Minnesota 30-year colon cancer study

Shaukat A. et al. NEJM 2013;369:1106

Figure 1. Cumulative Colorectal-Cancer Mortality.
Cumulative colorectal-cancer mortality was assessed on the basis of Kaplan–Meier estimates, evaluated at monthly time points. Point estimates and 95% confidence intervals at 30 years are also shown.

Figure 2. Cumulative All-Cause Mortality.
Cumulative all-cause mortality was assessed on the basis of Kaplan–Meier estimates, evaluated at monthly time points. Point estimates and 95% confidence intervals at 30 years are also shown.
Does preventive care saves money?

Cohen JT et al. NEJM 2008; 358:7
Nothing is permanent, except change