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Diagnostic error in primary care: causes & remedies

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Why focus on diagnostic error?

- ★ Diagnosis is core competence
- ★ Determines treatment and ultimately patient outcome
- ★ The commonest reason for patient claims against UK GPs (63% - Silk, 2000)
- ★ Can have the most serious patient consequences (Bhasale, 1998)
- ★ The errors that GPs remember the most and consider the most serious in their career (Ely et al. 1995; Fisseni et al. 2008)



Things are changing...

- ★ Neglected topic in the 'Patient Safety' movement
 - ★ Funding calls for research into diagnostic error
 - ★ DEM annual meetings
- ★ Mostly studied in secondary care
 - ★ Prompt diagnosis of serious conditions in primary care
 - ★ Cancers, IHD, infections...

Importance of clinician cognition

- ★ **Gandhi et al. (Ann Intern Med, 2006):** closed malpractice claims in ambulatory care.
 - ★ Cognitive factors ('judgment errors, vigilance and memory lapses, lack of knowledge') implicated in ALL diagnostic errors
 - ★ Alone in 55%
 - ★ or in association with patient- and/or system factors.
- ★ **Singh et al. (Arch Intern Med, 2007):** targeted record screening in primary care clinics at VA hospital.
 - ★ Commonest errors in the diagnostic process: failure or delay in eliciting information, misinterpretation or suboptimal weighing of information.

How people reason causally

- ★ Early generation of few hypotheses – associative or matching memory process
 - ★ Ease of retrieval (prevalence, recency)
 - ★ Ease of construction of explanation (existing diagnosis, co-morbidity, patient explanations)
- ★ Selective information search (information relevant to the working diagnosis).

How people reason causally

- ✦ Strive for coherent explanations: fill gaps, dismiss or denigrate inconsistencies
- ✦ Stop search once a coherent story emerges ('mental representation')
- ✦ Difficult to restructure it, question it or seek alternatives
- ✦ Filter for new information

Difficult diagnoses in General Practice

- ✦ Predictors of diagnostic accuracy
- ✦ Factors explored:
 - ✦ Information gathering
 - ✦ Length of clinical practice ('experience')

Methods

- ✦ Hypothetical patient cases
- ✦ Representative of diagnostic challenges in General Practice
- ✦ Presented to GPs on computer

7 common symptom presentations

Toddler with **fever** presenting 3 consecutive times

68 y/o man, smoker, presenting with **dyspnoea**

Young woman presenting with 3-month **abdominal pain**

60 y/o man, presenting with intermittent **chest pain**

Elderly COPD patient with increasing episodes of **dyspnoea**

69 y/o woman with persistent **headaches**

52 y/o man, on antidepressants, with **fatigue**

Diagnostic difficulty

- ✦ Atypical presentations
- ✦ Non-specific features
- ✦ Competing diseases of higher prevalence

Diagnosable

- ✦ 5 cases: diagnosis by investigation
- ✦ 1 case: diagnosis by criteria
- ✦ 1 case: diagnosis uncertain but best management could be defined

Participants

- ✦ 21 GP Registrars
 - ✦ 21 GPs with 1-3 years in General Practice
 - ✦ 42 GPs with ≥ 10 years in General Practice
 - ✦ 21 GP trainers
 - ✦ 21 Non-trainers
- } Matched for years of experience

Patient_Description

NAME: Mabel Evans AGE: 76 years old ETHNICITY: Caucasian
HEIGHT: 1.60m WEIGHT: 62kg (BMI 24.2, measured last year)
SMOKING STATUS: Smoked 20 cigarettes per day from age 15, gave up last year (60 pack years)
LAST BP: 122/67, 6 weeks ago
PAST MEDICAL HISTORY: COPD 1998, Hypertension 1996
MEDICATION: Combivent inhaler (via spacer) 2 puffs qds, bendroflumethazide 2.5 mg od
LAST CONSULTATION: 6 weeks ago, for exacerbation of COPD. Attended 3 times in previous 6 months for this reason.
APPEARANCE: On entering the room, you notice that her lips look blue.

I've come to see you about my breathing again, doctor. This is the 4th time in the past 6 months that it's flared up and I'm getting worried about it. It came out of the blue about 3 days ago. My breathing is now awful, I get out of breath doing the slightest thing, even getting ready to come to the surgery had me all out of puff today. I've been wheezy too, much worse than usual.

|

Time Elapsed 10:13:39

You have Patients waiting

Patient_Description

NAME: Mabel Evans AGE: 76 years old ETHNICITY: Caucasian
HEIGHT: 1.60m WEIGHT: 62kg (BMI 24.2, measured last year)
SMOKING STATUS: Smoked 20 cigarettes per day from age 15, gave up last year (60 pack years)
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MEDICATION: Combivent inhaler (via spacer) 2 puffs qds, bendroflumethazide 2.5 mg od
LAST CONSULTATION: 6 weeks ago, for exacerbation of COPD. Attended 3 times in previous 6 months for this reason.
APPEARANCE: On entering the room, you notice that her lips look blue.

ECG shows a heart rate of 98 beats per minute, right axis deviation and p-pulmonale.

Time Elapsed 10:00:10

You have Patients waiting

Recorded

- ✦ Information requests in sequence
- ✦ Time
- ✦ Comments
- ✦ Diagnoses & management decisions

- ✦ Diagnostic accuracy: correct diagnosis included in the final list of differential diagnoses
- ✦ Appropriateness of management (based on clinical guidelines)

Results

PATIENT CASE	CORRECT DIAGNOSES
Pyrexial child	25% (21/84)
Dyspnoea 1	27% (23/84)
Abdominal pain	41% (34/84)
Chest pain	44% (37/84)
Dyspnoea 2	46% (39/84)
Headache	52% (44/84)
Fatigue	57% (48/84)

Diagnosis & management

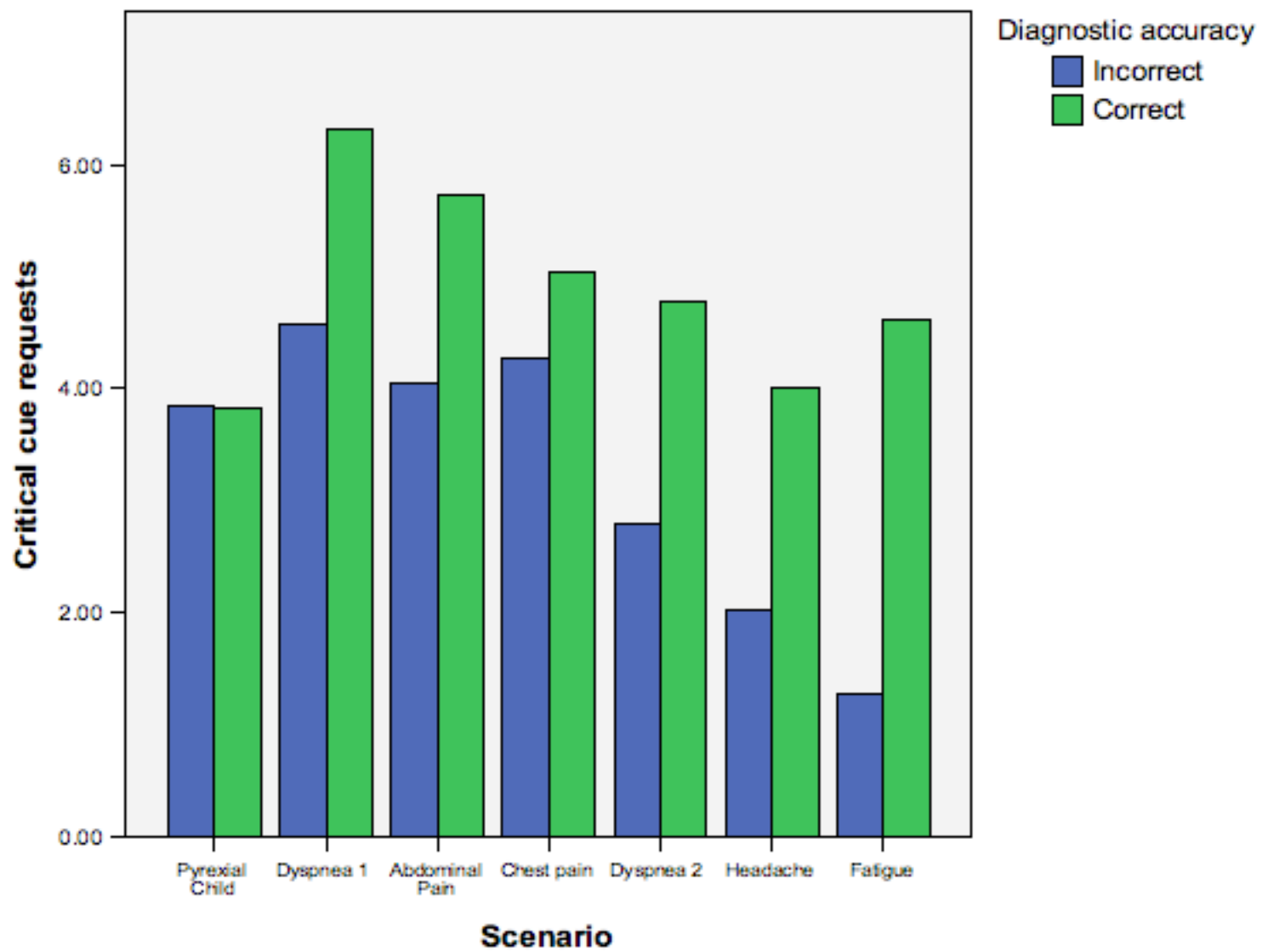
- ✦ $\chi^2=278.86$, $df=1$, $p<.0001$
- ✦ 92% of correct diagnoses were followed by appropriate management.
- ✦ 78% of incorrect diagnoses were followed by inappropriate management.

What about experience?

EXPERIENCE	CORRECT DIAGNOSES
GP registrars	35% (52/147)
1-3 years	43% (63/147)
≥10 years	45% (131/294)

What predicts diagnostic accuracy?

- ✦ Number of requests for 'critical' information
 - ✦ interaction (number of requests for critical information x scenario) ($p < .0001$)
 - ✦ experience ($p = .06$)



Critical information

- ✦ Information with diagnostic value
 - ✦ $LR+ > 1.5$ or $LR- < 0.67$
 - ✦ Separate web-based study of 'experts'

In summary

- ✦ Gathering diagnostic information predicted diagnostic accuracy. Gathering a lot of information did not.
- ✦ It is not asking a lot of questions, it is asking the right ones.
- ✦ So what determines if the right questions will be asked?

A detailed look into misdiagnosed cases

- ★ No feedback
- ★ ‘Stimulated recall’
- ★ Step by step
 - ★ This is what you asked for earlier.
 - ★ Why did you ask for it?
 - ★ What did it tell you?

Abdominal pain

NAME: Katie Smith AGE: 30 years old

ETHNICITY: Caucasian

HEIGHT: 1.62m WEIGHT: 66kg (BMI 25.1, measured 3 months ago)

SMOKING STATUS: Never smoked

LAST BP: 96/60, taken 3 months ago

PAST MEDICAL HISTORY: None

MEDICATION: Microgynon 30 one daily

LAST CONSULTATION: Review of oral contraceptive pill, 3 months ago. She is an infrequent attender.

APPEARANCE: As she enters the room you notice that she does not look ill.

PATIENT: 'Hello doctor. I've been having some tummy pain for 3 months now. I just noticed it one day and it's been there ever since. It's all over the tummy, like a sort of cramping feeling, a bit like a period pain, I suppose, but I'm getting it throughout the month. It comes on most days, there doesn't really seem to be a pattern to it. It's usually sore for a few hours, once it's come on. Some days it seems a bit worse than others but, as I said, there is no pattern to it.'

Diagnostic delays for coeliac disease

- ★ The “*most under-diagnosed common chronic condition in the UK today*”
- ★ Symptoms for 13 years on average and several GP consultations before diagnosis *

* 2006 survey of 800 members of Coeliac UK

A difficult diagnosis

- ✦ Early presentation, anaemia but no weight loss
- ✦ 50/84 misdiagnosed (60%)
- ✦ 38/50 stimulated recall (76%)

Stimulated recall results

- ★ 10 GPs mentioned coeliac disease (26%) at some point
- ★ Symptoms were not attributed to coeliac disease
 - ★ pain relieved by defaecation (0/17)
 - ★ diarrhoea (2/37)
 - ★ anaemia (0/16)

Microcytic anaemia

- ★ Full blood count was never requested to test for coeliac disease
 - ★ routine test
 - ★ to ‘exclude serious pathology’
 - ★ to check for inflammatory bowel disease



So how was anaemia explained?

- ★ 8/16 GPs could not explain it
 - ★ 4/8 gave it as a separate diagnosis
- ★ 2/16 'borderline'
- ★ 4/16 linked it to IBD
- ★ 2/16 failed to detect abnormality



Conclusions

- ★ The most frequent reason for missing a diagnosis was not considering it as a possibility.
- ★ In the absence of a single hypothesis that explains all the symptoms, clinicians may seek multiple, co-existing explanations.

What can be done

- ✦ Plenty of suggestions, little/no evidence
- ✦ Train students to diagnose PLENTY of carefully-structured, computerised scenarios, with immediate feedback
 - ✦ How long does effect last? Does it transfer to real patients?

What can be done

- ✦ Plenty of suggestions, little/no evidence
- ✦ Teach students to question their diagnosis:
 - ✦ “What else could it be?”
 - ✦ “Why might I be wrong?”
 - ✦ “Could I make a good case for the ‘other’ diagnosis?”
- ✦ Formal teaching of reasoning biases

The Holy Grail

Computerised diagnostic support systems



Thank you

- ✦ Kostopoulou et al. Predictors of diagnostic accuracy and safe management in difficult diagnostic problems in Family Medicine. *Medical Decision Making* 2008; 28: 668-680.
- ✦ Kostopoulou et al. Missing celiac disease in family medicine: the importance of hypothesis generation. *Medical Decision Making* 2009; 29: 282-290.
- ✦ Kostopoulou et al. Diagnostic difficulty and error in primary care: a systematic review. *Family Practice* 2008; 25: 400-413.
- ✦ Kostopoulou et al. Information search and information distortion in the diagnosis of an ambiguous presentation. *Judgment and Decision Making* 2009; 4: 408-418.