Diagnostic Process and Clinical Problem solving in Family Medicine Practice

Seminar delivered to Medical Year 4 1997-2008
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At the end of the session, you should:

Have a better understanding about:
- How doctors make diagnosis in general
- How family doctors make diagnosis
- The different approaches to making diagnosis and clinical problem solving
Important tasks for doctors

• Understanding the patient
• Understanding his or her diseases

Over last 2 to 3 decades, teaching of interviewing skills has facilitated doctors with better means for understanding their patients but more work is needed to understand the illnesses/diseases.
No disease-specific diagnosis is possible in about 50% of visits to family physician.

We gain insight into these problems by understanding the patient and the doctor-patient relationship.

Even with a diagnosis, successful management requires an understanding of the context of the disease.
FIVE Key Areas of Family Medicine

• Clinical practice - Health and disease
• Clinical practice - Human development
• Clinical practice - Human Behaviour
• Medicine and society
• The practice
Special features of Family Medicine Practice

• Highly prevalent health problems in family practice are not life threatening but not really considered as diseases by hospital clinicians but illnesses by patients.

• Not all clinical presentations would lead to established diagnoses.

• Most are undifferentiated problems at early stage with less classic presentations.
Special features of Family Medicine Practice

• Unique difficulties of diagnosing disease which presents in an early, undifferentiated form and of its management outside specialized hospital units with limited facilities for investigation
• Multiple problems, how to prioritize?
• Methods of disease prevention and health promotion in the community.
Problem Solving

- Different prevalence
- Different cues
- Different predictive value of tests at early stages of illness
- Serial versus parallel testing
Problem Solving

• Different prevalence
  – Age
  – Sex
  – Settings
<table>
<thead>
<tr>
<th></th>
<th>Present</th>
<th>Absent</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Positive</strong></td>
<td>a</td>
<td>b</td>
<td>a+b (test positive)</td>
</tr>
<tr>
<td><strong>Test</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Negative</strong></td>
<td>c</td>
<td>d</td>
<td>c+d (test negative)</td>
</tr>
<tr>
<td><strong>Test</strong></td>
<td></td>
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</table>
**Disease Prevalence 30%**

**Age Group 60**

<table>
<thead>
<tr>
<th></th>
<th>Present</th>
<th>Absent</th>
<th>Total</th>
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<tbody>
<tr>
<td><strong>Positive Test</strong></td>
<td>270</td>
<td>70</td>
<td>340</td>
</tr>
<tr>
<td><strong>Negative Test</strong></td>
<td>30</td>
<td>630</td>
<td>660</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>300</td>
<td>700</td>
<td>1000</td>
</tr>
</tbody>
</table>

Sensitivity: 90%
Specificity: 90%

**PPV** = \( \frac{270}{340} = 79.4\% \)

**NPV** = \( \frac{630}{660} = 95.5\% \)
## Disease Prevalence 1% 
**Age Group 20**

<table>
<thead>
<tr>
<th></th>
<th>Present</th>
<th>Absent</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive Test</td>
<td>9</td>
<td>99</td>
<td>108</td>
</tr>
<tr>
<td>Negative Test</td>
<td>1</td>
<td>891</td>
<td>892</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>990</td>
<td>1000</td>
</tr>
</tbody>
</table>

Sensitivity: 90% Specificity 90%

PPV = 9/108 = 8.3%

NPV = 891/892 = 99.9%
Contrasting cause of chest pain presenting in hospital and general practice

Hospital

Nil found
Cardiac and alimentary
Cardiac
Alimentary

General practice

Cardiac
Musculoskeletal
Neurosis
Alimentary
Respiratory
Brian storm in small groups of the three presentations over next three slides for different age groups
Patient complains of tiredness
What are the most likely diagnoses?

- 20 years old female
- 45 years old male
- 55 years old female
- 65 years old male
Patient with palpitation
What are the most likely diagnoses?

- 20 years old female
- 45 years old male
- 55 years old female
- 65 years old male
Patient complains loss of appetite
What are the most likely diagnoses?

- 20 years old female
- 45 years old male
- 55 years old female
- 65 years old male
Diagnostic Process

Traditional/Inductive Methods

- The complete history and physical
- Gather all the information before making a diagnosis
- A battery of tests
Diagnostic Process in Family Medicine

• Diagnostic fallacy that family physicians would make diagnoses by collection clinical information in routine fashion.

• Family physicians started off the process in formulation of provisional diagnostic hypotheses.

• They then test the hypotheses by selective collection of clinical information from patient’s history, clinical examination and laboratory test.
Diagnostic Process

• Inductive Method of Problem Solving:
  – Unproductive
  – Confusing
  – Time-consuming
Diagnostic Process in Family Medicine

• In the course of research, family physician will look for positive (confirming) and negative (refuting) evidence.

• This is hypothetico-deductive approach

• The process is cyclical and family physicians must prepare to revise and test the hypotheses further until it is refined to the point at which management decision is justified.

• Purely deductive approach can play relatively small role on some occasions
Diagnostic Process

- Presenting cues
- Gather information
- Interpret information
- Gather more information
- ...... ???
Cues in Diagnostic Process

• When a patient presents a problem, the family physician is faced with a large dataset: what patient says, the family physician’s own observations, previous knowledge of the patient, relatives, from other physicians or other health professionals.

• The different types of information are not of equal value and family physician responds to certain types of information having special meaning.

• We call these ‘cues’ and it helps family physicians to understand the context of problem and/or understand the patient.
Cues in Diagnostic Process

• A cue can be a symptom, sign, statement, or an aspect of patient’s behaviour
• It may be something that is known about the patient such as age, sex, ethnicity, occupation, past history
• It may be a contextual cue such as teenage girl accompanied by mother, a symptom tolerated by patients for years before presenting
• It may be a subjective cues
• Cues can be certain or probabilistic
Diagnostic Process

Hypothetico-deductive reasoning

• Form your diagnosis or hypotheses
• Gather information with a purpose
• Directed search
• Selective hx/pe/ix
Existing Information in medical record

Patient Demography
eg. age, sex, ethnicity, education, occupation

Past Medical History

Life style

Health Perception

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New observations
新的觀察資料

Any change of function activities 日常活動有否出現變化
Any adverse life events 生活有否出現大改變
Any unusual presentation? 有否異常的病況

What are the main concerns of patient during consultation?
病人最關注的問題

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Presenting complaints
病人出現的病情

Existing Information in medical record
现有病历资料

Patient Demography
eg. age, sex, ethnicity, 
education, occupation
病人基本资料，例如：年齢、性别、种族、教育、職業

Past Medical History
过往病历

Life style
生活習慣

Health Perception
個人健康觀感

New observations
新的观察資料

Any change of function activities
日常活動有否出現變化

Any adverse life events
生活有否出現大改變

Any unusual presentation?
有否異常的病況

What are the main concerns of patient during consultation?
病人最關注的問題

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What are your preliminary assessment

Provisional Diagnosis
Hypotheses

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Perform necessary clinical examination and investigations
進行適合的調查
Differential Diagnosis
診斷
Appropriate Management / advice
適合的治療 / 建議

Re-assessment
再度評估

Problem persist
病況持續

Improved resolved
病情好轉

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Problem persist
病況持續

Review
再次評估

Triangle of Preliminary Assessment

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Diagnostic Process

Hypotheses Formulation

PST Approach:

- Probability (most likely)
- Seriousness (most serious)
- Treatability (should not be missed)
Ranking of hypotheses

• The hypotheses are placed in ranking order based on two main criteria: probability and payoff.

• Payoff is an indication of the consequences of diagnosing or not diagnosing a disease. The more serious the disease and the more amendable to treatment, the greater the positive payoff of making the diagnosis and the greater the negative payoff of missing on it.

• If the disease has a high payoff, it will rank high on the list even low probability, e.g., acute appendicitis in children with abdominal pain.
Ranking of hypotheses

• If considerations of payoff is not the case, the hypotheses are ranked in order of probability.

• This is the conditional probability.

• If depression is first ranking hypotheses, one will begin the search of evidence for and against depression.

• If the diagnosis is supported, one will test it further to rule out other possible causes accounting for depressive like symptoms.

• Family physicians not necessary always think of common problems and this depends entirely on cues, e.g, projectile vomiting in early infancy looks for pyloric stenosis.
Diagnostic Process in Family Medicine

• Besides using common disease categories, family physicians use other types of category to deal with early and undifferentiated illness.

• Patient with acute abdomen, the first task is to divide them into two categories; ‘probably acute abdomen’ or ‘non acute abdomen’.

• Similarly with chest pain, if categorised as ‘non-cardiac chest pain’, one would stop the search and observe the patient.

• The prevalence of ‘non-disease’ is higher in family practice so the diagnostic tests will have higher predictive value.
A 30 year old clerk comes in with cold and cough for 2 weeks.

• What would you ask?

• What would you do?
A 76 year old man comes with cough for 2 months.

• What would you ask?

• What would you do?
• Probability: Consider prevalence, duration, age, previous smoking history, occupation, previous episodes
• Most serious: Ca, history of Ca
• Treatability: Bronchitis, COPD
## Diagnostic Probability: Prevalence in the community

<table>
<thead>
<tr>
<th>Diagnosis made</th>
<th>Frequency (%)</th>
<th>Crude probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute bronchitis</td>
<td>36</td>
<td>Most likely</td>
</tr>
<tr>
<td>Common cold</td>
<td>35</td>
<td></td>
</tr>
<tr>
<td>Influenza</td>
<td>7</td>
<td>Less likely</td>
</tr>
<tr>
<td>Chronic bronchitis</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Laryngitis tracheitis</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Pneumonia</td>
<td>1.9</td>
<td>Rare</td>
</tr>
<tr>
<td>Whooping cough</td>
<td>0.7</td>
<td></td>
</tr>
<tr>
<td>Measles</td>
<td>0.4</td>
<td></td>
</tr>
<tr>
<td>Pulmonary TB</td>
<td>0.4</td>
<td></td>
</tr>
<tr>
<td>Ca lung</td>
<td>0.2</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>7</td>
<td></td>
</tr>
</tbody>
</table>

Presenting symptoms of cough (N=527), adapted from Morrell, 1976
Diagnostic Probability: Duration

3 days

3 days

- URTI
- Acute bronchitis
- Pneumonia
- Whooping cough
- Chronic bronchitis
- Tuberculosis
- Bronchial carcinoma
3 weeks

URTI

Pneumonia

Chronic bronchitis

Bronchial carcinoma

Acute bronchitis

Whooping cough

Tuberculosis
URTI
Acute bronchitis
Whooping cough
Tuberculosis
Pneumonia
Chronic bronchitis
Bronchial carcinoma
Diagnostic Process: Seriousness

• Should consider life threatening/serious incapacitating condition

• Even rare
History & Mx

• In the 70 year old:
• Most serious and probable:
  – Frequency of cough, blood?
  – Associated symptoms: fever, wt loss
  – History of Ca
  – How daily life affected
• Full exam, Investigations: ESR?
• CXR
History & Management

- In the 20 year old, most likely URTI, symptomatic treatment and suggested follow up if no symptoms recur
A 60 year old lady was referred from private orthopaedic surgeon (she attended for back pain) to Family Medicine clinic because she had developed percordial chest pain with slight ST depression on ECG

- Why she was referred to you instead of specialist nearby?
- DDx?
<table>
<thead>
<tr>
<th>DDx</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ischeamic heart disease</td>
</tr>
<tr>
<td>Reflux symptoms</td>
</tr>
<tr>
<td>Injury</td>
</tr>
<tr>
<td>Acute bronchitis</td>
</tr>
<tr>
<td>Anxiety</td>
</tr>
<tr>
<td>Costochondritis</td>
</tr>
<tr>
<td>Peptic ulcer</td>
</tr>
<tr>
<td>Gallstone</td>
</tr>
<tr>
<td>Pericarditis</td>
</tr>
<tr>
<td>Myositis</td>
</tr>
</tbody>
</table>
Subsequent progress

- Her symptoms suggestive of acid reflux and anxiety
- Reflux was confirmed with endoscopy and also noted to have mild duodenal ulcer
- She was found to have mild degree of anxiety
Subsequent progress

• Her symptoms developed again after several years
• She had extensive cardiac investigation but inconclusive and made the symptom worse
• Further review with hypothetico-deductive approach reviewed that anxiety was the leading cause of symptom
• Better after appropriate counselling
Cues & hypotheses

- Patient’s understanding of the problem
- Why patient has come: expectation
- Appropriate context (pathophysiological or interpersonal)
- Disease category
- What the problems is?
- Patient’ feelings about the problems
The Content of Primary Medical Care (I McWhinney)

A specialty in breadth, rather than depth.
Factors affecting clinical decision making

1. Health problem (urgency, seriousness, natural history, etc)
2. Patient (expectation, culture, compliance)
3. Family (impact, support)
4. Other significant people
5. Doctor (communication with patients, previous experience with problem, knowledge, workload, uncertainty)
Factors affecting clinical decision making

6. Investigations (indications, reliability, results)

7. Resources (availability and constrains)

8. Time factor

9. Ethical and medicolegal

10. Management (indications and contraindications, drug side effects and interaction, risk and benefits of therapy)
Patients with complex needs: “Heartsink’ patients

This is a group of patients with frequent attendances presenting with multiple complaints but usually no definite diagnosis would be established and no serious underlying organic causes of the complaints would be detected.

Those patients have complex unmet needs although they might not be life threatening.

Those patients living alone with little or no family or social support and/or frequent attendance to Emergency Departments with multiple problems without needs of admission would be potential cases.
**Patient-Centred Clinical Method**

(病人為本的臨床方法)

- Exploring both the disease & illness experience
  探索疾病及毛病
- Understanding the whole person
  全人治理
- Finding common ground
  找尋共通點

Patient presents cues 病徵

Disease 疾病

**Physical, history, lab**
病歷, 體檢, 化驗

Illness 毛病

Ideas, expectations, feelings, effect on function
病人的想法, 要求及想法

Enhancing the Patient-Doctor Relationship
加強醫生及病人關係

Incorporating Prevention and Health Promotion
介入預防及健康促進

- Problems 問題
- Goals 目的
- Roles 功能

Being Realistic

Mutual Decision

PERSON

Disease 疾病

Illness 毛病

**Enhancing the Patient-Doctor Relationship**

加强醫生及病人關係

**Incorporating Prevention and Health Promotion**

介入預防及健康促進