Advanced Health Assessment and Clinical Diagnosis in Primary Care

DAINS BAUMANN SCHEIBEL

Mosby

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Mosby
A Harcourt Health Sciences Company
St. Louis London Philadelphia Sydney Toronto

Mosby
A Harcourt Health Sciences Company

Publisher: Sally Schrefer
Developmental Editor: Rae L. Robertson
Project Manager: John Rogers
Project Editor: Helen Hudlin
Manufacturing Manager: Don Carlisle
Designer: Yael Kats
Cover Design: Liz Young

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Printed in the United States of America

Mosby, Inc.
11830 Westline Industrial Drive
St. Louis, Missouri 63146

Library of Congress Cataloging-in-Publication Data
Dains, Joyce E.
Advanced health assessment and clinical diagnosis in primary care
Joyce E. Dains, Linda Ciofu Baumann, Pamela Scheibel.
p. cm.
Includes bibliographical references and index.
ISBN 0-8151-3627-7
1. Diagnosis, Differential. 2. Medical logic. 3. Medical history taking. 4. Physical diagnosis. I. Baumann, Linda Ciofu. II. Scheibel, Pamela. III. Title.
[DNLM: 1. Diagnosis, Differential. 2. Diagnostic Techniques and Procedures. 3. Primary Health Care. WB 141.5 D133a 1998]
RC71.5.D35 1998
616.07'5—dc21
DNLM/DLC 98-14984

00 01 02 / 9 8 7 6 5 4 3 2

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Differential Diagnosis of Common Causes Tables

Hematology Reference Ranges

Element	Reference Range	SI Units
Leukocyte count (WBC)	4.3-10.8 × 10^3/mm^3	4.3-10.8 × 10^9/L
Erythrocyte count (RBC)	4.15-4.9 × 10^6/mm^3	4.15-4.9 × 10^{12}/L
Hemoglobin Males Females	 13-18 g/dl 12-16 g/dl	 8.1-11.2 mmol/L 7.4-9.9 mmol/L
Hematocrit Males Females	 42%-52% 37%-48%	 0.42-0.52 0.37-0.48
Mean corpuscular volume (MCV)	86-98 mm^3	86-98 fl
Mean corpuscular hemoglobin (MCH)	28-33 pg/cell	28-33 pg/cell
Mean corpuscular hemoglobin concentration (MCHC)	32-36 g/dl	320-360 g/L
Red-cell distribution width (RDW) (%)	11.5%-14.5%	0.115-0.145
Platelet count	150-350 × 10^3/mm^3	150-350 × 10^9/L
Neutrophil bands (%)	0%-4%	0.0-0.04
Segmented neutrophils (%)	45%-74%	0.45-0.74
Lymphocytes (%)	16%-45%	0.16-0.45
Monocytes (%)	4%-10%	0.04-0.10
Eosinophils (%)	0%-7%	0.0-0.07
Basophils (%)	0%-2%	0.0-0.02
Reticulocyte count (%)	0.5%-2.5% of red cells	0.005-0.025 of red cells
Hemoglobin, A_{1C}	3.5%-6.0%	
Erythrocyte sedimentation rate (ESR) (Westergren's method)	Male: up to 15 mm/hr Female: up to 20 mm/hr Child: up to 10 mm/hr Newborn: 0-2 mm/hr	

Modified from Jordan CD, Flood JG, Laposata M, Lewandrowski KB: Normal reference laboratory values, *NEJM* 327(10):718-724, September, 1992; ESR values from Pagana KD, Pagana TJ: *Mosby's manual of diagnostic and laboratory tests*, St. Louis, 1998, Mosby, p. 199.

Conversion Tables

Length

in	cm	cm	in
1	2.54	1	0.4
2	5.08	2	0.8
4	10.16	3	1.2
6	15.24	4	1.6
8	20.32	5	2.0
10	25.40	6	2.4
20	50.80	8	3.1
30	76.20	10	3.9
40	101.60	20	7.9
50	127.00	30	11.8
60	152.40	40	15.7
70	177.80	50	19.7
80	203.20	60	23.6
90	228.60	70	27.6
100	254.00	80	31.5
150	381.00	90	35.4
200	508.00	100	39.4

1 in = 2.54 cm
1 cm = 0.3937 in

Weight

lb	kg	kg	lb
1	0.5	1	2.2
2	0.9	2	4.4
4	1.8	3	6.6
6	2.7	4	8.8
8	3.6	5	11.0
10	4.5	6	13.2
20	9.1	8	17.6
30	13.6	10	22
40	18.2	20	44
50	22.7	30	66
60	27.3	40	88
70	31.8	50	110
80	36.4	60	132
90	40.9	70	154
100	45.4	80	176
150	66.2	90	198
200	90.8	100	220

1 lb = 0.454 kg
1 kg = 2.204 lb

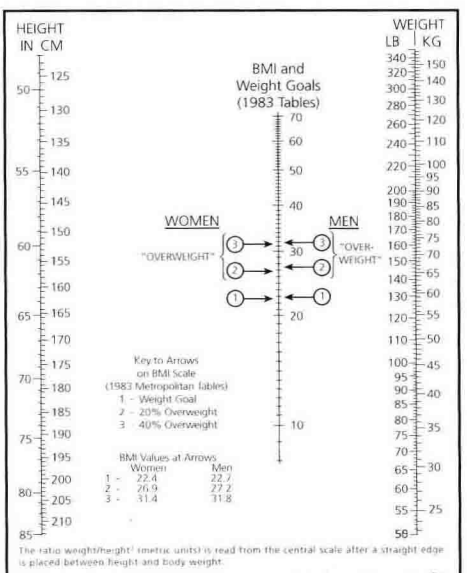
From Seidel HM et al: *Mosby's guide to physical examination*, ed 4, St. Louis, 1998, Mosby.

Temperature Equivalents

Celsius*	Fahrenheit†	Celsius*	Fahrenheit†
34.0	93.2	38.6	101.4
34.2	93.6	38.8	101.8
34.4	93.9	39.0	102.2
34.6	94.3	39.2	102.5
34.8	94.6	39.4	102.9
35.0	95.0	39.6	103.2
35.2	95.4	39.8	103.6
35.4	95.7	40.0	104.0
35.6	96.1	40.2	104.3
35.8	96.4	40.4	104.7
36.0	96.8	40.6	105.1
36.2	97.1	40.8	105.4
36.4	97.5	41.0	105.8
36.6	97.8	41.2	106.1
36.8	98.2	41.4	106.5
37.0	98.6	41.6	106.8
37.2	98.9	41.8	107.2
37.4	99.3	42.0	107.6
37.6	99.6	42.2	108.0
37.8	100.0	42.4	108.3
38.0	100.4	42.6	108.7
38.2	100.7	42.8	109.0
38.4	101.1	43.0	109.4

*To convert Celsius to Fahrenheit: (9/5 × Temperature) + 32.
†To convert Fahrenheit to Celsius: 5/9 × (Temperature − 32).

From Hockelman RA et al: *Primary pedicatric care* ed 3, St. Louis, 1997, Mosby.



Nomogram for body mass index (kg/m²) (1983 Metropolitan Life Insurance Company tables.) Weights and heights are without clothing. With clothes, add 5 lb (2.3 kg) for men or 3 lb for women and 1 in. (2.5 cm) in height for shoes.

From Burton BT, Foster WR: *Health implications of obesity: an NIH concensus development conference*, J Am Diet Assoc 85(9):1117-1121, 1985.

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Preface

This text is designed for beginning advanced practice clinicians and/or students who will be using history and physical examination skills in the clinical setting. Its purpose is to take the student to the "next step" of health assessment, i.e., beyond basic history and physical examination to using a diagnostic reasoning process. The book is intended to fill the gap between basic physical examination texts and the medical texts that are aimed primarily at disease and disorder management. It is not intended as a substitute for a clinical medicine management text nor does it address management of disorders or diseases. Rather, it is designed specifically to focus on the clinical evaluation of common problems that present in primary care settings, using the tools of history and physical examination to engage in the process of clinical diagnosis.

Each chapter is structured in the context of commonly occurring chief complaints rather than being based on a specific diagnosis or disease entity. These presenting problems are clustered by body system or area for convenience. Patients generally seek care for relief of symptoms and undiagnosed conditions. The initial challenge for primary care providers is to begin the process of differential diagnosis to determine the cause of a disorder, based on history and physical examination and laboratory and other diagnostic tests. However, the steps of the diagnostic reasoning process are seldom articulated in a sequence that reflects the clinician's thought process. Novice clinicians are often left to their own devices, to figure out, for example, which history questions are the most important, which should be asked first and which can be left for later, or to figure out which parts of the physical examination *must* be done as opposed to which will yield little information for a given complaint. This text tries to articulate the reasoning process, order the history questions in a meaningful way, and focus the physical examination for a specific chief complaint.

The diagnostic or clinical reasoning process is woven into each presenting problem. Each symptom begins with a brief introduction, providing the practitioner an overview of causative mechanisms and processes.

The clinical problem-solving process begins with **Diagnostic Reasoning: Focused History,** which walks the practitioner through the thinking process involved in getting a pertinent, relevant, problem-specific history that will assist with differential diagnosis. The section is designed around questions experienced clinicians ask themselves to order and organize the questions to be asked of the patient. These "self-questions" are structured according to what information the clinician needs first or most immediately about the presenting complaint, followed by self-questions that help sort through the possible differential diagnoses. The content and order of the self-questions vary, depending on the presenting problem. Sometimes the self-questions are based on what the condition is most likely to be; sometimes they are based on what is too important to miss.

For each of the self-questions there is a list of **Key Questions** to ask the patient or about the patient if a family member is giving the history. The key questions are followed by an interpretation or explanation of what the patient responses might signify. For ease of format, the key questions are written as though the clinician were addressing the patient. Certainly with young children and sometimes with adults, the clinician will be asking questions of another person about the patient. The intent is to convey *what* questions to ask, rather than to provide every possible format for each question.

Following these two sections is the **Diagnostic Reasoning: Focused Physical Examination** section. It instructs the practitioner in what focused physical examination to perform to assist in the diagnostic process. The section is *not* intended to teach basic physical examination; it assumes the practitioner knows how, using the techniques of inspection, auscultation, percussion, and palpation. This section, rather, provides focus for the examination, explains how to do additional or more advanced maneuvers, and offers an interpretation of the findings.

Following is the section entitled **Laboratory and Diagnostic Studies.** This section provides a brief outline of what kinds of laboratory or diagnostic studies would be appropriate for the chief complaint or suspected diagnosis. Because the goal of the text is clinical diagnosis, the laboratory and diagnostic studies included are those that would be a logical starting point, although perhaps not an ending point.

The final section of each presenting complaint is the **Differential Diagnosis.** It contains the most common differential diagnoses for the chief complaint and summarizes, in a narrative format, the history and physical examination findings, along with the laboratory and diagnostic studies indicated. The section finishes with table(s) of **Differential Diagnosis,** mirroring the narrative summary, which can be used as a quick reference.

The patient focus of *Advanced Health Assessment* is primary care patients. Both adults and children are included, with divergence in questions, examination, or interpretation of findings noted where pertinent. Management of health care problems is intentionally *not* included. Also, no attempt is made to address all possible patient complaints but rather to seek to focus on the most common chief complaints as exemplars of the diagnostic reasoning process.

Joyce E. Dains
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Chapter 1

Clinical Reasoning and Differential Diagnosis

Basic health assessment involves the application of the practitioner's knowledge and skills to identify and distinguish normal from abnormal findings. Basic assessment often moves from a general survey of a body system to specific observations or tests of function. Such an approach to assessment and clinical decision making uses a deductive process of reasoning. For example, a specialist, when examining a patient with known hyperthyroidism, would conduct a physical examination to test for deep tendon reflexes. Brisk or hyperreflexic findings would lead the practitioner to conclude that a hyperthyroid state is a likely cause for these findings. This would greatly narrow the choices of diagnostic tests to perform and alternations in treatment to make.

Advanced assessment builds on basic health assessment yet is performed more often using an inductive or inferential process, that is, moving from a specific physical finding or patient complaint to a more general diagnosis or possible diagnoses based on history, physical findings, and laboratory and diagnostic tests. The practitioner gathers further evidence and analyzes this evidence to arrive at a hypothesis that will lead to a further narrowing of possibilities. This is known as the process of diagnostic reasoning.

DIAGNOSTIC REASONING

Diagnostic reasoning is a scientific process in which the practitioner suspects the cause of a patient's symptoms and signs based on previous knowledge, gathers relevant information, selects necessary tests, and recommends therapy. The difference between an average and an excellent practitioner is the speed and focus used to arrive at the correct conclusion and initiate the best course of treatment with minimum cost, risk, inconvenience, and delay (Eddy, 1996).

In using diagnostic reasoning, the practitioner:

- Determines and focuses on what needs to be asked and what needs to be examined
- Performs examinations and diagnostic tests accurately
- Clusters abnormal findings
- Analyzes and interprets the findings
- Develops a list of likely or differential diagnoses

THE DIAGNOSTIC PROCESS

The Primary Care Context

The process of assessment in the primary care setting begins with the patient stating a reason for the visit or a chief complaint. Most visits to primary care providers involve symptoms presented by the patient, such as earache, vomiting, or fatigue. The initial evidence is collected through a patient history. Demographic information, such as gender, age, occupation, and place of residence, is obtained to place the patient in a risk category that can generally rule out certain diagnoses immediately. In most primary care settings, routine vital signs are obtained, which may include height and weight, temperature, pulse, respiratory rate, blood pressure, last menstrual period, and smoking status. As the practitioner is obtaining the history he or she is also making observations of the patient's appearance, interactions with family members, orientation, physical condition, and will note any unusual findings that may help focus the assessment process.

Presenting symptoms need to be explored with further questions about the (1) timing or onset, duration, and frequency; (2) anatomical location; (3) character or quality; (4) setting in which they occur; (5) severity or intensity; (6) aggravating and alleviating factors; (7) associated symptoms; and (8) the patient's perception of the meaning of the symptom. The practitioner then clusters the findings into logical groups based on prior knowledge of symptom clusters associated with specific diagnoses or anatomical locations, which suggests the involvement of a specific body system.

Formulating and Testing a Hypothesis

The practitioner then formulates a hypothesis based on expertise and knowledge of probable processes—e.g., pathological, physiological, psychological. Further interpretation of evidence refines the hypothesis to a working or probable diagnosis. Hypothesis generation, in fact, probably already began based on the patient's age, gender, race, appearance, and presenting problem. Age is the most significant variable in narrowing the probabilities of a problem.

Hypothesis generation forms the context in which further data are collected. This context includes the setting in which care is delivered, such as a hospital, an outpatient setting, or another community-based setting where more than a single individual may be affected. Clinical decision making can be filled with uncertainty and ambiguity. Because available evidence is almost never complete, hypothesis formation involves some element of subjective judgment.

The hypothesis must then be tested and assessed for (1) coherence—are the physiological linkages, predisposing factors, and complications for this disease present in the patient? (2) adequacy—does the suspected disease encompass all of the patient's normal and abnormal findings? (3) parsimony—is it the simplest explanation of the patient's findings? The surest way to make this determination is to ask the patient or the parents why they are seeking care and ask what their perception of the problem is. This is a crucial step since patients must find any treatment recommendation acceptable. And, finally, (4) can a competing hypothesis be eliminated? Are there other disease possibilities that could explain the patient's symptoms?

To confirm the hypothesis, the practitioner establishes a working definition of the problem as a basis for a treatment plan and evaluates the outcome. The goal of a clinical decision is to choose an action that is most likely to result in the health outcomes the patient desires. This step of the decision-making process involves personal preference as to whether benefits are worth the risks involved, the cost is reasonable, or whether the most desired outcomes are short or long term.

Clinicians make extensive use of heuristics, or rules of thumb, to guide the inductive or inferential process of diagnostic reasoning. Heuristics are generally accurate and useful rules to make the task of in-

formation gathering more manageable and efficient—rules such as familiarity, salience, resemblance to a patient who has a known disease. However, heuristics can, on occasion, be faulty (if the presentation is atypical or the condition is rare). The clinician must always be open to a low probability or a very serious diagnosis. Heuristics can have negative effects on judgment when stereotypes or biases influence judgment. For example, assuming that a patient is heterosexual can lead to errors in clinical reasoning and differential diagnosis when evaluating the symptom of rectal pain.

EXPERT VERSUS NOVICE CLINICIANS

Students of advanced assessment have a wide variety of backgrounds, with many coming from specialized areas of clinical practice. Such students may have difficulty broadening the scope of their observations and clinical possibilities. In any case, whether specialists or not, non-experts tend to be non-selective in data gathering and clinical reasoning strategies used. Experts, on the other hand, are able to focus on a problem, recognize patterns, and gather only relevant data, with a high probability of a correct diagnosis. The goal for a novice practitioner is to aim for competence and expertise.

The competent practitioner will:

1. *Identify most important cues.* These cues are obtained largely by a thorough symptom analysis, functional assessment, and a history that assesses the patient's beliefs and understanding about the problem or representation of the illness. People's beliefs about an illness or symptom often include a cause, an opinion about the timeline (acute or chronic), consequences of the condition (minor or life threatening), and some type of verbal label used to identify the cluster of symptoms or sensations (e.g., "the flu," "the blues") (Baumann and Leventhal, 1985; Kleinman, Eisenberg, and Good, 1978). Clinicians need to distinguish between the presence of disease, which has a biological basis, and illness, which is the human experience of being sick that may have little correlation with the objective evidence available.
2. *Understand and perform advanced examination techniques.* These techniques may include special maneuvers and closer observation of fine detail during the physical examination, more in-depth interviews using valid and reliable instruments to assess the patient's risk for a specific diagnosis, and "gold standard" diagnostic tests for the identification of a specific disorder.
3. *Test differential or competing diagnoses.* A differential diagnosis results from a synthesis of subjective and objective findings, including laboratory and diagnostic tests, with knowledge of known and recognized patterns of signs and symptoms. When using the "rule-out" strategy, the clinician looks for the absence of findings that are frequently seen with a specific condition; the absence of a sensitive finding is strong evidence against the condition being present. When using the "rule-in" strategy, the clinician looks for the presence of a finding with high specificity (low false positive and high true negative) rate; presence of this finding is strong evidence the condition is present.
4. *See a pattern in the information gathered.* A pattern or cluster of findings may emerge from the subjective and objective data. This pattern may be evident during one patient encounter or it may depend on a pattern of signs and symptoms that develops over time. Often the expert clinician can eliminate competing diagnoses only after the initial treatment pre-