HOW TO THINK LIKE A NEUROLOGIST

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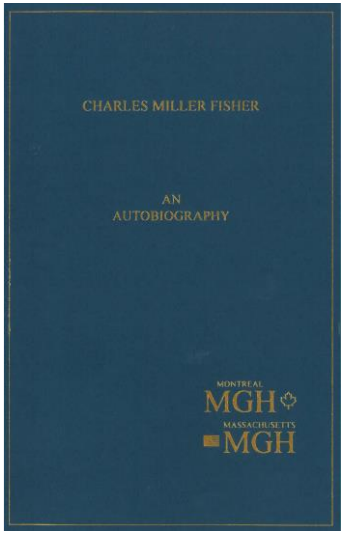
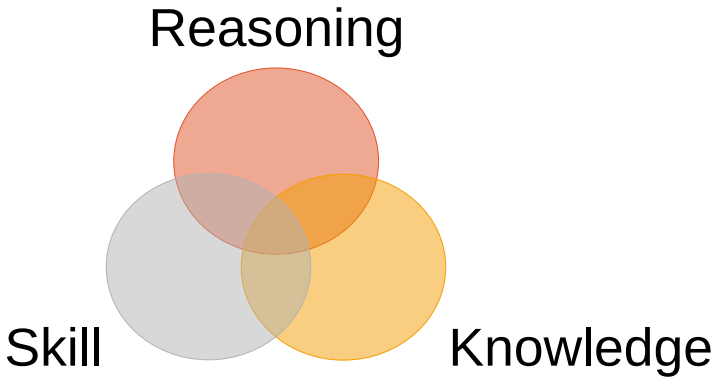
Objectives

- Review the neurologic diagnostic catechism as outlined by master clinicians
- Delve deeper into the question "Where is the Lesion"
- Discuss the reasons why a good consultation note is essential for optimum patient management
- Share a few caveats on effective bedside teaching and life-long learning





"In arriving at a clinical diagnosis, think of the five most common findings (either historical, physical findings, or laboratory) found in a given disorder. If at least three of these five are not present in given patient, the diagnosis is likely to be wrong."

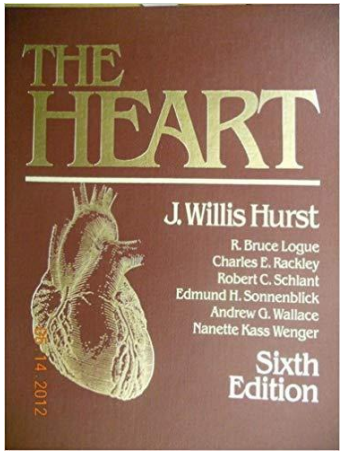
C. Miller Fisher

It has been said that the most expensive piece of medical equipment is the doctor's pen. Nowadays, it would be the doctor's EMR

Reflect on the following:

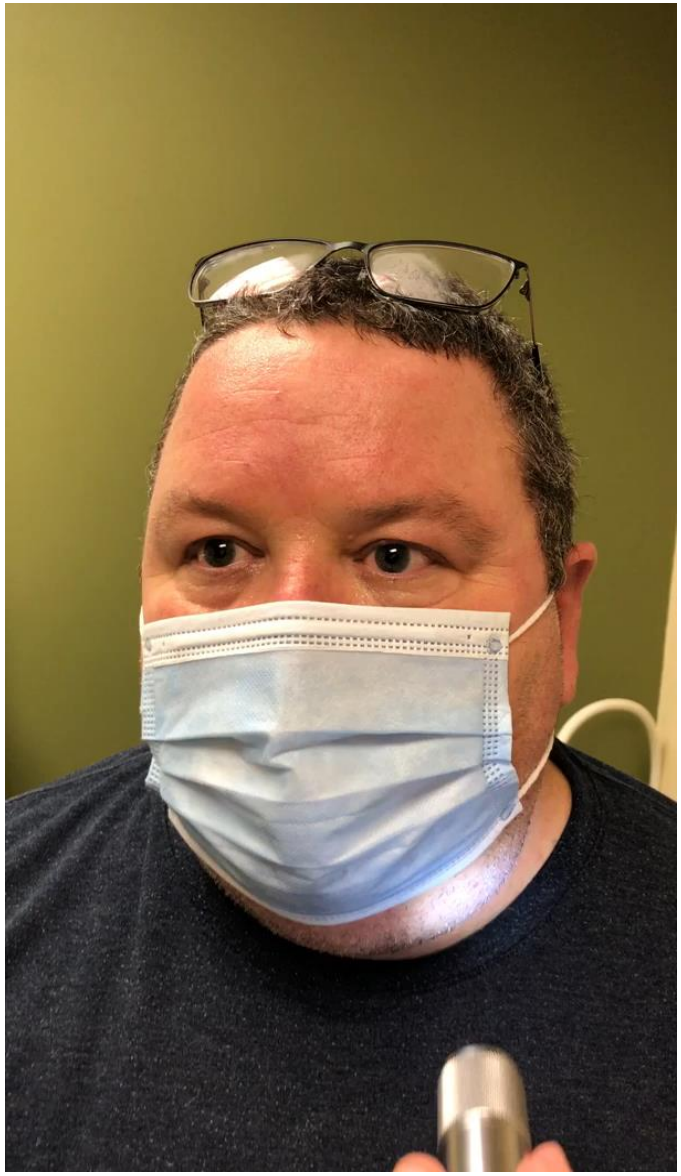
"***The misuse of diagnostic techniques begins when the physician fails to have the proper medical question in mind. The technique is often asked to answer the wrong question***."

J. Willis Hurst



History

- Attentive listening
- Open-ended questions
- Avoid suggesting possible responses
- Avoid labeling patient beings as a "*poor historian*" as there are as many poor history takers as there are poor history givers



Diagnostic Steps in Neurology

- Syndromatic diagnosis
- Topographic diagnosis
- Etiologic diagnosis

"A doctor who cannot take a good history and a patient who cannot give one are in danger of giving and receiving bad treatment"

Sir William Osler

Following your History and Examination, your assessment should include a provisional diagnosis and a hierarchical differential diagnoses.

Ancillary investigations should reflect the above.

Always follow this diagnostic catechism

- Is there a lesion or disease?
- If so, where is the lesion or the disease?
- What is the lesion or the disease (the provisional diagnosis)?
- What is the optimal diagnostic management? What clinical or laboratory tests, **if any**, will confirm or reject the provisional diagnosis?
- What is the optimal therapeutic management?
- What is the optimal preventative management?

Biller J, Gruener G, Brazis P. DeMyer's. The Neurologic Examination A Programmed Text, 7th ed, McGraw Hill, 2017

Clinical Diagnosis and Lesion Localization

- Recognition of impaired function
- Is the dysfunction neurologic in origin?
- Identification of what site of the nervous system has been affected---LOCALIZATION
- Definition of the most likely etiology, often resulting in a hierarchical differential diagnostic list
- Use of appropriate ancillary procedures to determine which of the different possible etiologies is present in the given patient

Brazis PW, Masdeu JC, Biller J. Localization in Clinical Neurology. 7th Ed.

"Diagnoses are missed not because of lack of knowledge on the part of the examiner, but rather because of lack of examination."

William Osler

- What is the matter with me? **Diagnosis**
- Can you put me right? **Treatment & prognosis**
- How can I get it? **Causation**
- How can I avoid it in the future? **Prevention**

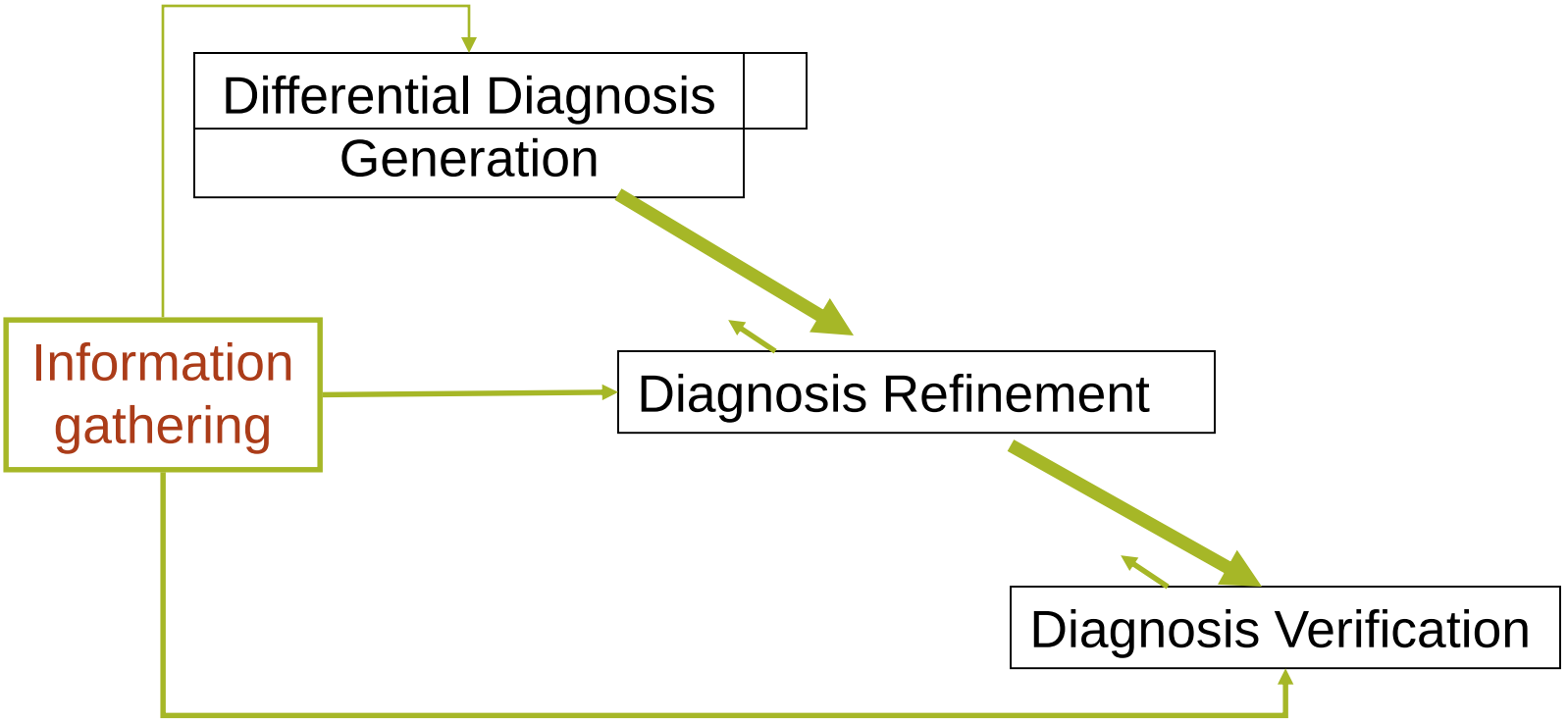
Taking the Clinical History. Eliciting Symptoms. Knowing the Patient. Ethical Foundations. by William DeMeyer, Oxford University Press, 2009

Caveats

- You must examine everything pertinent to the clinical problem
- Record what actually occurred during the operation, not the interpretation
- ***More tests = more tests, but no more relevant diagnoses***
- ***Cannot test everyone!***
- Always look at the images yourself and check that the name on the images matches the name of your patient

Diagnostic Process

"You find what you look for, and you look for what you know."



Cognitive Aspects of Overconfidence

"Not knowing what you don't know"

Not only are they wrong but physicians are "walking…in a fog of misplaced optimism" with regard to their confidence

CMAJ. 1995; 153: 811-814

I recommend consuming appropriate amounts of humble soup before coming to work.

Caveats

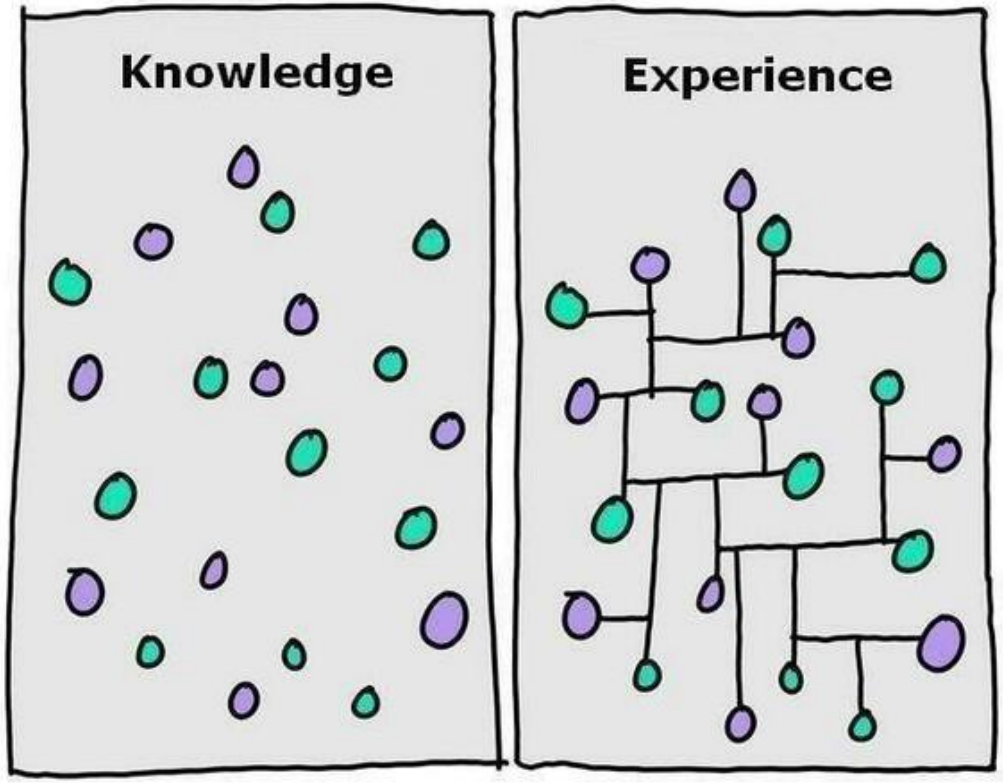
- Do not copy/paste blocks of text from another healthcare provider's documentation without attributing the entry to the originating healthcare provider's document
- Whenever possible, if you are trying to figure out why someone is deteriorating, go see the patient yourself

Caveat

Careful follow-up is to correct diagnostic mistakes associated with atypical presentations or rare diseases

Where is the lesion?

Localization means anatomy not pathophysiology



Neurology Catechism

- Is there a lesion?
- Where is the lesion?
- What is the lesion or disease present?
- How do I confirm the diagnosis
- What is the therapeutic and preventive management?

Migraine, TIA, Stroke, Seizures, Syncope and Amyloid Spells

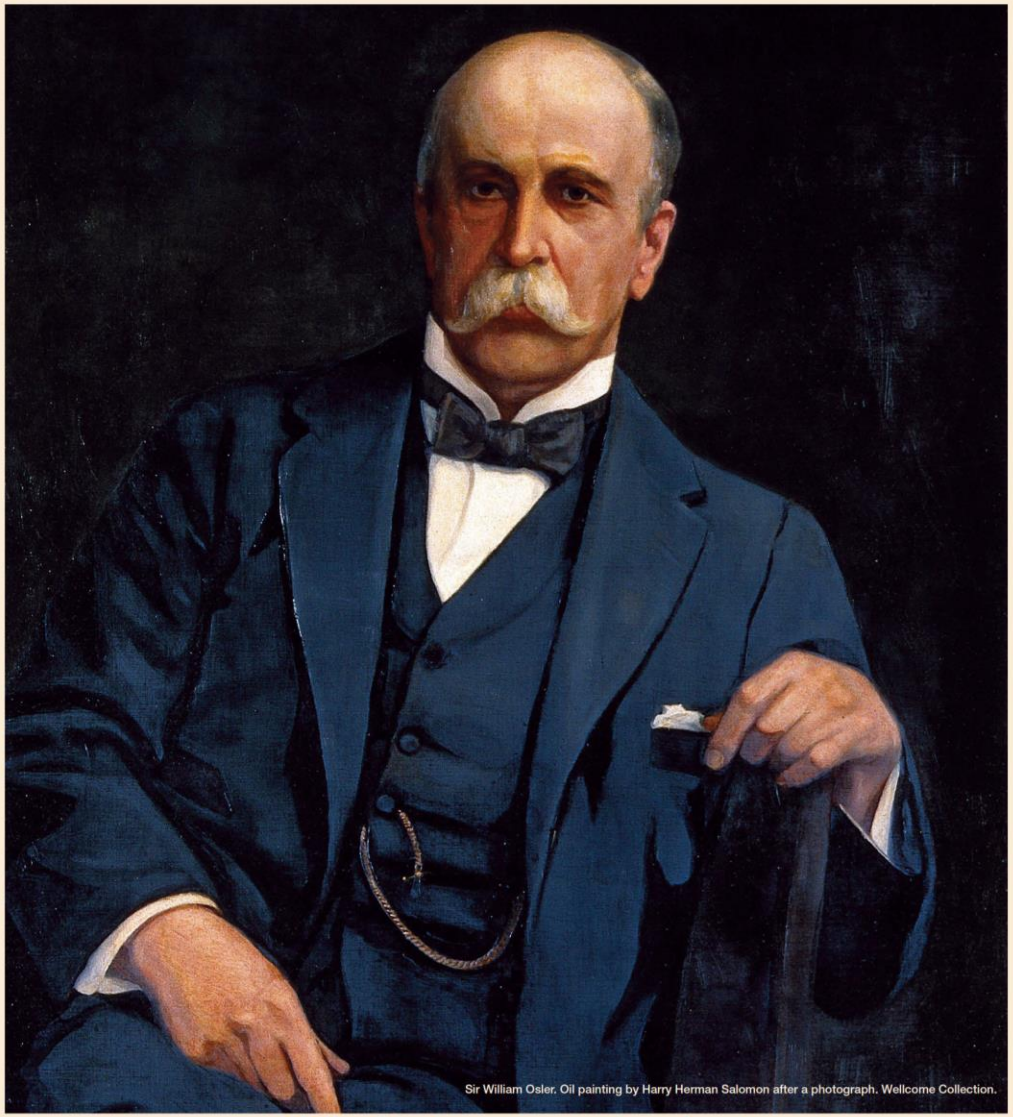
Feature	Onset	Offset	Duration	Quality	Loss of Function/Comment
Migraine with aura	Gradual	Gradual	10-30 minutes	Positive, followed by negative	Usually none or temporary, <50 years. Headache after aura
TIA	Sudden	Gradual	Minutes < one hour	Negative. Rarely stereotyped	Temporary. LOC rare. >50 years. Headache during attack
Stroke	Sudden	Ongoing	Long term	Negative	Permanent, incomplete recovery
Seizure	Sudden, recurrent	Slow	Seconds. Rarely >2 minutes	Positive & stereotyped	Todd's paresis. LOC. Lateral tongue biting, bladder incontinence
Syncope	Gradual	Gradual	Seconds	Positive e.g. blurred vision, muffled hearing	Rapid recovery
Amyloid spells	Gradual	Gradual	Minutes	Positive, sensory and stereotyped	Usually none or temporary

Adapted from Instant Neurologic Diagnosis CH Hawkes, T Swift, K Sethi

Education

How do you get into Carnegie Hall? Practice, Practice, Practice

- 80% of clinical education occurs in the inpatient setting, yet 80% of medicine is practiced in the outpatient arena
- Everyone learns in a different way
- Set high standards
- Lowering standards does not work
- No shortcuts
- No magic
- Hard work and more hard work
- Study to learn, not just to ace a test



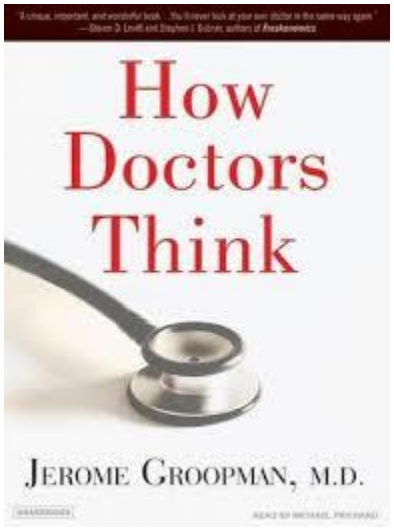
Sir William Osler. Oil painting by Harry Herman Salomon after a photograph. Wellcome Collection.

"The best preparation for tomorrow is to do today's work superbly well."

—Sir William Osler

Bringing Diagnosis Into the Quality and Safety Equations

- Ironically, quality criteria (2010) do not include diagnostic accuracy
- Diagnostic errors surprisingly common despite widespread use of imaging studies and other sophisticated laboratory technologies
- *74% of all diagnostic errors have a cognitive basis*
- *Most medical errors are mistakes in thinking (Jerome Groopman, MD)*



JAMA. 2012;308(12):1211-1212

VIEWPOINT

JAMA. 2012;308(12):1211-1212

Bringing Diagnosis Into the Quality and Safety Equations

Mark L. Graber, MD
Robert M. Wachter, MD
Christine K. Cassel, MD, MSc

CASES OF DELAYED, MISSED, AND INCORRECT DIAGnosis are common, with an incidence in the range of 10% to 20%.[1] Some errors in diagnosis stem from mistakes in the interpretation of diagnostic tests. For example, pathology, radiology, and the clinical laboratory each have error rates of 2% to 5%. Superimposed on these testing errors are the ubiquitous system-related errors encountered in every health care organization, as well as cognitive errors caused by faulty clinical reasoning. Diagnostic errors do not occur only in connection with unusual conditions but span the breadth of clinical medicine, from rare disorders to commonplace ones like anemia and asthma.[2,3]

Most diagnostic errors are either inconsequential or discovered in time, but others are not. Based on the findings from large autopsy series, Leape et al[4] estimated that diagnostic error accounts for 40 000 to 80 000 deaths per year, and the number of patients who are injured must be substantially higher. In a recent survey of more than 6000 physicians, 96% felt that diagnostic errors were preventable.[5]

the absence of ownership: in the quality and safety family, diagnostic error is essentially an orphan. Health care leaders assume their physicians should be responsible for ensuring reliable diagnoses, but most physicians seem to believe they are doing just fine. Through malpractice suits, physicians are well aware of diagnostic error, but there is a general tendency to perceive that such errors are made by someone else, someone less careful or skillful. Moreover, whereas errors such as wrong-site surgery and wrong-dose medication errors seem amenable to systems solutions (time-outs, computerized order entry, etc), diagnostic errors seem intensely personal: the "system" appears to be the physician, and his or her own knowledge, skills, values, and behaviors.

The absence of diagnosis-related quality measures has had several consequences. The lack of interest and emphasis has translated into a similar level of apathy within health care organizations. We are unaware of any health care organization that is currently collecting specific data on diagnostic error or engaged in a system-wide campaign to decrease the frequency or consequences of diagnostic error. Without data on such errors, there is no clear motivation to improve the diagnostic process and no way to measure progress. Moreover, with so much focus being placed on improving quality and safety in treatment-related areas, the relative inattention to diagnosis has consequences: re-

Diagnostic errors seem intensely personal: the "system" appears to be the physician

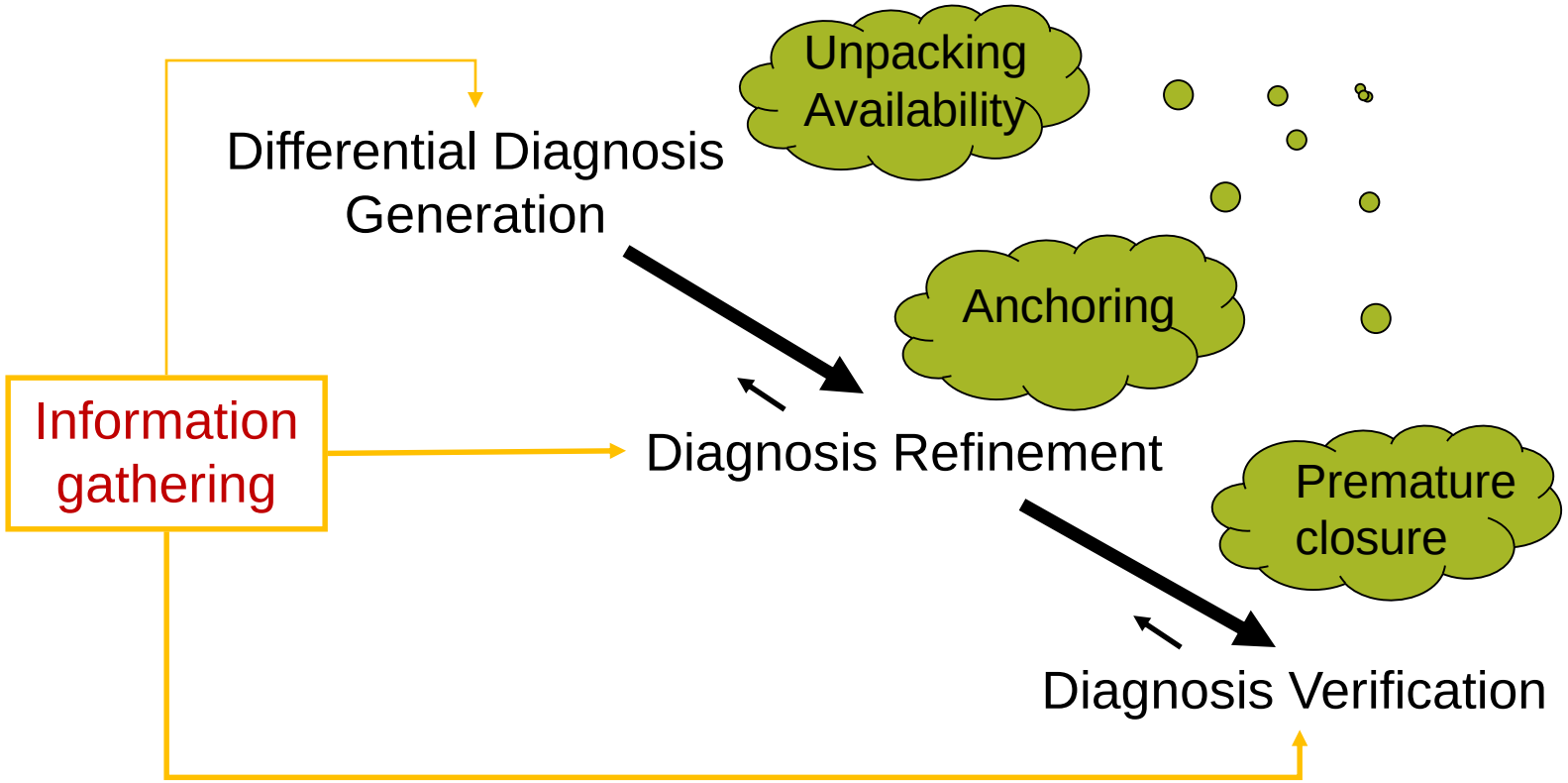
Diagnosis

- Despite the ready availability of sophisticated tests and technological advances, the "*hands on*" neurologic examination remains the fundamental aspect of Clinical Neurology
- The neurologic evaluation of a patient remains first and foremost a bedside exercise
- Diagnosis is a primary determinant of treatment planning
- Patient's assessment strategies are most effective when based on clinical hypotheses
- Clinical hypotheses should be formulated on the principles of neurological localization, chronological course of symptoms development, and application of risk factor analysis

Advanced technology is best used for verifying rather than formulating clinical impressions

"To err is human"

Diagnostic Errors



"the chief causes for incorrect diagnoses are insufficient examination, inaccurate observations, and, less commonly, false conclusions from correct and sufficient facts"

DeJong RN. The Neurologic Examination, Incorporating the Fundamentals of Neuroanatomy and Neurophysiology. New York: Hoeber, 1950.

Proc (Bayl Univ Med Cent) 2015;28(2):172-179

History of Neurologic Examination Books

Comparison of monographs focused primarily on the complete neurologic examination published prior to 1960

Book author	Publisher of first edition	Length of first edition (pp.)	Exam form	Editions	Translations*
Monrad-Krohn	H. K. Lewis	135	No	12 (not including 1914 book)	5; English, French, German, Spanish, Japanese
Wimmer	C. V. Mosby	177	No	1	1; English
McKendree	W. B. Saunders	280	Yes	1	0
Core	E. and S. Livingstone; Wm. Wood	248	No	1	0
Holmes	E. and S. Livingstone	183	No	3	3; Italian, Serbo-Croatian (Cyrillic), Serbo-Croatian (Roman)
Denny-Brown	Harvard; Oxford	112	No	3	0
DeJong	Paul B. Hoeber	1079	No	7	1; Italian
Wartenberg	The Year Book	228	No	3 in German; 1 in English	6; German, Spanish, Italian, Serbo-Croatian (Cyrillic), Serbo-Croatian (Roman), Japanese
Steegmann	The Year Book	164	Yes	3	0
Mayo Authors	W. B. Saunders	370	Yes	7	2; Spanish and Japanese

*Sources for translations: The European Library and University of Tokyo Medical Library.

Proc (Bayl Univ Med Cent) 2015;28(2):172-179

The history of the neurologic examination is therefore a consequence of the history of neuroanatomy and clinical neurophysiology.

Steinberg DA. Scientific Neurology and the History of the Clinical Examination of Selected Motor Cranial Nerves. Semin Neurol 2002;22(4):349-356.

Proc (Bayl Univ Med Cent) 2015;28(2):172-179

Gordon Holmes [1876-1965] noted in 1936:
the more common causes of …errors are inaccuracy or incompleteness of observation. This is particularly liable to occur in the ordinary examination of patients, in which facts that seem insignificant are neglected, or the student may see only that for which he looks, or routine may blunt the keenness of observation

Institut Neurologique de Montréal. *Neurological Biographies and Addresses.* London:Oxford, 1936

Proc (Bayl Univ Med Cent) 2015;28(2):172-179

"Only constant practice brings facility in description, conciseness with relevant detail. Phrases such as 'tends to' or 'is suggestive of' should be avoided. An ounce of fact is worth ten of guessing."

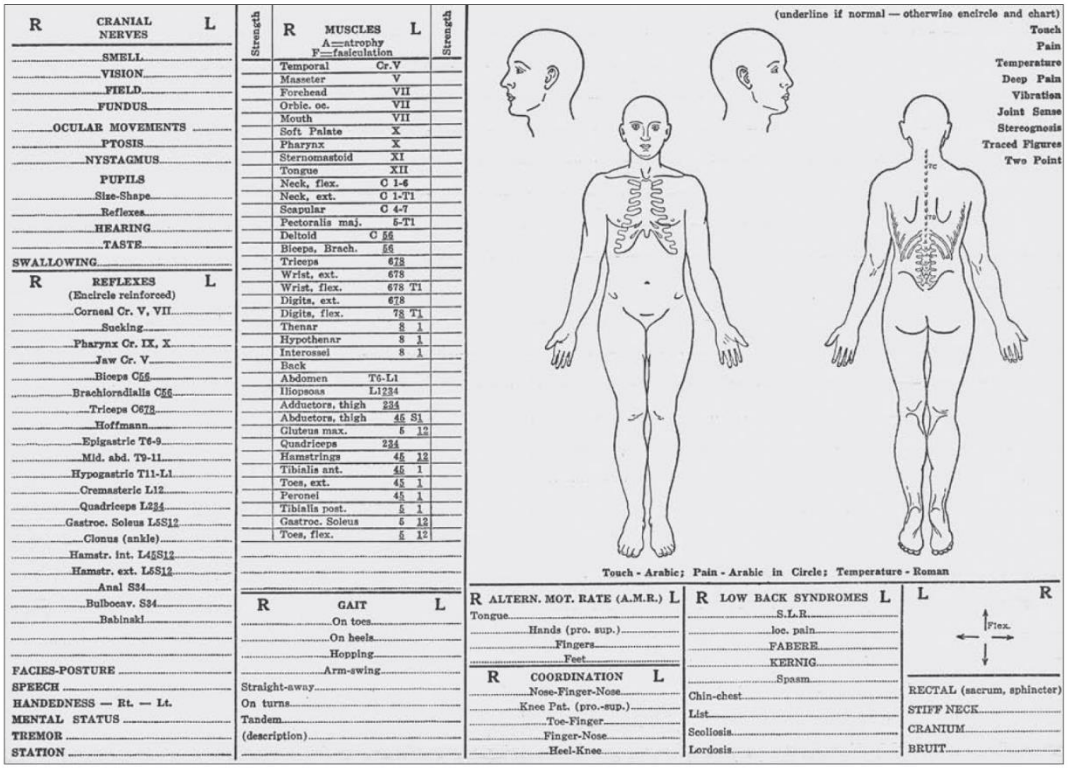
Denny-Brown D. Handbook of Neurological Examination and Case Recording. Cambridge: Harvard University Press, 1946.

Proc (Bayl Univ Med Cent) 2015;28(2):172-179

Medical literature is voluminous and often contradictory and frequently characterized by the use of such words as: “may”, “could”, “would”, and “possible”.

C. M. Poser. An Atlas of Multiple Sclerosis. The Encyclopedia of Visual Medicine Series. The Parthenon Publishing Group . 1998

"since our practice is a group practice, data regarding examination must be recorded in a form intelligible to others in the group"



R CRANIAL NERVES L

SMELL
VISION
FIELD
FUNDUS
OCULAR MOVEMENTS
PTOSIS
NYSTAGMUS
PUPILS
Size-Shape
Reflexes
HEARING
TASTE
SWALLOWING

R REFLEXES L
(Encircle reinforced)
Corneal Cr. V, VII
Sucking
Pharynx Cr. IX, X
Jaw Cr. V
Biceps C56
Brachioradialis C56
Triceps C678
Hoffmann
Epigastric T6-9
Mid. abd. T9-11
Hypogastric T11-L1
Cremasteric L12
Quadriceps L234
Gastroc. Soleus L5S12
Clonus (ankle)
Hamstr. int. L45S12
Hamstr. ext. L5S12
Anal S34
Bulbocav. S34
Babinski

FACIES-POSTURE
SPEECH
HANDEDNESS — Rt. — Lt.
MENTAL STATUS
TREMOR
STATION

R MUSCLES L (A=atrophy F=fasciculation)		Strength
Temporal	Cr.V	
Masseter	V	
Forehead	VII	
Orbic. oc.	VII	
Mouth	VII	
Soft Palate	X	
Pharynx	X	
Sternomastoid	XI	
Tongue	XII	
Neck, flex.	C 1-6	
Neck, ext.	C 1-T1	
Scapular	C 4-7	
Pectoralis maj.	5-T1	
Deltoid	C 56	
Biceps, Brach.	56	
Triceps	678	
Wrist, ext.	678	
Wrist, flex.	678 T1	
Digits, ext.	678	
Digits, flex.	78 T1	
Thenar	8 1	
Hypothenar	8 1	
Interossei	8 1	
Back		
Abdomen	T6-L1	
Iliopsoas	L1234	
Adductors, thigh	234	
Abductors, thigh	45 S1	
Gluteus max.	5 12	
Quadriceps	234	
Hamstrings	45 12	
Tibialis ant.	45 1	
Toes, ext.	45 1	
Peronei	45 1	
Tibialis post.	5 1	
Gastroc. Soleus	5 12	
Toes, flex.	5 12	

R GAIT L
On toes
On heels
Hopping
Arm-swing
Straight-away
On turns
Tandem
(description)

(underline if normal — otherwise encircle and chart)
Touch
Pain
Temperature
Deep Pain
Vibration
Joint Sense
Stereognosis
Traced Figures
Two Point

Touch - Arabic; Pain - Arabic in Circle; Temperature - Roman

R ALTERN. MOT. RATE (A.M.R.) L
Tongue
Hands (pro. sup.)
Fingers
Feet

R COORDINATION L
Nose-Finger-Nose
Knee Pat. (pro.-sup.)
Toe-Finger
Finger-Nose
Heel-Knee

R LOW BACK SYNDROMES L
S.L.R.
loc. pain
FABERE
KERNIG
Spasm
Chin-chest
List
Scoliosis
Lordosis

L R
Flex.

RECTAL (sacrum, sphincter)
STIFF NECK
CRANIUM
BRUIT

Clinical Examinations in Neurology (1956)

Mayo Clinic Sections of Neurology and Section of Physiology. Clinical Examination in Neurology. Philadelphia: Saunders, 1956

Asking questions IS NOT a sign of weakness

Consultation Note

- Neat, organized, succinct
- Primary physicians in an acute care hospital, should be able to digest the consultation in 2 minutes
- Long notes are usually boring and tend to lose attention to the reader
- Notes that are bad, for whatever reason, reflect poorly on the consultant, and harm patient's care

D Myland Kaufman & MJ Milstein. Clinical Neurology for Psychiatrists. Elsevier. Saunders. 2013

Consultation Note and Differential Diagnosis

- Both the referring physician and consultant should be clear about the reason for the consultation
- The consultant should insist on a specific question, and ultimately answer it
- Start with the most common and most likely possibility, the disease or diseases - up to 3 - consistent with the patient's symptoms & signs
- *"Hoof beats are usually from horses, not zebras"*
- Patients are more likely to have hemiparesis from a stroke than mitochondrial disorders
- "One Babinski sign is worth a thousand words"

D Myland Kaufman & MJ Milstein. Clinical Neurology for Psychiatrists. Elsevier. Saunders. 2013

" I cannot teach anybody anything. I can only make them think."
Socrates

"*Socratic dialogue gives way to Powerpoint*"

LK Altman, MD NYTimes. 12/12/06

A doctor, a patient and hospital staff in grand rounds in the 1920s

Concern for the patient…no matter what the problem or the hour

PERSPECTIVE

Medical Professionalism in the New Millennium: A Physician Charter

Project of the ABIM Foundation, ACP–ASIM Foundation, and European Federation of Internal Medicine*

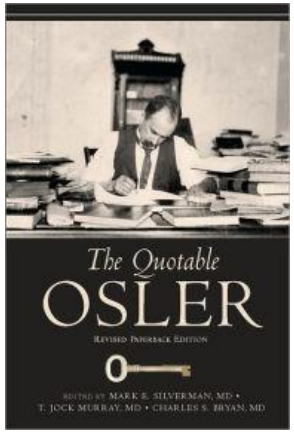
To our readers: I write briefly to introduce the Medical Professionalism Project and its principal product, the Charter on Medical Professionalism. The charter appears in print for the first time in this issue of *Annals* and simultaneously in *The Lancet*. I hope that we will look back upon its publication as a watershed event in medicine. Everyone who is involved with health care should read the charter and ponder its meaning.

The charter is the product of several years of work by leaders in the ABIM Foundation, the ACP–ASIM Foundation, and the European Federation of Internal Medicine. The charter consists of a brief introduction and rationale, three principles, and 10 commitments. The introduction contains the following premise: Changes in the health care delivery systems in countries throughout the industrialized world threaten the values of professionalism. The document conveys this message with chilling brevity. The authors apparently feel no need to defend this premise, perhaps because they believe that it is a universally held truth. The authors go further, stating that the conditions of medical practice are tempting physicians to abandon their commitment to the primacy of patient welfare. These are very strong words. Whether they are strictly true for the profession as a whole is almost beside the point. Each physician must decide if the circumstances of practice are threatening his or her adherence to the values that on the globe will read the charter. Does this document represent the traditions of medicine in cultures other than those in the West, where the authors of the charter have practiced medicine? We hope that readers everywhere will engage in dialogue about the charter, and we offer our pages as a place for that dialogue to take place. If the traditions of medical practice throughout the world are not congruent with one another, at least we may make progress toward understanding how physicians in different cultures understand their commitments to patients and the public.

Many physicians will recognize in the principles and commitments of the charter the ethical underpinning of their professional relationships, individually with their patients and collectively with the public. For them, the challenge will be to live by these precepts and to resist efforts to impose a corporate mentality on a profession of service to others. Forces that are largely beyond our control have brought us to circumstances that require a restatement of professional responsibility. The responsibility for acting on these principles and commitments lies squarely on our shoulders.

—Harold C. Sox, MD, Editor

Ann Int. Med. 2002; 136: 243-246



"Care more particularly for the individual patient than for the special features of the disease."

Address to the Students of the Albany Medical College, Albany Med Ann 1899;20:307-307

Bedside Teaching

- Most effective method to teach clinical skills and communication
- Practice of bedside teaching is declining
- Increasing reliance on technology and laboratory testing
- 75% of all physician training in 1960
- 8% - 19% (if at all) of present medical training
- "Each day, median time spent at the bedside was 2.5 minutes vs 69 minutes in the classroom"

Mikhail M. The Death of Bedside Teaching. The BMJ Opinion. Dec. 15, 2016
Peters M, ten Cate O. Perspect Med Edu. 2014;3(2):76-88

"Better than a thousand days of diligent study is one day with a great teacher"

Japanese Proverb

Some Thoughts on Bedside Teaching

- The large volume clinical care system, currently in place in academic hospitals, occurs at the expense of time for teaching medical students and residents
- Medical education in the 3rd year of medical school has become much more classroom/ seminar oriented rather than hands-on bedside teaching

Alpert JS. Am J Med 2009;122(3):203-204

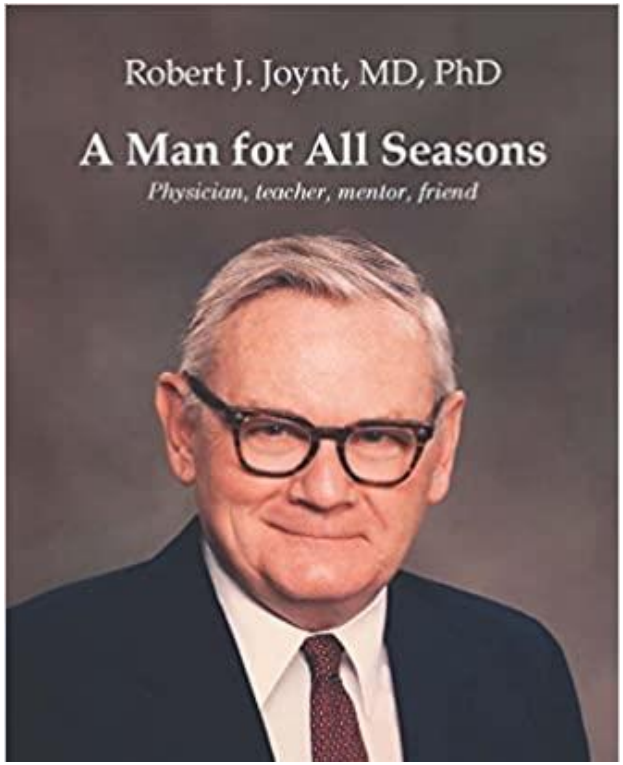
Characteristics of Excellent Bedside Teachers

The mediocre teacher tells
The good teacher explains
The superior teacher demonstrates
The great teacher inspires

William Arthur Ward (1921-1994)

Paraphrasing the first A.B. Baker awardee (1990), Robert J. Joynt, MD, PhD: 10 Commandments for a Successful Internship:

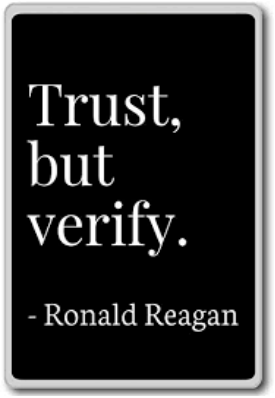
Listen! Your patient is trying to tell you something.



Take Away Messages

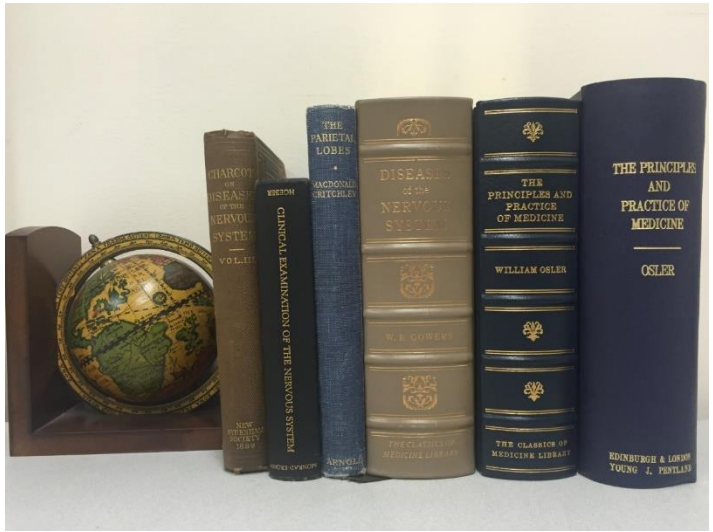
✓"Never trust and always verify"

José Biller



✓Never stop trying to be qualified for the job

✓Read!!!



"If I am walking with two other men, each of them will serve as my teacher. I will pick out the good points of the one and imitate them, and the bad points of the other and correct them in myself."

Confucius (551-479 BC)