

Chapter 2

Deconstructing the Medical Chart

Alan J. Lerner and Mike R. Schoenberg

Abstract This chapter provides an overview of the medical chart, and its sections. The neuropsychologist will be provided with detailed information about how to decipher some of the many abbreviations, and we also provide the neuropsychologist, who may not be familiar with common lab values with descriptions of the neurologic examination common grading systems such as motor and sensory functions. In addition, this chapter provides a brief overview of neurologic terms commonly encountered in general medical and more detailed neurological examinations along with figures and illustrations of some of these terms.

Key Points and Chapter Summary

- The medical chart has several components and familiarity with the basic structure of each section is important to both effective patient management and quality care
- The History and Physical (H&P) is the initial evaluation of a patient upon admission to a hospital, service, or transfer, and is often the most comprehensive source of current patient information
- While the basic structure of a H&P is similar across medical disciplines/specialties, elaboration within different sections is often discipline/specialty-specific

The Medical Chart

The quality of care rendered by medical personnel is proportional to the quality of the assessment, diagnosis and management of the patient. While the point of medical training is to ensure consistent high quality patient care, certain variables such as

A.J. Lerner (✉)

Memory and Cognition Center, University Hospitals Case Medical Center and Case Western Reserve University School of Medicine, Cleveland, OH, USA

e-mail: Alan.Lerner@UHhospitals.org

the information available to assist in this process often remain beyond our control. Good assessment and consultation often start with a review of the existing medical chart and records. In this chapter, a practical method for extracting information from often complex, chaotic medical records is reviewed with particular emphasis on information relevant for neuropsychological evaluation (see also Lezak et al. 2004; Victor and Ropper 2001; Zaidat and Lerner 2008, for review).

Inpatient Chart

Various state and federal guidelines mandate the prompt evaluation of an individual admitted to a hospital or longer-term health care facility. The admission note is often the most detailed source of information available in an entire chart, and therefore bears special scrutiny in helping with neuropsychological assessment. The basic form of the admission History and Physical includes the following sub-sections

Chief complaint. This is usually in the form of a succinct sentence often or ideally in the patient's own words such as "shortness of breath" or "change in mental status" or "admitted for elective cardiac surgery." The chief complaint encapsulates the reason for admission, at least on the initial basis.

1. *History of present illness.* This forms the main narrative of the admission history and physical and often starts with a brief review of past medical history. An example of this might be a "Chief complaint of left-sided weakness" followed by "The patient is a 68-year-old right-handed man with a history of hypertension, diabetes, coronary artery disease admitted for left-sided weakness of 1 day's duration."

The History of Present Illness often contains additional important information such as who provided the history; whether it was the patient or family or other medical personnel. It may also contain cross-references to other portions of the medical chart such as records obtained from the Emergency Medical Services. More importantly, one needs to scrutinize the History of Present Illness section for what it does *not* contain, such as important demographic information or vague statements that need to be considered in making one's own evaluation at a later date.

2. *Past medical history.* Typically, this is a listing of medical conditions, frequently abbreviated. Regulatory agencies such as JCAHO have rightly criticized the practice of abbreviations in medical charts as they can be confusing or ambiguous, and this may impact patient quality of care. Caution should be given in considering the source of medical history and confirming the list of critical past illnesses, as these can be in error and, if so, may lead to erroneous conclusions about contributing factors in the patient's current condition. For example, a patient with an erroneously reported history of Diabetes, Hypertension, or Coronary Artery Disease may be evaluated differently when presenting with stroke symptoms only to find out they have blood clots (phlebitis) after a long journey in a sedentary position.

Table 2.1 Abbreviations for common medical diseases, conditions, and terms

Abbreviation/Acronym	Medical Term, Condition, Disease
AD	Alzheimer's disease OR Attachment disorder
ADD(-R)	Attention deficit disorder(-resistant)
ADEM	Acute disseminated encephalopathy
ADHD	Attention deficit hyperactivity disorder
AF	Atrial fibrillation
AIDS	Acquired immune deficiency syndrome
ALS	Amyotrophic lateral sclerosis (Lou-Gehrig's disease)
APS	Antiphospholipid syndrome
ARDS	Acute respiratory distress syndrome
ASD	Autism spectrum disorders (see also PDD)
AVM/ AVMs	Arteriovenous malformations
BEB	Benign essential bepharospasm
BPH	Benign prostatic hyperplasia
BSE	Bovine spongiform encephalopathy
CAD	Coronary artery disease
CADASIL	Cerebral autosomal dominant arteriopathy with sub-cortical infarcts and leukoencephalopathy
CAT	Computerized axial tomography study
CCU	Critical care unit OR Coronary care unit
CF	Cystic fibrosis
CFS	Chronic fatigue syndrome
CH	Cluster headache
CHD	Congenital heart disease OR Coronary heart disease OR Congenital hip dysplasia
CHF	Congestive heart failure
CICU	Cardiac intensive care unit
CIPD	Chronic inflammatory demyelinating polyneuropathy
CJD	Creutzfeldt-Jakob disease (see also SSE)
COPD	Chronic obstructive pulmonary disease
CRF	Chronic renal failure
CSA	Central sleep apnea
CSF	Cerebrospinal fluid
CT	Computerized tomography study
CVD	Cardiovascular disease
DM (I or II)	Diabetes mellitus, [Type I (juvenile); Type 2 (acquired)]
DLB	Dementia with Lewy bodies (also DLBD)
DTs	Delirium tremens
ED	Emergency department OR emotionally disturbed
EDS	Ehlers-danlos syndrome OR excessive daytime sleepiness
EMR	Electronic medical record
EPS	Extrapyramidal symptoms
ESRD	End state renal disease
FAE	Fetal alcohol effects
FAS (FASDs)	Fetal alcohol syndrome (Disorders)
FMA	Focal muscular atrophies
FMLA	Family medical leave act
FXS	Fragile X syndrome

(continued)

Table 2.1 (continued)

Abbreviation/Acronym	Medical Term, Condition, Disease
GAD	Generalized anxiety disorder
GAS (disease)	Group A streptococcal disease
GBS (disease)	Guillain-barre syndrome OR Group B streptococcal (disease)
GD	Gestational diabetes
GERD	Gastroesophageal reflux disease
HA (H/A)	Headaches
HD	Huntington's disease
HTN	Hypertension
HPV Infection	Human papillomavirus infection
HSV (infection)	Herpes Simplex Virus
IBD	Inflammatory bowel disease OR Ichthyosis bullosa of siemens
IS	Infantile spasm
JRA	Juvenile rheumatoid arthritis
LD	Learning disability OR Legionnaires' disease
LKS	Landau-Kleffner syndrome
LP	Lipoid proteinosis OR Little Person
MD	Muscular dystrophy
MMR(V)	Measles, mumps, rubella (varicella)
MND	Motor neuron disease
MPS (I to VII)	Mucopolysaccharoidosis (Type _)
MR/(DD) (MRDD)	Mentally retarded/Developmentally disabled
MRI	Magnetic resonance imaging
MS	Multiple sclerosis
NCL	Neuronal ceroid lipofuscinosis
NF (1 or 2)	Neurofibromatosis (type __)
NICU	Neonatal intensive care unit
NLD (NVLD)	Nonverbal learning disorder
NP (NPC1)	Niemann-pick disease (type C1)
NPH	Normal pressure hydrocephalus
NSU	Neurosciences (Neurological) intensive care unit
OCD	Obsessive-compulsive disorder
ODD	Oppositional defiant disorder
OPCA	Olivopontocerebellar atrophy
OSA	Obstructive sleep apnea
PACU	Post anesthesia care unit
PCP	Primary care physician
PD	Parkinson's disease
PICU	Pediatric intensive care unit
PDD (NOS)	Pervasive developmental disorder (Not Otherwise Specified)
PML	Progressive multifocal leukoencephalopathy
PMS	Premenstrual syndrome
POTS	Postural orthostatic tachycardia syndrome
PSP	Progressive supranuclear palsy
PVL	Periventricular leukomalacia
RA	Rheumatoid arthritis
RIND	Reversible ischemic neurologic deficit

(continued)

Table 2.1 (continued)

Abbreviation/Acronym	Medical Term, Condition, Disease
RLS	Restless legs syndrome
ROP	Retinopathy of prematurity
RSD	Reflex sympathetic dystrophy
RTI	Respiratory tract infection
SARS	Severe acute respiratory syndrome
SB	Spina bifida
SBS (SIS)	Shaken baby syndrome (Shaken infant syndrome)
SIDS	Sudden infant death syndrome
SLE	Systemic lupus erythematosus
SMA	Spinal muscular atrophy
SPS	Stiff person syndrome
SSE	Subacute spongiform encephalitis
SSPE	Subacute sclerosing panencephalitis
STD	Sexually transmitted disease
SWS	Sturge-weber syndrome
TB	Tuberculosis
TBI	Traumatic brain injury
TCS	Tethered cord syndrome
TIA	Transient ischemic attack
TMJ (TMD)	Temporomandibular joint disorder
TS	Tourette syndrome OR Tuberos sclerosi
TSC	Tuberos sclerosi
TSE	Transmissible spongiform encephalopathies
UTI	Urinary tract infection
VD	Venereal disease
VHF	Viral hemorrhagic fever
VSD	Ventricular septal defect
WD	Wilson's disease

3. *Family and social history.* Although this is usually a very truncated section of the history and physical, it is of importance in interpretation of any neuropsychological testing. This is one of the few sections that actually gives a sense of the person as living on a day-to-day basis. It will frequently contain information such as marital status or gender, tobacco, alcohol, and drug abuse. It may also contain information about the number of children, although in an inpatient setting this is often not specified. Of special importance is the patient's educational history and primary language (if specified), as many neuropsychological skills and test performances vary considerably with education, and consideration should be given to evaluate a patient in his/her primary language. For example, the same memory capacity would not be expected of someone with 4 years of education compared to someone with a graduate degree. If not a Fluent English speaker, performances and expectations should be altered. For practitioners who do not speak the language of the patient, options may include identifying another practitioner who does speak the language or finding an interpreter (caution should be taken if a family member or friend of the patient is used as this may

introduce bias). If unavailable basic cognitive testing using nonverbal tasks/tests may provide some useful information, but interpretation and conclusions should be viewed with caution.

4. *Review of systems.* The review of systems should ideally complement previous medical history. A complete review of systems encompasses constitutional symptoms as well as up to about 15 bodily systems. Frequently, this may be just marked as NC for noncontributory.
5. *Vital signs.* Typically, this would include Temperature (recorded either in Centigrade or Fahrenheit), Pulse (per minute), Respirations (per minute) and Blood Pressure with systolic recorded over diastolic. In charting, these are often abbreviated as T, P, R, B/P, and often noted as numbers in that order. Caution is again warranted as the information provided here may have been copied from earlier in the chart (or another chart), such as the evaluation in the emergency room, and may not reflect information at the time of the writing of the admission History and Physical. It is also not uncommon in a busy inpatient hospital setting for the actual writing of the admission History and Physical to be delayed for several hours following the actual examination.

Rule of thumb: Outline of the H&P

- Chief Complaint
- History of Present Illness
 - Current medications
- Past History
 - Medical history (including Psychiatric)
 - Family and Social history
- Review of Systems
 - Head, Eyes, Ears, Nose and Throat (HEENT)
 - Neck
 - Lungs
 - Cardiovascular
 - Abdominal
 - Extremities
 - Back
 - Genito-urinary
 - Neurologic
 - Cranial Nerves
 - Mental Status
 - Motor
 - Sensory
 - Gait/Station
- Laboratory

The following subsections of the Review of Systems are often found:

HEENT. This stands for Head, Eyes, Ears, Nose, and Throat. A frequent abbreviation is NC/AT which stands for Normocephalic, Atraumatic. Ideally, this section will identify any observed defects and state of the skin, oral mucosa, dentition, use of hearing aides, or glasses. However, this information is often omitted. Again, cross-reference with the history as described above is often useful. Gross vision problems may be noted here (or in CN exam section), including strabismus, exotropia, esotropia, or amblyopia. Strabismus is the lack of muscle co-ordination between the eyes. Exotropia refers to an eye being deviated away from midline (deviated outward), and is a form of strabismus. Esotropia refers to an eye being deviated towards the midline (deviated inward), and is a form of strabismus. Amblyopia refers to when the brain does not process visual signals of a misaligned eye (the eye that is exotropic or esotropic), resulting in vision being based on one eye and a patient losing depth perception. Strabismus refers to the condition of misaligned eyes when looking ahead.

Neck. This is often described as supple, a rigid neck being a concerning finding regarding the possibility of meningitis in a patient particularly who is febrile. There may be referral to nuchal (neck) rigidity which may be accompanied by a Brudzinski's sign (raising of the legs towards the chest when the head is bent forward at the neck) often associated with meningeal irritation or inflammation. Other abbreviations seen here would be JVD, standing for jugular venous distention, which may be increased with right heart failure as with pulmonary hypertension, for example. There may also be references to the size of the thyroid as well as the presence or absence of carotid bruits (an abnormal sound made by blood in the carotid arteries when it swirls past a stenotic or ulcerative plaque).

Lungs or chest. This may or may not include a breast examination. A variety of maneuvers are taught to medical students to describe chest findings. The most common abbreviation here is CTA (Clear To Auscultation) meaning the quadrants of the chest do not demonstrate any abnormal (i.e. different or atypical) sound when thumped or listened to (auscultated). It is less likely, particularly with more senior clinicians, to have a detailed chest examination unless they are performed by a pulmonologist or a cardiologist. Other findings of note may include findings suspicious for a pleural effusion such as dullness at the base or evidence for pneumonia such as crackles or decreased breath sounds. The presence of wheezes suggestive of obstructive airway disease is sometimes noted as well. These comparisons are often reported by chest or lung quadrant indicating a more precise area of abnormal findings.

Cardiovascular. This refers primarily to the heart sounds on auscultation, but may also contain information regarding peripheral arterial disease. Most commonly, it may say normal $S_1 S_2$ (S refers to sound and S_{1-4} refers to the 1st through 4th heart sounds in a normal heart beat) referring to the normal opening heart sounds. The presence of additional heart sounds which are nonspecific findings include the possibility of an abnormal S_3 or S_4 . The presence of murmurs is often noted, and this may be abbreviated as an M. Pulses may also be included under cardiovascular. The dorsalis pedis pulse (or pedal pulse) is abbreviated as DP and often will be marked as +/-; the initial + referring to their right side and the second + to the left side.

Abdomen. Frequently abbreviated as ABD. The most common abbreviations here are BS for bowel sounds and NT for non-tender. Also noted is focal tenderness or masses, and sometimes the presence of an aortic or femoral bruit may be located here rather than under the cardiovascular examination.

Extremities. Frequently abbreviated as EXT. The most common abbreviation is C/C/E standing for cyanosis, clubbing, or edema. The presence of osteoarthritic changes may be noted here, as may be congenital or acquired deformities such as an amputation. This is sometimes accompanied by a drawing of an affected or infected extremity. Frequently, the pulse is recorded and relevant here, and may be obtained from two extremities (e.g., the dorsalis pedis pulses may be recorded here rather than under the cardiovascular examination). Evaluation is based not only on recording abnormalities but also symmetry. Differences in symmetry in either palor, size or functionality may be noted here. Limitations in movement, such as inability to abduct or adduct a limb may be noted here. Abduct(ion) is action that moves a body part away from the midline or center axis along an horizontal plane. Adduct(ion) is action moving a body part toward the midline or center axis.

Back. This may or may not be present. A common abbreviation is CVA or costovertebral angle (this refers to the angle of the spine and ribs) or CVAT for costovertebral angle tenderness which may or may not be present. The presence of scoliosis or kyphosis may also be noted here. Also noted here may be any complaints of pain and the distribution of the region of the pain, which may be helpful in differentiating central and peripheral from referred pain that may be associated with organ dysfunction.

Rectal. This may be included under the abdominal examination or it may be deferred. Often times, abbreviations here refer to the presence or absence of occult blood such as determined with the guaiac screening card or the presence of normal rectal reflexes indicative of normal sacral spinal cord function.

Genitourinary. Abbreviated as GU. This would include vaginal or external male genitalia examination including the penis, scrotum, and testes. This examination may also be deferred in inpatient evaluations.

Neurological. The neurologic examination is frequently replete with abbreviations. The importance of the neurologic examination to neuropsychological evaluation cannot be overstated. The most important piece of information available to the consulting neurologist or neuropsychologist is a prior neurological examination noted in sufficient depth to reassure the examiner that it was performed with more than cursory inspection. The components of the Neurologic examination are elaborated below.

Mental status. This is frequently abbreviated as AO \times 3 standing for alert, oriented to person, place, and time. Occasionally one may see orientation described as AO \times 4 with the "4" referring to situation or circumstances. Just as commonly, one will see AAO \times 3 (or AAO \times 4) which stands for *Awake*, Alert and Oriented to person, place, and time (and circumstances/situation). A more detailed listing of specific findings such as a score obtained for the Mini-Mental State Exam (MMSE; Folstein et al. 1975) may be found (e.g., 30/30), as well as descriptions of which items the

patient failed. This section should include observations regarding attention, language, memory and insight/awareness of any current problems. Notation of defects in orientation, language problems (dysarthria, expressive/receptive aphasia, paraphasias) may be reported here. This section may also report about the patient’s mood and affect along with presence of hallucinations or delusions and risk of harm to self or others. The presence of more specific observations indicates the person was examined in depth, since the designation of “AO × 3 or AAO × 3” does not indicate a full or detailed exam was performed.

Cranial nerves. These are often summarized as “CN II-XII intact.” Cranial nerve I (olfactory nerve) is generally not tested. As with mental status, it is not always clear when this is a cursory evaluation versus a summation of a detailed examination. See Chap. 3 for review of anatomy of Cranial Nerves, and Chap. 4 for list of the Cranial Nerves and methods for assessment. Neurologists will often group cranial nerves into functional clusters including smell, taste, vision and eye movement, hearing, swallowing, and facial and neck strength and sensation. Sometimes, one will see “CN I–XII were intact (or WNL),” indicating sense of smell was evaluated. However, a more detailed exam will provide clear indication how the CN’s were tested (e.g., “each nostril tested separately, and pt. able to identify several common scents.”).

Motor examination. This includes muscle tone (resistance to passive movement), bulk, strength, often expressed according to the 0–5 Medical Research Council (MRC) grading scale (Table 2.2). Deep tendon reflexes (DTRs) should be noted here. Frequently, these are provided along with a stick drawing of a person with reflexes noted (see Fig. 2.1 and Table 2.3). Plantar responses may also be provided here, and may be noted along with DTRs (see Fig. 2.1). Figure 2.2 illustrates how the plantar response can be elicited.

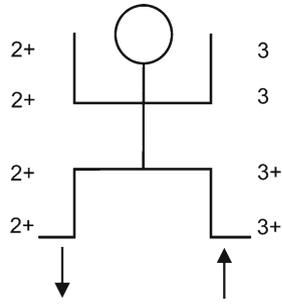
The presence of a abnormal movements/movement disorder (e.g., tremor, jerks, incoordination), apraxia, ataxia, hypertonicity (rigidity), hypotonicity (flaccidity) or other abnormalities of gait and station are also often noted here. Tremor

Table 2.2 Grading of muscle strength (MRC scale)

Grading of muscle strength	Qualitative descriptor of muscle grading
0	No palpable muscle contraction
1	A flicker or trace of contraction
2	Active movement with gravity eliminated
3	Movement against gravity but not resistance
4–	Active movement against gravity and slight resistance
4	Active movement against gravity and resistance
4+	Active movement against gravity and strong resistance
5	Full active range of motion and normal muscle resistance

A muscle grading of 0 is verbally discussed as “muscle strength is/was zero or zero out of five”.

Fig. 2.1 Common notation used to record reflexes as part of a neurological exam



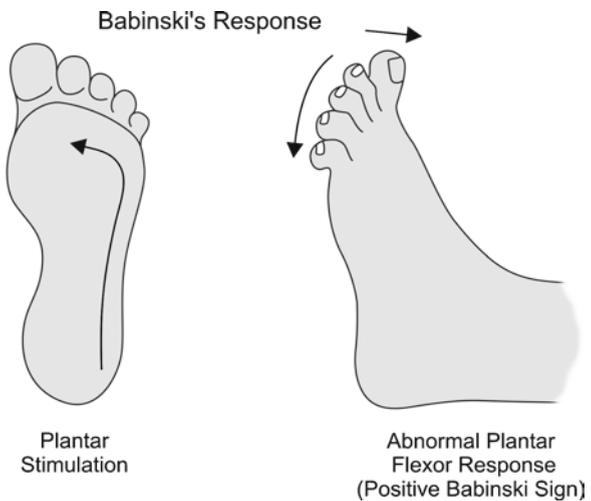
Note: Illustration for left sided increased deep tendon reflexes (i.e. left hyperreflexia). Note also the Plantar flexor noted for abnormality.

Table 2.3 Grading of deep tendon reflexes (DTRs)

Grading of DTRs	Qualitative descriptor of reflex grading
0	Not present, even with facilitatory procedure
1	Present but reduced or weak
2	Normal
2+	Normal, but somewhat brisk (high normal)
3	Brisk
3+4 (or 3+)	Very brisk, but no clonus
4	Pathologically brisk with clonus

Reflex grading of 2+ throughout, is discussed as “reflexes were 2+ throughout”.

Fig. 2.2 Illustration of the Plantar (Babinski) reflex



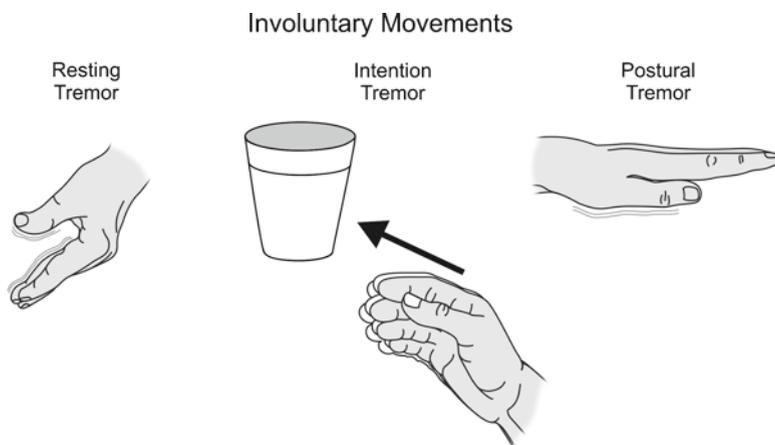


Fig. 2.3 Illustration and descriptions for common types of tremors

description should indicate where the tremor is present (e.g., upper extremity, lower extremity, head), when it is present (i.e., continuous, under stress, only at rest), and the severity of the tremor (see Fig. 2.3 for illustration of tremors). A variety of terms may be used to describe when it is present, but the most common will be *action tremor* (including postural, kinetic, physiological, and intention tremors) or *resting tremor* (classically, Parkinsonian tremor). Among action tremors, the most common clinically diagnosed type is *essential tremor* (ET), which is a tremor of 4–8 Hz most predominant when a static limb posture is maintained, but may also be evident when moving (intention tremor). Classically, it affects the upper limbs bilaterally, but may present worse in one limb (typically dominant hand). It may also involve the head, termed titubation, with a nodding type of movement. Involvement can include jaw, lips, and larynx, such that the patient's voice has a quavering quality. It is uncommon for lower extremities to be markedly affected by ET. It can progress to be disabling, making writing illegible and preventing a patient from holding a cup of water to drink (see also Chap. 19, this volume, for further review of ET and other movement disorders). Physiological tremor is present in all normal individuals, and is of high frequency (8–13 Hz) and low amplitude such that it is not seen by the naked eye nor appreciated by most people. When exaggerated, termed Enhanced Physiological tremor, by fright, anxiety, extreme exertion, withdrawal from alcohol, toxic effects from some chemicals (caffeine, lithium, etc.) or metabolic dysfunction (e.g., hyperthyroidism or hypoglycemia), the physiological tremor increases to be seen and to disrupt routine activities. Enhanced physiological tremor can appear like ET, and is most easily appreciated when holding arms out with fingers outstretched. Intention tremor refers to a tremor distinguished from other action or postural tremor by its form and associated features. Intention tremor is absent at rest and the initial start of a movement. However, as increasingly fine movement is needed

for an act (i.e., picking up a full cup of water), the tremor becomes present with a sideways oscillation at about 2–4 Hz of increasingly large amplitude that often continues after the target is reached. Intention tremor is always associated with cerebellar ataxia.

Other abnormal movements, such as chorea, athetosis, dystonias, ballismus (often hemiballismus) or akinesia, are often noted here. Choreiform movements may involve the proximal or distal muscles and are involuntary, excessive, jerky, irregularly timed, and randomly distributed. These movements can vary from subtle (appearing as “restlessness” to unstable dance-like gait while walking), to more severe (disabling flow of continuous extreme and violent movements). They are frequently associated with basal ganglia diseases. Athetosis describes slow writhing-like movements that are slower than choreiform movements, but may be described as “slow choreiform movements.” Choreoathetosis is an “intermediate” form of choreiform movements. Ballismus describes an extreme of choreiform movement in which motor movements are rapid and include violent flinging movements. It typically involves an involuntary, continuous, uncoordinated movement involving proximal and distal muscle groups resulting in a limb being “flung out.” It typically involves one side of the body, termed hemiballismus, but bilateral parballismus has been reported. Ballismus is considered an extreme choreiform motor movement. Akinesia is lack of movement.

Motor abnormalities of hypertonicity/rigidity [e.g., spasticity, cogwheel rigidity, lead pipe rigidity, paratonia (gegenhalten), etc.] or hypotonicity are also frequently noted here. Hypertonicity refers to excess motor tension, presence of spasticity, lead pipe rigidity (rigidity of a limb maintained during and after passive movement of muscle), cogwheel rigidity (passive movement results in a cogwheel or ratchet like catching and quickly releasing as limb moves), and paratonia (involuntary variable resistance to efforts at passive movement of a muscle, like a limb) (see Chaps. 10 and 19, this volume, for more details).

The presence of apraxia, ataxia and/or disorders associated with cerebellar function, such as dysmetria or dysdiadochokinesia, may be identified here or in the Gait and Balance section below. Apraxia refers to the loss of ability to complete previously learned purposeful motor movements, not due to motor weakness (see Chap. 9 for additional review). Examples include ideomotor and ideational apraxia. Ataxia refers to inability to coordinate muscle movements that is not due to motor weakness. Muscle movements will appear clumsy or “jerky.” Ataxia is typically associated with lesions to the cerebellum leading to gait abnormalities (see below), but may also occur due to sensory ataxia from damage to proprioception sensory pathways. Optic ataxia is the inability to coordinate eye–hand motor movements and is observed with Balint’s syndrome (see Chap. 9, this volume). Ataxic respiration is the poor coordination of muscles in chest and diaphragm, related to damage of the respiratory centers in the medulla oblongata or associated pathways.

Gait and balance. Sometimes included under the motor system, this includes rapid alternating movements (RAM), finger to nose testing (FTN), Romberg

testing, and other gait and balance descriptions. Observations of ataxia (e.g., dysmetria, dysdiadochokinesia) may be noted here. Dysmetria is abnormal movements associated with cerebellar damage, and involves dysfunction in the ability to accurately control the range of movement needed for a muscular action. Dysmetria is commonly tested with finger-to-nose testing. The individual with dysmetria will be unable to guide his/her finger to the examiners finger or nose, in which the target is under- or overshoot, with attempts at corrections which have a ‘jerky’ quality and overcorrection is often present. Dysdiadochokinesia is the inability to complete rapid alternating movements associated with cerebellar ataxia, and is often tested by having a patient rapidly alternate slapping the palm of each hand and back of the hand on a stable surface (i.e., pronation/supination test). Gait may be described with various terms, but some of the more common include: normal, spastic, apraxic (wide-based), ataxic (also wide-based), parkinsonian, steppage, or scissored gait (see Fig. 2.4 for illustration and summary description of common gait abnormalities).

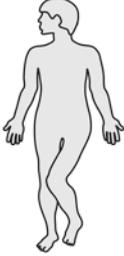
Sensory. Basic sensory modalities include light touch, pain sensation, vibratory sensation and joint position testing. “Higher order” sensory testing such as two point discrimination, sensory extinction, and/or graphesthesia may be included here. Figure 2.5 illustrates a bedside neurological examination to assess for graphesthesia. While this illustrates using the patient’s palm, it may also be tested on the patient’s finger tips. Presence of agraphesthesia is associated with contralateral parietal lobe damage.

Laboratory evaluations. Frequently listed after the physical examination in both the admission note and daily progress notes, laboratory evaluations include many abbreviations and common ways of recording the results. Tables 2.4–2.6 provide the abbreviations, descriptors, and purpose or function of common laboratory tests. Figures 2.6 and 2.7 illustrate how common laboratory values are diagramed in a chart.

Outpatient Medical Chart

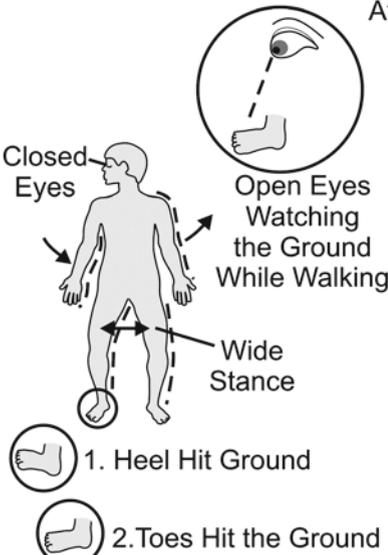
The outpatient medical chart is often very similar to the inpatient chart, although follow-up visit notes may note less detail than above for some medical subspecialties. However, like the inpatient medical chart, the beginning consultation (office visit) report generally will include a detailed written report of the patients presenting history and medical evaluation similar in format (often identical to) that reviewed above for the inpatient medical record. However, return office visits may not re-review all the patient’s history again and note changes in the patient’s history as necessary for the patient’s ongoing care with the treatment provider. Thus, we will not re-review the sections noted above.

Abnormalities of Gait and Posture

<h4 style="text-align: center;">Spastic Hemiparesis</h4>  <p>Gait resulting from upper motor neuron disease. Arm of affected side is held immobile and close to the body. Elbow, wrist, and finger joints often flexed. Leg is 'stiff' and extended. The foot is also often flexed out (plantar flexion). When walking, the affected leg is often circumducted (swung in a side ways arc motion). The toe may drag along the ground during this movement.</p>	<h4 style="text-align: center;">Scissors Gait</h4>  <p>Gait resulting from spastic paresis of both legs (bilateral upper motor neuron dysfunction affecting legs). Gait appears stiff and with each advancing step, the thigh will cross over in front of the other thigh. Steps are short. One may hear the thighs rubbing together. May appear as if person is walking through deep water.</p>
--	---

Abnormalities of Gait and Posture

Sensory Ataxia



Closed Eyes

Open Eyes Watching the Ground While Walking

Wide Stance

1. Heel Hit Ground

2. Toes Hit the Ground

Gait resulting from deficient sensory input due to polyneuropathy or damage to dorsal column (medial lemniscus tract). Gait is unsteady and wide based. Feet appear 'thrown forward' and then down to the ground, heels first. Patients watch the floor for visual guidance. When eyes are closed, gait worsens with more exaggerated staggering and the patient may fall. Patients are also unable to stand with feet together and eyes closed (positive Romberg sign).

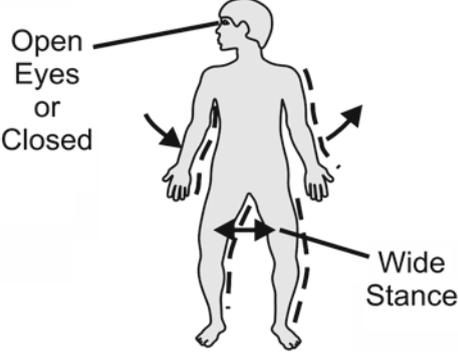
Fig. 2.4 Illustration and description of common gait abnormalities

Abnormalities of Gait and Posture

<p style="text-align: center;">Steppage Gait</p>  <p>Gait resulting from when a foot (or both feet) are weak, resulting in so-called "foot drop." Classically, the patient will lift up leg(s) high (as if climbing up stairs). When the patient puts a foot down, the foot 'slaps' the ground, which can often be heard. Patients unable to walk on heels.</p>	<p style="text-align: center;">Parkinsonian Gait</p>  <p>Gait is characteristically slow and shuffling with short steps (festinating gait), and the person is often stooped over. Arm swing is diminished and may be absent. Patient can have difficulty taking a step (start hesitation or freezing), and sometimes a verbal cue ("ready, go!") or placing an object in front of the patient to step over can start (resume) walking. Turns are made "en bloc," in which turns are made with a number of small steps.</p>
---	--

Abnormalities of Gait and Posture

Cerebellar Ataxia



Open Eyes or Closed

Wide Stance

Gait resulting from damage to cerebellum or associated motor tracts. Gait is unsteady and wide based. Turning is completed with difficulty. Gait does not worsen when eyes are closed. A positive Romberg sign is present, eyes open or closed.

Fig. 2.4 (continued)

Fig. 2.5 Bedside procedure to assess graphesthesia

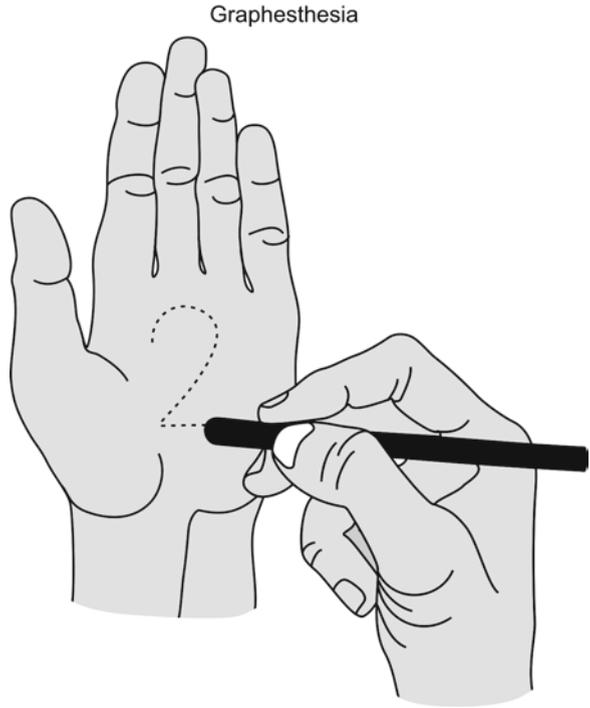


Table 2.4 Blood count and coagulation descriptors and abbreviations

Laboratory abbreviation	Laboratory term	Purpose of function of test (what abnormal value may mean)
<i>Complete blood count</i>		
Hb	Hemoglobin	To assess for anemia. Transports O ₂ to cells and CO ₂ away Adult Reference Ranges: – Females = 12–16 g/dL – Males = 13–18 g/dL
Hct	Hematocrit	To assess for anemia; Hematocrit is the percentage of blood volume occupied by cells Adult Reference Ranges: – Females = 35–48% – Males = 39–54%
Plt	Platelet count (in thousands)	Primary hemostasis. Initial blood clotting ability
RBC	Red blood cells	Density of Red Blood cells. Scales with Hb and Hct Adult Normal Range: Males = 4.2–5.4 × 10 ⁶ /μL Females = 3.6–5.0 × 10 ⁶ /μL
WBC	White blood cell count	Assessment for infection; > 11,000/μL very elevated, can reflect infection, bone marrow disease (leukemia), trauma, etc.; <4,300/μL very low, can reflect bone marrow disease (leukemia), infection, chemotherapy, etc.

(continued)

Table 2.4 (continued)

Laboratory abbreviation	Laboratory term	Purpose of function of test (what abnormal value may mean)
<i>Coagulation/sedimentation</i>		
INR	International normalized ratio	Measure of anticoagulation (normal = 1.0) based on PT
PT	Prothrombin time	Measures function of vitamin K dependent clotting factors
PTT	Partial thromboplastin time	Measure of clotting function; measured with PT Adult reference range: 25–41 s
ESR	Erythrocyte sedimentation rate	Measure of rate RBC's settle out of whole blood in 1 h Adult reference ranges: – Females = 1–20 mm/h – Males = 1–13 mm/h

Table 2.5 Chemistry (routine) laboratory descriptors and abbreviations

Laboratory abbreviation	Laboratory term	Purpose or function of test
Alb	Albumin	Major protein found in blood. Diminished with severe illness, kidney or liver dysfunction. Often measured with TP and Glob Adult reference range: 3.5–5.0 gm/dL
ALK or ALK Phos	Alkaline Phosphatase	Liver function. Elevated in conditions with increased bilirubin and in some bone diseases (e.g., Paget's disease)
ALT	Alanine Aminotransferase	Liver function. Also found in cardiac and skeletal muscle. Elevated with liver damage Adult reference range: 1–21 units/L
AST	Aspartate Aminotransferase	Same purpose as ALT Adult reference range: 7–27 units/L
Bili	Bilirubin (total, direct, or indirect may be specified)	Bilirubin forms bile and is increased with cholestasis (blockage of bile excretion) Adult reference range: Total: 0.3–1.0 mg/dL
BUN	Blood urea nitrogen	Measures kidney function. Increased with kidney failure. Associated with Cr Reference ranges: – Adults = 6–20 mg/dL – Higher in elderly (i.e., 8–23), lower in kids (5–18)

(continued)

Table 2.5 (continued)

Laboratory abbreviation	Laboratory term	Purpose or function of test
Ca (Ca ²⁺)	Calcium	Involved in neural transmission and muscle function Adult reference range: 8.5–10.5 mg/mL
Cl (or Cl ⁻)	Chloride	Major anion in body fluids. Often abnormal when sodium or potassium abnormal Adult reference range: 98–106 mEq/L
Cr	Creatinine	Measure of renal (kidney) excretion. Produced as part of energy metabolism in muscle Adult reference ranges: 0.6–1.2 mg/dL
GGT	Gamma Glutamyl transpeptidase	Abnormal with cholestasis; elevated in alcoholism
Glob	Globulins	Measure of antibodies. Associated with TP and Alb Adult reference range: 2.3–3.5 gm/dL
HCO ₃ (or HCO ₃ ⁻)	Bicarbonate	Measure of acid – base balance Adult reference range: 18–23 mEq/L (CO ₂ content)
K (or K ⁺)	Potassium	Involved in muscle contraction and function. Extreme low or high levels may be life threatening Adult reference range: 3.5–5.0 mEq/L
Na (Na ⁺)	Sodium	Involved in muscle and nerve function. Low levels may be associated with seizures
PO ₄ or Phos	Phosphorus	Associated with bone metabolism and excreted renally. Related to calcium levels Adult reference range: 3.0–4.5 mg/dL (inorganic)
T4	Thyroxine	Thyroid hormone level. Adult reference range: 4.6–12.0 µg/dL
TP	Total protein	Sum of albumin and globulin concentration. Adult reference range: 6.0–8.4 gm/dL
TSH	Thyroid stimulating hormone	Pituitary hormone whose levels are inversely related to thyroid function. Adult reference range: 0.5–5.0 microIU/mL

Table 2.6 Cerebral spinal fluid and other body fluid laboratory descriptors and abbreviations

Laboratory abbreviation	Laboratory term	Purpose or function of test
Cell ct	Cell count	Increased in meningitis or cerebral hemorrhage
Diff	Differential	Assesses for type of white blood cells found in body fluid (blood, CSF, etc.)
Prot	Protein	In CSF, elevations are nonspecific; elevated with neuropathy, stroke, MS and other conditions
Glu	Glucose	Low levels seen with bacterial meningitis. Usually 60% of serum value Adult Reference Range: 70–110 mg/dL (fasting)
U/A	Urinalysis	Screen for urinary tract infection, and measure of kidney function
C + S	Culture and sensitivity	Identification of pathogens (usually bacterial)
Cx	Culture	As above
14-3-3 protein		used for evaluating for prion disorders
Oligoclonal bands	Antibodies that appear as discrete “bands” on staining	Evaluates for inflammatory conditions (such as Multiple Sclerosis, but are <i>non-specific</i>)

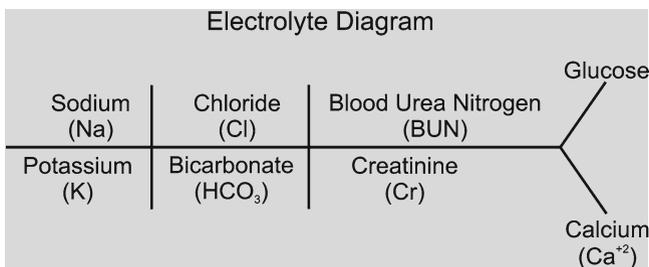


Fig. 2.6 Basic chemistry notation diagram(The serum glucose is often appended at the right hand side of this figure as illustrated)

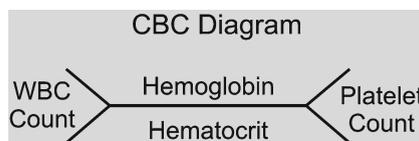


Fig. 2.7 Basic Blood Chemistry diagram

References

- Folstein, M. F., Folstein, S. E., & McHugh, P. R. (1975). "Mini-mental state". A practical method for grading the cognitive state of patients for the clinician. *Journal of Psychiatric Research*, *12*, 189–98.
- Lezak, M. D., Howieson, D. B., & Loring, D. W. (2004). *Neuropsychological assessment* (4th ed.). New York: Oxford.
- Victor, M., & Ropper, A. H. (2001). *Adams and Victor's principals of neurology* (7th ed.). New York: McGraw-Hill.
- Zaidat, O. O., & Lerner, A. J. (2008). *The little black book of neurology* (5th ed.). Philadelphia: Elsevier Health Sciences.