

What is Assessment of Sensory Function?

- › Basic assessment of sensory function involves bilateral evaluation of the three primary sensation pathways: pain and temperature, proprioception (i.e., position sense), and light touch. Cortical sensory function (e.g., *graphesthesia* [i.e., ability to identify figures being written on the skin from touch alone], *stereognosis* [i.e., perception of depth or three-dimensionality; typically tested by ability to perceive the form of a solid object such as a coin or key], and *extinction* [i.e., disorder impairing ability to perceive multiple stimuli of the same type simultaneously]) is a higher-order aspect of sensation that is assessed if bilateral primary sensation pathways are intact. Sensory function assessment evaluating the overall integration of sensation within the brain
 - *What*: A brief sensory assessment is performed as part of a routine head-to-toe assessment of patients with no known neurological symptoms. A more detailed, focused assessment is appropriate for patients who demonstrate abnormal findings
 - *How*: The sensory examination is primarily subjective. The patient must be alert and coherently communicative during the test
 - *Where*: Assessment of a patient's sensory function can take place in any health care setting
 - *Who*: The examination can be performed by registered nurses, midlevel practitioners such as nurse practitioners and physician assistants, and physicians. This assessment should not be delegated to assistive healthcare staff. Depending on the patient's preference, the presence of family members during the examination can be helpful

What is the Desired Outcome of Sensory Function Assessment?

- › Assessment of sensory function is ordered to detect the presence of sensory abnormalities and/or to screen for changes in a patient's neurological function

Why is Assessment of Sensory Function Important?

- › Abnormal findings during sensory assessment can help identify abnormal disease states and locate lesions within the nervous system

Facts and Figures

- › Peripheral sensory deficits occur commonly among older patients. Researchers who conducted a study involving 795 patients aged 64–94 years in the United States found that half of participants 84 years of age had at least one bilateral sensory deficit (Mold et al., 2004)
 - The most common bilateral deficit was the absence of ankle reflexes (86% of those with deficits), followed by insensitivity to touch (31%), vibration (15%), and position (7%). Associated factors included increasing age, annual incomes of < \$15,000 (U.S. dollars), increased body mass index, diabetes mellitus, vitamin B₁₂ deficiency, rheumatoid arthritis, and, interestingly, absence of hypertension. Patients with one or more deficits often reported numbness of extremities (28%), pain or discomfort in the affected area (48%), difficulty walking (44%), and/or impaired balance (35%). These findings show that peripheral sensory deficits may be present in approximately one-quarter of patients

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65–74 years of age in the U.S., increasing to over half of all patients aged 85 years and older. These deficits often occurred without obvious medical causes

- › Researchers have confirmed that diabetic peripheral neuropathies, particularly those that lead to sensory impairment that results in plantar ulcers or neurogenic arthropathy, also called Charcot joint (i.e., destruction of stress-bearing joint), can involve any segment of peripheral nerves from nerve roots to nerve endings and give rise to different patterns of abnormal sensations (Kazamel, et al., 2015)

What You Need to Know Before Assessing Sensory Function

- › The examiner should be familiar with the sensory dermatomes (i.e., area of skin supplied by a sensory neuron) that arise from spinal nerve ganglion
 - The majority of sensory deficits are caused by peripheral neuropathies related to sensory dermatomes. Exceptions are in the case of major brain lesions, such as cerebrovascular accidents, which can cause one-sided loss of sensation. Peripheral neuropathies caused by alcoholism usually develop over the areas covered by a glove or sock (i.e., glove-and-socking distribution)
- › Function will be tested for the following senses: tactile and tactile identification, sharp/dull, vibration, proprioception, and temperature to the extent of the tests described in *How to Assess a Patient's Sensory Function*, below
 - Tactile sensation; tested by lightly touching the patient with a cotton swab
 - Tactile identification sensation; tested by asking the patient to identify (by touch alone) a common object placed in his/her hand, such as a coin or key
 - Sharp/dull sensation; tested by asking the patient to identify the sensation of “sharp” or “dull” when being touched by the appropriate object
 - Vibration sensation; tested by asking the patient to report when he/she senses cessation of the vibrations of a tuning fork placed against the hand
 - Proprioception sensation; tested by accurate identification of the movement directed against a toe or finger
 - Temperature sensation; tested by correct identification of cold or hot water
- › Preliminary steps that should be performed before assessing sensory function include the following:
 - Review facility/unit-specific protocols for assessing sensory function, if one is available
 - Review treating clinician's written orders for assessment of sensory function
 - Verify completion of facility informed consent documents, if appropriate. The typical consent executed at admission to a health care facility encompasses neurological assessment
 - Review the patient's medical history/medical record for
 - allergies (e.g., latex); use alternate materials, if appropriate
 - history of neurological deficit or disorder
- › Assemble the appropriate supplies, which include the following:
 - Personal protective equipment (PPE; e.g., sterile/nonsterile gloves; use additional PPE [e.g., gown, mask, eye protection] can be necessary depending on the patient's condition and if exposure to body fluids is anticipated)
 - Cotton wisp
 - Tongue blade
 - Tuning fork
 - Coin or key
 - 2 containers, one holding warm water and the other containing cold water
 - Written information, if available, to reinforce verbal education

How to Assess a Patient's Sensory Function

- › Perform hand hygiene and don PPE, as appropriate
- › Identify patient using two unique identifiers or according to facility protocol
- › Establish privacy by closing the door to the patient's room and/or drawing the curtain around the bed
- › Introduce yourself to the patient and family members, and explain your clinical role in the assessment of sensory function
- › Assess patient/family for knowledge deficits regarding the assessment
 - Determine if the patient/family requires special considerations regarding communication (e.g., due to illiteracy, language barriers, or deafness); make arrangements to meet these needs, if present
 - Follow facility protocols for using a professional certified medical interpreter when a communication barrier exists

- › Explain the purpose and details of the assessment of sensory function—that you will be doing simple painless tests that require a patient response; answer any questions and provide emotional support as needed
- › Instruct the patient to close his/her eyes and to keep them closed until instructed to open them
- › Assess tactile sensation as follows:
 - Tell the patient you are going to touch him/her with an object and ask him/her to say the word “now” when the touch is felt
 - Lightly touch a cotton wisp to the face, torso, and all four limbs
 - Note response to each touch
- › Assess tactile identification sensation (tests stereognosis) as follows:
 - Tell the patient you are going to place a common object into his/her hand and ask that he/she identify the object by touch alone
 - Place a common object such as a coin or key in the patient’s hand; repeat the process for the opposite hand
- › Note the patient’s response
- › Assess sharp/dull sensation as follows:
 - Tell the patient you are going to touch him/her with a sharp or dull object and ask him/her to identify the touch when felt
 - Break a tongue blade in half
 - Lightly touch the sharp end of the blade on all four limbs; repeat with the dull end of the blade
 - Note patient response to all touches
- › Assess vibration sensation as follows:
 - Tell the patient that you are going to touch him/her with a vibrating metal object
 - Ask the patient to identify when the vibration sensation ceases
 - Strike the tuning fork
 - Place the handle of the tuning fork over a bony prominence on the distal joint of the great toe or the proximal thumb joint body; repeat the process for the same joint on the opposite side of the body
- › Assess proprioception sensation as follows:
 - Tell the patient that you are going to move his/her great toe or index finger and to indicate the direction the toe or finger is being moved
 - Move the great toe or index finger up and down; repeat the process for the same joint on the opposite side of the body
 - Note the patient’s responses to all touch
- › Assess temperature sensation as follows:
 - Tell the patient you will place his/her hand in warm and cold water
 - Instruct the patient to identify if the water is warm or cold
 - Repeat the process for the opposite hand
 - Note the patient’s responses to all attempts
- › Instruct the patient to open his/her eyes
- › Discard used procedure materials according to facility protocol
- › Perform hand hygiene
- › Update the patient’s plan of care, if appropriate, and document the following information in the patient’s medical record:
 - Date and time of patient assessment
 - Results of sensory assessment
 - Any unexpected events that occurred, interventions performed, and if the treating clinician was notified
 - All patient/family education, including topics presented, response to education provided/discussed, plan for follow-up education, and details regarding any barriers to communication and/or techniques that promoted successful communication

Other Tests, Treatments, or Procedures That Can Be Necessary Before or After Assessment of Sensory Function

- › Report abnormal test results to the treating clinician
- › Additional tests that may be ordered in the evaluation of patients with impairments in sensory function include
 - testing of neuromotor function (see *Nursing Practice & Skill ... Neurological Assessment: Assessing Neuromotor Function*)
 - imaging studies (e.g., CT scan, MRI)
 - electromyography (EMG; i.e., test that evaluates the electrical activity in a muscle)
 - blood tests (e.g., for vitamin deficiencies, blood glucose levels)
 - nerve biopsy

What to Expect After Assessment of Sensory Function

› In combination with the results of additional testing, the extent and type of the patient's sensory loss is identified, if present

Red Flags

- › If the patient's sensations of touch, vibration, or temperature are impaired, identify the pattern of the loss on areas of the body. This information will help the treating clinician locate the potential lesion within the nervous system
 - A (i.e., a pattern of peripheral nerve disease located at body areas typically covered by socks and gloves) suggests peripheral nerves damage
 - A dermatomal distribution (i.e., area of skin in which sensory nerves derive from a single spinal nerve root) suggests damage to isolated nerves (i.e., mononeuritis multiplex) or nerve roots (i.e., radiculopathy)
 - Reduced or absent sensation below a certain level suggests damage of the spinal cord. One-sided loss of sensation is seen when a lesion causes damage within the brain as is often seen with a cerebrovascular accident (CVA; i.e., stroke). The location of the lesion is confirmed when motor weakness and reflex changes follow a similar pattern. Patchy sensory, motor, and reflex deficits in a limb suggest lesions of the brachial or pelvic nerve plexus

What Do I Need to Tell the Patient/Patient's Family?

- › Explain the purpose of the examination of sensory function and what to expect as you conduct it. Encourage questions
- › If further testing is required, explain the purpose of the testing, what information will be obtained, and when the results will likely become available
- › If the neurological examination of sensory function is conducted in a home or outpatient setting, provide the family with contact information for the treating clinician; emphasize the importance of contacting the treating clinician if changes in the patient's condition occur, or questions or problems arise

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