



Kessler Foundation Neglect Assessment Process

KF-NAP™ 2014 Manual

Authors

Peii Chen, PhD,^{1,2} Kimberly Hreha, MS, OTR,^{3,4} and Marco Pitteri, PhD⁵

Contributors

Sharon Holman, MS, OTR,³ Lindsay Comardo, MS, OTR,³ and Gretchen March, OTR³

¹Kessler Foundation, West Orange, New Jersey

²Department of Physical Medicine and Rehabilitation, Rutgers New Jersey Medical School, Newark, New Jersey

³Kessler Institute for Rehabilitation, West Orange, New Jersey

⁴Movement Science and Occupational Therapy, Teachers College, Columbia University, New York, New York

⁵Laboratory of Neuropsychology, Istituto di Ricovero e Cura a Carattere Scientifico, San Camillo Hospital Foundation, Lido-Venice, Italy

Acknowledgment

Authors thank Courtney Silviotti, MS, OTR for conducting the assessment and collecting data during the manual development, A.M. Barrett, MD for administrative support, and Thomas Van Vleet, PhD for manual suggestions.

Research work leading to the KF-NAP™ 2014 Manual is supported by the National Institutes of Health (NIH/NINDS, R01NS055808, PI: Barrett; NIH/NICHD/NCMRR, K24HD062647-01, PI: Barrett) and the Department of Education/ National Institute on Disability and Rehabilitation Research (NIDRR Field Initiated Research, H133G120203, PI: Barrett). Contents in the manual do not necessarily represent the policy of the Department of Education, and one should not assume endorsement by the federal government.

Contact information

Peii Chen, PhD: pchen@kesslerfoundation.org

Kimberly Hreha, MS, OTR: khreha@kesslerfoundation.org

Kessler Foundation

1199 Pleasant Valley Way, West Orange, New Jersey 07052, the United States of America

Prior to using the Kessler Foundation Neglect Assessment Process (KF-NAP™), please read, sign and return a copy of the KF-NAP™ License Agreement to Kessler Foundation.

Copyright© 2014 Kessler Foundation Inc. All rights reserved.

CONTENTS

I.	Introduction	Page 1
II.	Eligible Patients	Page 1
III.	Basic Principles of the KF-NAP™	Page 2
IV.	Instructions for Administering and Scoring Each Category	Page 3
	1. Limb awareness	Page 3
	2. Personal belongings	Page 4
	3. Dressing	Page 5
	4. Grooming	Page 6
	5. Gaze orientation	Page 7
	6. Auditory attention	Page 8
	7. Navigation	Page 9
	8. Collisions	Page 10
	9. Eating	Page 11
	10. Cleaning after meal	Page 12
	References	Page 13
	Appendix	Page 14
	Preliminary Data	Page 14
	KF-NAP™ Kit	Page 15
	KF-NAP™ Certification Procedure	Page 16

KF-NAP™ Scoring Sheet

Date: _____

Name of Examinee: _____

Time: _____ am/pm

Examiner(s): _____

Kessler Foundation Neglect Assessment Process (KF-NAP™)

How to use the Catherine Bergego Scale to assess spatial neglect

	Category	0 no neglect	1 mild neglect	2 moderate neglect	3 severe neglect	NA (provide reasons)
1	Limb awareness					
2	Personal belongings					
3	Dressing					
4	Grooming					
5	Gaze orientation					
6	Auditory attention					
7	Navigation					
8	Collisions					
9	Eating					
10	Cleaning after meal					
<p>Neglected side (circle one): <i>left-sided</i> spatial neglect; <i>right-sided</i> spatial neglect</p> <p>Number of scored categories = _____ Sum of the score = _____ Final Score = _____</p> <p>Neglect severity (circle one): Absent (0); Mild (1-10); Moderate (11-20); Severe (21-30)</p>						

- See the *KF-NAP™ 2014 Manual* for detailed instructions of each category.
- A score of 0 is given if no symptom of spatial neglect is observed.
- A score of 1 is given if a mild neglect is observed, with the patient typically exploring one side of the space first, and going slowly and hesitating towards the other side (i.e., the neglected side). At this level, omissions or collisions are rare and inconsistent in the neglected side. Fluctuations could be observed with fatigue and emotions.
- A score of 2 is given in case of moderate neglect, with constant and clear omissions or collisions to one side of space (i.e., the neglected side); at this level, patients are still able to cross the midline, but performance in the neglected side is incomplete and ineffective.
- A score of 3, severe neglect is given if the patient is only able to explore one side of the space but ignore the other (i.e., the neglected side).
- The final score is calculated by adding up all the category scores, ranging from 0 to 30.
- If a category is impossible to score even under the circumstance where the examiner creates the best possible scenario for observation (see the *KF-NAP™ 2014 Manual*), it is not included in the final score. In this case, the final score is then calculated from the average score of the valid categories, using the following formula:

$$\frac{\text{Sum of the individual scores}}{\text{Number of scored categories}} \times 10 = \text{final score}$$

- Based on the final score, classify neglect severity by circling either “absent” (final score = 0), “mild” (final score = 1-10), “moderate” (final score = 11-20), or “severe” (final score = 21-30).
- The KF-NAP™ is provided under license and is strictly limited for administration by trained and certified individuals only.

I. Introduction

The current manual is refined from the previous version published in the journal *Topics in Stroke Rehabilitation*.¹ The Kessler Foundation Neglect Assessment Process (KF-NAP™) 2014 Manual provides detailed scoring methods and instructions for using the Catherine Bergego Scale.² The 10-category scale is based on observations of patients' everyday life activities that may be affected by **spatial neglect**. Spatial neglect is a neurocognitive disorder affecting attentional control, spatial perception and representation, and motor action planning. Individuals with spatial neglect show a failure or slowness to respond, orient, or initiate action towards contra-lesional stimuli.³ Neglect of the left side often occurs following right-brain damage, whereas neglect of the right side is a result of left-brain damage.^{4,5} The terms "left-sided neglect" and "right-sided neglect" are related to the patient's body (so-called "body-centered neglect.") There are other forms of spatial neglect based on different frames of references, such as object-centered neglect.⁶ In this manual, we only concern the body-centered spatial neglect.

The purposes of the KF-NAP™ are: 1) to assess symptoms of spatial neglect in activities of daily living (ADLs) and 2) to assist predicting functional outcomes after a brain damage, such as stroke or traumatic brain injury, in the context of comprehensive clinical evaluation. In addition to the clinical purpose, the KF-NAP™ can be used as an outcome measure in research studies. Behaviors observed in the KF-NAP™ are related to spatial locations in the *personal space* (i.e., in/on/of one's body surface), the *peripersonal space* (i.e., within arms' reach), the *extrapersonal space* (i.e., beyond arms' reach), and the *mental space* (i.e., the space and location information in memory). An individual with spatial neglect manifests symptoms in one, several, or all of the spatial sectors.

KF-NAP™ can be administered in multiple settings, including the patient's home, an inpatient clinic, an outpatient clinic, an acute care hospital setting, or a subacute facility. The aspect of familiarity is important especially for the categories of "navigation" and "personal belongings". Thus, if completing this assessment in the outpatient clinic, please ask the patient or the caregiver to 1) bring a few items that are personal to the patient (e.g., coat, glasses, handbag, backpack, etc.) to be used during the assessment, and 2) bring in food prior to the session where "eating" will be observed. In the Appendix, we suggest use of the KF-NAP™ Examiner's Kit when the assessment will take place in the outpatient clinic setting.

We suggest that the examiner follows the order of the categories as they are in the scoring sheet for the purposes of ease. Nonetheless, the order in which the individual category is observed has no critical importance. If the KF-NAP™ is used for multiple follow-up assessments, it is preferable to observe the patient at the same time of the day as the first session took place, to reduce the effect of wakefulness, mood, or motivation that may fluctuate throughout the day and influence the accuracy of the assessment. Also, all ten categories should be observed during the same session. Each category is scored from 0 (no neglect) to 3 (severe neglect); that is, a higher score indicates more severe spatial neglect.

II. Eligible patients

You may use the KF-NAP™ to assess individuals who suffer from brain damage or injuries after a cardiovascular accident (stroke), traumatic brain injury (TBI), surgical procedures, etc.

III. Basic Principles of the KF-NAP™

1. No lateralized cue

During the observation, the examiner often provides patients with verbal instructions to initiate, or try to initiate, certain behavior. However, none of the verbal instructions should involve spatial cues. Allow patients to spontaneously explore the environment, and permit them to freely use their limbs and move their eyes. It is important to allow for a good amount of time to observe the several aspects of patients' behavior.

2. Look for lateralized or asymmetrical behavior

The KF-NAP™ allows measuring functional impairment related spatial neglect. Thus, the examiner must look for behavior biased toward one side of space, or the other side of space, related to the patient. It is important that both spatial sides are assessed, so that the examiner can compare activities on the right versus the left side of space before making the conclusion that the patient shows left-sided or right-sided spatial neglect.

3. Score the deficits

Each category is scored from 0 (no neglect) to 3 (severe neglect); that is, a higher score indicates more severe spatial neglect. In order to best score the categories that require observation throughout the entire session, it is helpful to think of a percentage score. We will reference a basic converging scoring method to assist the examiner with those items. For example: score 0 = 100% able (no neglect); score 1 = 75% able (mild neglect); score 2 = 50% able (moderate neglect); score 3 = no ability on the neglected side (severe neglect). The percentages could also mean that the behavior is happening that amount of time (for example: the gaze preference toward the right side is occurring 75% of the time). Otherwise, please refer to the word descriptions for additional information on what typical behaviors may be seen and how that translates into a mild, moderate or severe impairment.

IV. Instructions for Administering and Scoring Each Category

In this manual, we provide instructions for assessing behavioral signs of *left-sided* spatial neglect, commonly occurring after right-brain damage. However, the examiner may use the same principles to assess *right-sided* spatial neglect, commonly occurring after left-brain damage. Also, the scoring sheet is applicable to both left and right-sided spatial neglect.

1. *Limb awareness*

Spatial sector where the behavior occurs

- Personal space (i.e., in/on/of one's body surface)

What to observe

- Observe the patient during the entire session.
- Observe how many times and how much time the patient cares for or attends to the left versus right limbs.

How to score

Score = 0 The patient pays attention and cares for the left as well as the right limbs. He/she may pick up and move the weaker arm regularly throughout the session. He/she may passively straighten out his/her left hand fingers to avoid cramping/discomfort; same for the left leg. The patient may state difficulties actively moving his/her left limbs and even asks for help in doing activities.

Score = 1 The patient moves slowly and hesitates toward the left limbs. The time spent on caring for the left limbs is less and weaker respect to the right limbs, but the patient does attend to the left limbs.

Score = 2 The patient rarely pays attention to the left limbs. There is constant and clear absence of caring left limbs. When attention is paid to the left limbs, time spent in caring to the left limbs is short, and the performance is incomplete.

Score = 3 The patient completely ignores the left limbs altogether. He/she never moves his/her left arm/leg with his/her right hand in order to assist movement of the left limbs. The patient does not attempt to move or interact with his/her left limbs. There is no observation of spontaneous caring of the left limbs.



Is the patient aware of his/her limb hanging outside the wheelchair?

2. *Personal belongings*

Spatial sectors related to the occurring behavior

- Peripersonal space (i.e., within arms' reach)
- Extrapersonal space (i.e., beyond arms' reach)
- Mental space (i.e., the space and location information in memory)

What to observe

- Observe the patient in his/her room, hospital room, familiar clinic room.
- Observe if he/she can tell you where personal objects are located in the room. Some objects are placed on the left side, and some are placed on the right side respect to the patient's position. Ask for the same number of objects on the left and on the right side of the patient.
- "Personal belongings" are objects that are used by the patient regularly and that are most likely stay in the same location. The preferred location is determined by the patient after every use throughout the patient's stay in the facility or at patient's home.
- Do not hide objects for the patient to "find", even though the examiner is asking questions such as: "*I cannot find your reading glasses. Can you tell me where they are?*" Note that this word choice does not show any spatial bias. Objects may include his/her handbag, mobile phone, glasses, toothbrush, picture frames, clothing, flowers/plant, greeting cards, etc.
- Ask for 3-5 objects on each side of space (i.e., right and left). If there are a limited number of objects, which is often the case in an outpatient clinic setting, you may ask for the same objects later in the session while the patient's position has been changed so that the point of view has changed. For example, there is one object on the right and two on the left at the beginning of the session when the patient faces the door. At some point during the session, the door is behind him/her, and thus now there are two objects on the left and one on the right.

Additional observation

- During this personal belonging observation, the examiner will be observing how the patient is looking around to locate the objects and spontaneously exploring the environment. The examiner may notice that he/she only moves his/her eyes toward one side or keep his/her head position to the right side. Such observation could then provide additional information related to Category 5 ("gaze orientation").

How to score

Score = 0 The patient does not hesitate to locate and point towards all the objects on the right as well on the left side respect to his/her body position.

Score = 1 The patient always locates and point the objects on the right side respect to his/her body position but fails to locate and point one-third of the objects located on the left side respect to his/her body position.

Score = 2 The patient always locates and point the objects on the right side respect to his/her body position but fails to locate two-thirds of the objects on the left side respect to his/her body position.

Score = 3 The patient always locates and point the objects on the right side respect to his/her body position but fails to locate any object on the left side respect to his/her body position.

3. Dressing

Spatial sector where the behavior occurs

- Personal space (i.e., in/on/of one's body surface)

What to observe

- Provide the patient an open-front shirt or a button-down coat (e.g., a jacket from his/her closet) and say: *"Would you please put this on?"* or *"Show me how you would put this on."*
- Observe his/her spontaneous behavior for this task, paying attention for different performances on the left compared to the right side of his/her body.
- It is important to note that if the patient is physically unable to put the shirt over the left shoulder or onto the left arm, but can acknowledge his/her disability and asks for help (in this case, the examiner can minimally help the patient to proceed), then the examiner should assign the score of "0" (no neglect), unless other behaviors occur that deem a spatial bias.

How to score

Score = 0 The patient can manage to get the shirt on completely or acknowledges that he/she needs help for the left body side. He/she attends to his/her left arm throughout the dressing process.

Score = 1 The patient does not acknowledge a need for help. He/she first tries on getting his/her right arm in the sleeve and eventually works on the left arm with hesitation. The patient gets the shirt on completely and fairly neatly done. The time spent on wearing the left arm is less and weaker in comparison to the right arm, but the dressing behavior of the left arm is present.

Score = 2 The patient does not acknowledge a need for help. He/she first tries on getting his/her right arm in the sleeve and hesitates significantly before paying attention to the left arm. Moreover, patient takes a significantly less time on getting his/her left arm in the clothing's sleeve. The shirt is messy on the left side. The patient is able to attend to the left arm, but the performance is incomplete or ineffective.

Score = 3 The patient only pays attention on getting his/her right arm in the clothing's sleeve, completely ignoring the left arm. Patient does not put the left arm through sleeve at all and does not acknowledge a need for help.



Does the patient acknowledge a need for help dressing his/her left side?

4. Grooming

Spatial sector where the behavior occurs

- Personal space (i.e., in/on/of one's body surface)

What to observe

- Bring the patient in front of the sink in his/her room (in the clinic or at home).
- Alternatively, if the bathroom or any sink is not accessible, you can set up a desk mirror, a comb, and a wet paper towel in front of the patient, prior to getting him/her to the bedside table. If setting up the environment is necessary, we suggest the examiner use the KF-NAP Examiner's Kit (see the Appendix; page 15).
- Observe how the patient spontaneously combs his/her hair, shaves his face, and wipes his/her face. The examiner may say: *"Show me how you wash your face"*.
- Observe how much time it takes the patient on both the left and right side of his/her face/head.

Additional observation

- During this grooming observation, if at the patient's home, the examiner can also ask the patient to search for personal belongings in his/her own bathroom (e.g., toothbrush, towel, comb, etc.) to assist in scoring Category 2 ("personal belongings"). However, DO NOT assess "personal belongings" if the assessment does not take place at the patient's home but rather in a clinic setting where toiletries may change locations frequently without the patient's awareness.
- The examiner can also ask the patient to wash his/her hands and observe if he/she takes care of both hands or ignore the left or the right hand. This will help observation of Category 1 ("limb awareness").

How to score

Score = 0 The patient is able to brush/wipe his/her hair/face on both sides, symmetrically and effectively.

Score = 1 The patient brushes/wipes his/her hair/face on the right side first and spends quite longer time on the right side than the left. Eventually, the left side is taken care of.

Score = 2 The patient brushes/wipes his/her hair/face on the right side and spends quite longer time on the right side than the left. Performance on the left side of his/her face/head is ineffective or inconsistent compared to the right side.

Score = 3 The patient brushes/wipes his/her hair/face on the right side only.



Does the patient brush his/her hair on both sides?

5. *Gaze orientation*

Spatial sectors related to the occurring behavior

- Peripersonal space (i.e., within arms' reach)
- Extrapersonal space (i.e., beyond arms' reach)

What to observe

- Observe the patient during the entire session.
- Observe how the patient spontaneously shifts his/her gaze.
- Observe how he/she explores the space around him/her: Does he/she move their head or just their eyes? Does the patient look toward the examiner with his/her eyes when the examiner is talking to him/her? Does the patient look around the room? Take note of how much time the patient is engaged in exploring both the left and the right sides of space.
- Prior to the assessment, make sure that the patient is not suffering from deficits related to oculomotor nerves (critical for eye movement).

How to score

Score = 0 The patient spontaneously directs his/her gaze toward the right and left sides of space without hesitation and without any prompting.

Score = 1 The patient explores an environment by looking toward the right side first and slowly looking toward the left side with hesitation. In comparison to the right side of space, the patient takes longer time directing his/her gaze toward the left side. During the entire session, the patient spends more time looking to the right side than the left side of space.

Score = 2 The patient explores the environment by looking toward the right side of space first and slowly looking toward the left side after a long delay. There are constant and clear asymmetries in the gaze direction toward the left and right sides of space. During the entire session, the patient spends much more time looking to the right side than the left side of space.

Score = 3 The patient looks toward the right side of space spontaneously but does not look toward the left side at all, unless the examiner explicitly requests him/her to do it. The patient is easily able to direct the gaze toward the right side of space and does not attempt to orient his/her eyes toward the left side of space. Note that he/she does not have oculomotor deficits and thus, when instructed, the patient is able to move his/her eyes toward the left.

6. **Auditory attention**

Spatial sector related to the occurring behavior

- Extrapersonal space (i.e., beyond arms' reach)

What to observe

- Observe how the patient's attention is captured (or not) by a sudden loud sound.
- Make loud, unexpected noise to the patient's right and left sides out of the patient's sight. For example, drop a heavy object such as a trash can or clap your hands.
- Observe the startle reaction and the directional gaze or head movement of the patient. For example, the patient may immediately turn his/her head or body toward the noise, or simply shift his/her gaze. Contrarily, the patient may not show any significant reaction at all. In this latter case, the examiner should ask the patient if he/she has heard something and, if so, where was the source of noise.
- Prior to the assessment, make sure that the patient is not suffering from severe hearing deficit.

How to score

- Score = 0** The patient shows an immediate startle reaction and correctly turns his/her head/body/gaze toward the source of noise, no matter it came from the right or left side. The direction of the patient's behavior correctly points toward the location of the noise. The reaction observed is appropriate and immediate.
- Score = 1** The patient shows a startle reaction and he/she may first shift his/her head/body/gaze toward the right side of space (when orienting to the sound coming from the left). He/she may eventually look toward the left side of space with hesitation. His/her velocity to orient his/her head/body/gaze toward the source of noise is quite slow.
- Score = 2** The patient may not show a startle reaction immediately. His/her directional reaction is incorrect at the first instance: he/she shifts his/her head/body/gaze to the right after the sound coming from the left side. However, he/she may eventually turn his/her head/body/gaze to the left after a long delay. The patient may state that he/she heard something but is not able to identify the location of the sound.
- Score = 3** The startle reaction is absent. The patient does not shift his/her head/body/gaze to the sound coming from the left. The patient may state that he/she heard something but is not able to identify the location of the sound. Sometimes, the patient may state that he/she has heard nothing even though he/she is not suffering from severe hearing deficits.

7. Navigation

Spatial sectors related to the occurring behavior

- Extrapersonal space (i.e., beyond arms' reach)
- Mental space (i.e., the space and location information in memory)

What to observe

- Make sure that the functional level is known prior to this observation. Consult with the therapy team, doctor or family member for the patient's mobility or what type of mobility is most commonly used by the patient every day.
- The patient is asked to find his/her way to a familiar place (e.g., cafeteria, therapy gym, another room out of patient's main room, etc.) Initiate this observation by saying: "*Show me how to get to the therapy gym*".
- If the patient is not able to move his/her wheelchair because of several reasons (e.g., severe hemiplegia or medical precautions) or cannot walk, the examiner can push the patient's wheelchair while he/she instructs the way to get to the familiar location. The patient can instruct the examiner by using hand gestures and/or oral suggestions.
- The way to the familiar location should require an equal amount of "right-turn" and "left turn" options.
- When there are a limited number of turns on the route, the examiner may ask the patient to find the way to the destination and to find the way back to the original location.

How to score

Score = 0 The patient employs approximately equal number of left and right turns to get to the final location. He/she is able to reach the final destination correctly.

Score = 1 The patient makes more right turns than necessary and some left turns to get to the final destination. He/she hesitates at left turns and may take a longer route than necessary because the majority of turns are of the right turn preference. However, the patient is able to reach the final destination correctly.

Score = 2 The patient makes more right turns than necessary and only turns left when there is no other option to get to the final destination. He/she hesitates for long periods at left turns and may take a longer route than necessary because the majority of turns are of the right turn preference. The patient might not be able to reach the final destination.

Score = 3 The patient only tries to do right turns to get to the final destination. The patient usually is not able to reach the final destination.

8. Collisions

Spatial sectors where the behavior occurs

- Peripersonal space (i.e., within arms' reach)

What to observe

- This category can be observed during “navigation” (Category 7).
- The patient is required to not collide into the furniture or walls and can either use the wheelchair or by ambulate.
- You must stop the patient if him/her is in harm's way (e.g., bumping into the wall or a piece of furniture).
- In the absence of obstacles, the examiner can strategically place obstructions such as a chair, a basket, etc. of which locations are balanced on right and left sides. Alternatively, the examiner may ask the patient go through a door way followed by a right or left turn. The examiner would then observe the patient's performance avoiding these obstacles.

How to score

Score = 0 The patient does not collide into any items in the environment.

Score = 1 The patient bumps into items placed on the left side infrequently, but more often than into items placed on the right side.

Score = 2 The patient bumps into items placed on the left side frequently and much more often than into items placed on the right side.

Score = 3 The patient bumps into items placed on the left side with almost every movement, even repetitively.



Does the patient collide to one side when going through the door way?

9. Eating

Spatial sector where the behavior occurs

- Peripersonal space (i.e., within arms' reach)

What to observe

- Observe the patient while he/she is having a meal or snack.
- All the related items (food, utensils, spice, creamer, etc.) should be prepared and placed on the tray in an organized, conventional manner (i.e., plate at the lower center with utensils on its left and right sides, drink and soup at the upper corners). The arrangement must be done prior to being placed in front of the patient.
- If the setting is a clinic, ask the patient or his/her caregiver to bring in food items. If the patient only brings a snack, you should have extra plates and utensils available (even additional food that you could offer), to be able to have a good amount of items on the tray (see the Appendix for the KF-NAP™ Examiner's Kit).
- When the patient is asking for certain item, the examiner will give an unbiased answer. For example, when the patient asks: *"Where is the coffee?"* the examiner may answer: *"It is on the tray. Can you find it?"*

Additional observation

- During the observation of this category ("eating"), you may observe the patient look around to locate food or utensil. Such observation will help scoring for Category 5 ("gaze orientation").

How to score

Score = 0 The patient finds/eats food on his/her right and left sides without any difficulty. He/she is able to find, touch or acknowledge all the items on the plate and on the tray.

Score = 1 The patient eats food mainly from the right side of the array and hesitates to have food on the left side. The patient searches food or other items from right to left.

Score = 2 The patient eats food mainly on the right side and rarely eats food on the left side. The patient searches food or other items from right to left, but he/she may have a hard time finding items on the tray. For example, he/she asks for coffee despite it being on the tray. Once told that coffee is on the tray, he/she may be able to look toward the left and find it.

Score = 3 The patient eats food only on the right side and he/she is not able to find items on the left. For example, he/she asks for coffee despite it being on the tray. Once told that coffee is on the tray, he/she remains unable to look toward the left or find it.



Does the patient eat or reach for all the items on the food tray?

10. *Cleaning after meal*

Spatial sector where the behavior occurs

- Personal space (i.e., in/on/of one's body surface)

What to observe

- Observe this category with "eating" (Category 9).
- Observe whether the patient cleans both sides of his/her mouth after the meal.
- Observe if the patient notices food on the edge of the left side of his/her mouth, during or after the meal. Look for any food that is being held on one side of the patient's mouth.
- Observe if the patient can initiate this task spontaneously. If not, ask the patient to wipe his/her mouth.

How to score

Score = 0 The patient cleans both the right and left sides of his/her mouth after the meal. During the meal, patient regularly cleans his/her mouth several times.

Score = 1 The patient cleans the right side of the mouth first and does a less thorough job on the left side. The patient cleans his/her mouth few times during the meal.

Score = 2 The patient cleans the right side of the mouth first and hardly reaches the left side. During the meal, the patient occasionally cleans his/her mouth, and some food could remain on the left corner of the mouth both during and after the meal.

Score = 3 The patient only cleans the right side of his/her mouth. During the meal, the patient rarely perceives the need to clean his/her mouth, and some food could remain on the left corner of the mouth both during and after the meal.

Reminder: In this manual, we provide instructions for assessing behavioral signs of **left-sided** spatial neglect, commonly occurring after right-brain damage. However, the examiner may use the same principles to assess **right-sided** spatial neglect, commonly occurring after left-brain damage. Also, the scoring sheet is applicable to both left and right-sided spatial neglect.

References

1. Chen P, Hreha K, Fortis P, Goedert KM, Barrett AM. Functional assessment of spatial neglect: A review of the Catherine Bergego Scale and an introduction of the Kessler Foundation Neglect Assessment Process. *Top in Stroke Rehabil.* 2012;19(5):423-435.
2. Azouvi P, Marchal F, Samuel C, et al. Functional consequences and awareness of unilateral neglect: Study of an evaluation scale. *Neuropsychol. Rehabil.* Apr 1996;6(2):133-150.
3. Heilman KM, Watson RT, Valenstein E. Neglect and related disorders. In: Heilman KM, Valenstein E, eds. *Clinical Neuropsychology*. 5th ed. New York: Oxford University; 2012:296-348.
4. Alvarez TL, Kim EH, Vicci VR, Dhar SK, Biswal BB, Barrett AM. Concurrent vision dysfunctions in convergence insufficiency with traumatic brain injury. *Optom. Vis. Sci.* Dec 2012;89(12):1740-1751.
5. Pavlovskaya M, Groswasser Z, Keren O, Mordvinov E, Hochstein S. Hemispheric visual attentional imbalance in patients with traumatic brain injury. *Brain Cogn.* Jun 2007;64(1):21-29.
6. Shah P, Spaldo N, Barrett AM, Chen P. Assessment and functional impact of allocentric neglect: A reminder from a case study. *The Clinical Neuropsychologist.* 2013;27(5):840-863.
7. Chen P, Hreha K. Clinical feasibility and validity of the Kessler Foundation Neglect Assessment Process (KF-NAP). American Congress of Rehabilitation Medicine 2014; Toronto, Canada.

APPENDIX

Preliminary Data⁷

From July 2012 to March 2014, 133 stroke survivors were enrolled to the study from the inpatient rehabilitation facilities of the Kessler Institute for Rehabilitation. The inclusion and exclusion criteria were 1) first stroke, 2) unilateral brain damage, and 3) ability to give written or verbal informed consent. Led by Dr. Peii Chen, the study was to evaluate the feasibility of using the KF-NAP™ in the clinical setting as part of the ADL assessment and to establish the prevalence of spatial neglect. Occupational therapists used not only the KF-NAP™ but also FIM™ and the Barthel Index within each assessment session.

Each participant was assessed within 72 hours after admission and before discharge.

- Frequency of spatial neglect at the time of admission to the inpatient rehabilitation facility:

	No neglect	Mild neglect	Moderate neglect	Severe neglect	Presence of spatial neglect
KF-NAP score	0	1 - 10	11 - 20	21 - 30	1 - 30
Left-brain stroke (n=36)	19 (52.8%)	13	1	3	17 (47.2%)
Right-brain stroke (n=85)	20 (23.5%)	35	19	11	65 (76.5%)
Total (N=121)	39 (32.2%)	48	20	14	82 (67.8%)

- Frequency of spatial neglect at the time of discharge from the inpatient rehabilitation facility:

	No neglect	Mild neglect	Moderate neglect	Severe neglect	Presence of spatial neglect
KF-NAP score	0	1 - 10	11 - 20	21 - 30	1 - 30
Left-brain stroke (n=34)	25 (73.5%)	6	3	0	9(26.5%)
Right-brain stroke (n=75)	33 (44.0%)	30	10	2	42 (56.0%)
Total (N=109)	58 (53.2%)	36	13	2	51 (46.8%)

- Severity of spatial neglect at admission adversely affected rehabilitation efficiency:

Higher KF-NAP score at admission predicted lower rate of FIM change per day over the course of inpatient rehabilitation, $\rho = -0.61$, $p < .001$, and lower rate of Barthel Index change per day, $\rho = -0.54$, $p < .001$.

- Severity of spatial neglect at admission prolonged the length of stay in the inpatient facility even after controlling for the effect of age:

Higher KF-NAP score at admission predicted longer length of stay (square-root transformed), $b = .08$, 95% CI = [.05, .10], $p < .001$, controlling for age, $b = .02$, 95% CI = [.002, .03], $p = .023$.

KF-NAP™ Examiner's Kit

For observing dressing, grooming, auditory attention, eating, and cleaning after meal

- Dressing (Category 2)
 1. Lab coat or a large button-down shirt

- Grooming (Category 3)
 2. Plastic basin
 3. Mirror with stand
 4. Grooming supplies: Hair brush, soap, paper towel

- Auditory attention (Category 6)
 5. Empty garbage can or anything safe to drop on the floor for making unexpected loud noise

- Eating (Category 9)
 6. Food tray
 7. Utensils
 8. Water and food for observing the meal

- Cleaning after meal (Category 10)
 9. Napkins





KF-NAP™ Certification Procedure

Procedure to obtain the certificate to use the Kessler Foundation Neglect Assessment Process (KF-NAP™)

Trainee: _____
 Name Signature

 Department Organization

All the check boxes have to be checked by the trainer for the trainee to reach a given level of competence.

- Trainee’s department or organization has signed the KF-NAP™ License Agreement

Level 1: Competence to administer KF-NAP™

- Observing Trainer’s administration with at least 2 patients
- Creating the environment for KF-NAP™
- Assessing the 10 functional activities in no more than one visit

Trainer: _____
 Name Signature Date

Level 2: Competence to score KF-NAP™

- Observing Trainer’s scoring on at least 2 patients
- Scoring at least 5 patients with Trainer’s supervision

Trainer: _____
 Name Signature Date

Level 3: Competence to train KF-NAP™

- Having assessed and scored at least 10 patients independently
- Creating the environment for KF-NAP™ in a novel environment (e.g., examination room)
- Completing the knowledge test with at least 90% accuracy
 (Please contact Kessler Foundation for the knowledge test)

Trainer: _____
 Name Signature Date