Handgrip Strength Assessment: A Skill to Enhance Diagnosis of Disease-related Malnutrition

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Abstract

The handgrip strength examination recommended and published by the American Society of Hand Therapists (ASHT), and also recommended by the American Society for Surgery of the Hand (ASSH), provides a standardized method for measuring a patient’s functional ability that is influenced by protein-calorie malnutrition (PCM). Handgrip, or grip strength (GS) assessment, is a clinical characteristic of adult PCM, as described in the Consensus statement of the Academy of Nutrition and Dietetics and American Society for Parenteral and Enteral Nutrition (A.S.P.E.N.) for identifying and documenting adult malnutrition (undernutrition) (1). The Centers for Disease Control and Prevention has recognized an International Classification of Diseases (ICD-CM-10) diagnosis of sarcopenia (2). Dietetics professionals can apply the methodology described by the ASHT at the patient bedside or clinic to obtain reliable measurements that can contribute to diagnosing PCM or sarcopenia. Determination of an accepted GS methodology by professional nutrition organizations can aid in efforts to align clinical practices, which can provide more objective measurements for diagnosis and for outcomes from nutrition interventions. Developing competence in GS assessment is an important basic skill that registered dietitian nutritionists (RDNs) can apply in clinical nutrition practice and research.

Introduction

Many RDNs learned of GS assessment as a method to evaluate patient functional ability from the 2012 Academy/A.S.P.E.N. Consensus statement on characteristics of adult disease-related malnutrition (1). GS is a method to assess maximal voluntary effort as a measure of a patient’s functional ability that reflects the impact of nutritional status on muscle mass and muscle function. Several publications provide enlightening discussion and review of the purpose, application, strengths, and weaknesses of GS as a nutritional status marker (3–10).

This article and an online toolkit teach GS examination methodology, practical applications, strengths and weaknesses of the examination, assessment of staff competency, interpretation of results, documentation, and opportunities for GS examination related to PCM. The toolkit is a member benefit for select dietetic practice groups and will be posted on the respective dietetic practice groups’ websites. The member benefit includes a prerecorded training webinar, supplemental materials, and other related documents and forms.

The ASHT released the third edition of Clinical Assessment Recommendations and Online Companion (11) in 2016. The ASHT book and online document outlines the validity and rationale for the ASHT grip assessment method using the Jamar® Plus+ or dial Jamar® handgrip dynamometer (Patterson Medical, Warrenville, IL) (12). This dynamometer and method is recommended by both the ASHT and the ASSH for use with adults and children because of its reliability among and between examiners and the consistency and reliability of the dynamometer itself (11). There are four types of hand dynamometers: hydraulic, pneumatic, mechanical, and strain (13). In addition, there are other methodologies, and the Academy/A.S.P.E.N Consensus (1) does not discuss or recommend a preferred approach for clinical practice or research. The ASHT methodology for the Jamar® Plus+ digital handgrip dynamometer is the focus of this article because of the precision of measurement with the digital readout and because both the dynamometers and methodology are considered the “gold standard” devices and recommended by the ASHT and the ASSH (11). Research methodology may vary and should be considered as part of the population being studied. The focus of this article is for bedside or clinical applications.

Methodology

GS measurement of maximal voluntary effort can predict physical function of the upper body using the proxy of a series of right and left handgrip strength tests with a digital or dial hydraulic handgrip dynamometer. GS correlates with upper extremity function in nutritional impairment and is used to assess overall body strength and relationships with various health issues such as nutrition status (11). The test is a measure of active muscular contraction of both intrinsic and extrinsic hand muscles (14). Specific methodology, including patient position, examiner position, procedure, and equipment technique using a calibrated dynamometer, is critical to obtain accurate results for a clinical assessment (11).

The ASHT recommends recording a rapid exchange of three alternating-hand sequential measurements, with the means (average for each hand of three alternating readings, for a total of six readings taken in prompt alternating sequence) calculated manually or read on the dynamometer. The duration of the grip should be at least 3 seconds. The dynamometer reading stops at the maximum force applied by the hand. The patient should exhale during the grip. At least 15 seconds should elapse between alternating hands, called a “rapid exchange,” to allow for recovery from muscle fatigue and to avoid patient malingering and submaximal effort (11). It is not necessary to correct for hand dominance because this effect varies substantially among users (11). Malnourished patients do not recover rapidly and, therefore, may have declining results with the test sequence of each hand.

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ASHT Grip Strength Methodology

The American Society of Hand Therapists (www.asht.org) has given permission to publish the methodology to be used with the JAMAR® and JAMAR® Plus+. See original text for more information (11). These recommendations are for these specific devices, which are considered the “gold standard.” This methodology does not apply to other dynamometers or devices.

Positioning of the Person

- The client should be in a seated position (not a standing position).
- The client should be comfortably seated in a chair without arm rests, with feet fully resting on the floor, hips as far back in the chair as possible, and the hips and knees positioned at approximately 90 degrees.
- The gripping arm should be in the following position: the shoulder adducted, the elbow flexed at 90 degrees, and the forearm and wrist in a neutral position.
- The wrist should be positioned between 0 and 30 degrees extension (dorsiflexion) and between 0 and 15 degrees of ulnar deviation. The varied ranges are recommended due to a controversy in literature regarding wrist posture.
- To avoid muscle substitution patterns and ensure shoulder adduction, it is recommended that clients hold a small block between the upper arm of the gripping hand and the lateral thorax. (Author note: in practice, this is not often done.)
- During testing, clients should be reminded to maintain their position and should be corrected as needed.

Positioning of the Dynamometer

- The second dynamometer handle position should be used.
- The dynamometer should be placed in the client’s hand by the examiner, who should gently support the base of the instrument to prevent accidental dropping.
- Grip force should be applied smoothly, without rapid wrenching or jerking motion.
- No visual or auditory feedback should be provided; thus, the dynamometer’s dial should be turned away from clients so they cannot see the display. (Author note: this step is critical for occupational therapists who assess for disability and insurance coverage; this may not be as critical for testing for malnutrition, although it is a recommended practice to avoid patient malingering.)

Instructions:

Because instructions influence performance on evaluation tests, standardized instructions have been used in research studies examining reliability and validity of grip strength testing. The ASHT has recommended the use of standardized testing instructions but has not previously provided specific instructions, with the exception of instructing the client to maximally grip the handle of the dynamometer. To ensure consistency, clients should not be coached or encouraged during grip testing and only standardized verbal directions should be given. Thus, the examiner should provide appropriate verbal instruction. Suggested standardized instructions include: “This test will tell me your maximum grip strength. When I say go, grip as hard as you can until I say stop. Before each trial, I will ask you ‘Are you ready?’ and then tell you ‘Go.’ Stop immediately if you experience any unusual pain or discomfort at any point during the testing. Do you have any questions? Are you ready? Go!” Then as the client begins to squeeze, the examiner should say: “Harder….harder…harder…Relax.” The examiner should tell the client to relax when the dial of the dynamometer levels off and starts to drop, after approximately 3 to 5 seconds of gripping.


The averages (mean) of each hand are compared to the appropriate age-sex-hand normal references range, including the age-sex-hand mean, and compared to minus two standard deviations (-2SD) below the mean. The comparison is typically made to a reference chart included in the documents that accompany the specific dynamometer equipment. For example, the chart supplied with the JAMAR® (11) has reference readings for ages 6 to 74 years. Bohannen et al (15) has completed a meta-analysis of GS data for individuals ages 75 to 99 years. Patient means (averages) that are -2SD or more beyond the mean for their age, sex, and hand may suggest severe PCM (8). Up to plus or minus (±) 2SD of the mean is considered within normal range. Patient results should be recorded, compared, and documented in the health record and factored in with other objective and subjective data for a clinical assessment. (Note: Bohannon and associates (15,16) use measures below the 95th percentile confidence interval, an interpretation that is not discussed in this article but is an alternate interpretive method typically used in research.)

Clinical Use of Grip Strength

The European Working Group includes GS as one measure for consideration of the diagnosis of sarcopenia in its consensus definition and criteria (17). The Foundation for the National Institutes of Health Biomarkers Consortium Sarcopenia Project used data (not consensus) from community dwelling elders and recommends cut-points for grip strength for application to sarcopenia (2,18). The Centers for Disease Control and Prevention recognized sarcopenia as an ICD-10-CM diagnosis code (M62.84) in October 2016 (2). Cut-points and application vary between the use of GS for PCM and for sarcopenia, and there are no international consensus criteria for sarcopenia at present. However, substantial effort is being devoted to this topic due to the significant impact of sarcopenia in international populations (16).

GS was selected as one of the clinical characteristics in the Academy/A.S.P.E.N 2012 Consensus statement due to the historic
strong presence of GS testing in literature related to PCM. In addition, the Malnutrition Workgroup for the Academy/A.S.P.E.N recognized that a functional parameter for nutrition assessment was necessary to make the nutrition-focused physical examination comprehensive (personal communication). At the time of publication of the statement, GS was considered to have a stronger literature base over other functional tests implicating PCM. GS examination is considered a realistic, inexpensive, and practical test that can be performed without patient discomfort in typical settings such as hospitals and clinics. Finally, GS does not rule out use of other examinations and tests to address patient functional ability related to nutritional status. GS may be used in conjunction with other measures of functional ability such as the sit-to-stand test or 6-minute walk (3,10).

The GS examination is noninvasive and provides objective measurements in pounds or kilograms of isometric grip force to determine normal range values or a deficit when the patient exerts maximal effort with a calibrated dynamometer. This proxy measure is related to both muscle mass and force correlated with PCM and other health-related and non-health-related variables and conditions (11). GS is not a test that independently differentiates patients who have or do not have a nutrition diagnosis of PCM (11). The Malnutrition Workgroup and authors of the Academy/A.S.P.E.N Consensus statement noted that the clinical characteristics of PCM could change with more research and with the development of improved, cost-effective measures of lean body mass and other clinical and functional measures (1). Therefore, GS, as with much of clinical nutrition practice, requires professional judgment, monitoring of individual patient trends, consideration of the validity of the information received, interpretation of objective and subjective information, an understanding of fuel metabolism and muscle function, and familiarity with disease and the nutritional impact of specific disease states.

According to the Consensus, when GS is performed, the averaged result of -2SD below the mean or beyond for age-sex-hand is an indicator of negative nutritional status and potential severe PCM in the setting of a complete nutritional assessment. Of note, the GS characteristic in the Consensus terminology, “measurably reduced,” pertains to the category of severe acute, chronic, and starvation types of PCM, not because GS should not be measured for mild or moderate PCM, but because -2SD presently only differentiates a severe level of PCM from the normal range for age, sex, and hand (1). As noted previously, results between the mean and ±2SD are “within normal range.” Reference data to differentiate moderate from mild or severe malnutrition are inadequate at present. Sequential measurements of an individual patient are also meaningful and can assist in clinical judgment. Patients with known deficits due to injury or other conditions in one or both hands and arms can still perform the examination and serve as their own “normal!” Results for use in the diagnosis of sarcopenia may differ from results and interpretation for PCM (1,18,19).

Benefits
Diagnosing PCM remains a challenge. As with much in medicine, information received from patients, family, and health care professionals and as determined in a nutrition assessment by an RDN is not often truly objective, reliable, or traceable. Professionals combine the information they are presented with as “facts,” their own professional judgment, communications with colleagues, and their learned experiences to arrive at diagnostic and clinical conclusions. GS testing aligns with this approach and is an inexpensive, uncomplicated, objective examination when conducted according to ASHT methodology (11). The characteristics described in the Consensus statement are intended for practical bedside application and may change with time. For example, progress is being made on measuring muscle mass and attenuation using computed tomography scans, bioimpedance, and other methods (20–22). However, at present, observation, palpation, and measurement of muscle mass and fat stores in a nutrition-focused physical examination remain the most available and practical means to obtain rapid data at the bedside or in the clinic to determine a reasonable nutrition assessment, nutrition diagnosis, and treatment plan.

An example of a similar clinical challenge is the assessment of food and tube feeding intake. In non-research settings, objective intake information is determined by rather subjective means. Bedside clinicians use documentation in health records, occasional calorie count information, and dietary history from patients or family members rather than a detailed computerized nutrient analysis, food aliquot nutrient analysis, or precise recordings of weighed food. Weight change is preferably measured on a calibrated scale, although both stated and estimated weights are commonly the only data available to clinicians. Considering the available data, professionals use trended measures, cross-verification, verbal reports, and their own and others’ experience and judgment to determine patient assessment. RDNs use this type of information to make nutrition diagnoses, develop nutrition interventions, and adjust their analysis and patient care plans when more objective and subjective information is obtained. At present, GS provides an opportunity for objective measurements when used consistently by trained and competent RDNs.

The Academy/A.S.P.E.N. Consensus statement recommends use of a minimum of two clinical characteristics to make the nutrition diagnosis of PCM (1), and GS results can be one of those two described characteristics. However, in practice, GS can be useful as an additional characteristic because RDNs tend to perform the test routinely or sporadically for patients in whom weight loss, poor intake, and reduced muscle mass or fat stores already is known. Such patients may be those identified as at nutritional risk, those losing large amounts of protein via drains or fistulas, or those receiving inadequate

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intake. In addition, patients with complex medical, surgical, and treatment histories who are not progressing as expected may be routine candidates for GS. GS is an option for patients who are unable to provide clear nutrition or weight histories, for those in whom there may be problems with language translation or speech difficulties, those who lack medical records, or for families or patients asking about measures for patient progress. Many health care institutions recommend documentation of as many clinical characteristics as possible to create a solid clinical case for the diagnosis of PCM and to decrease the risk of regulatory compliance audits related to coding and reimbursement.

Situations where GS findings are inconsistent or conflict with the other Consensus characteristics for PCM are not often reported in professional publications. An example of this conflict related to GS would be when all other clinical characteristics suggest a nutrition diagnosis of severe PCM but GS results are between -1 SD and -2 SD below the mean (considered within normal range). Rather than creating a perceived conflict with the diagnosis of severe PCM, such results could serve as a baseline measurement for future evaluation, contribute to the general knowledge of the patient’s condition at a specific point in time, and be used for comparison with new results. The GS findings should be documented and may be included or excluded as a clinical characteristic of PCM for a particular patient. The clinician should judge if the patient is severely or moderately malnourished based on clinical results of the entire nutrition assessment, with GS results potentially increasing, decreasing, or not influencing the coded severity of the PCM diagnosis. Declining nutritional status occurs over time, and cut-points and data do not often fit perfectly at a single point in time. Therefore, ongoing patient care, experience, clinical judgment, and repeat examination and analysis remain critical for integration of GS results into clinical practice.

Repeat GS testing depends on the health care setting, although once per week for patients in an acute-care setting is practical because it allows for intervention activities. Longer time frames in settings such as long-term care may be appropriate. Treatment clinics such as radiation oncology or eating disorder programs may find the examination useful at the beginning and end of treatment. There is value for future clinicians to see historical results when conducting their own nutritional evaluation. In all of these situations, consistent methodology is critical for meaningful clinical results and historical comparisons.

**Contraindications**

There are few contraindications to GS examination. Organizations should determine their own policy for the interval between the determination of hand injury and surgical procedures. Typically, patients are not considered injured by 8 to 10 weeks after arm or hand surgery or when released from the surgeon’s care. Testing does not exacerbate arthritis. Patients are not asked to squeeze to a painful level and are told not to squeeze if it hurts. Patients may be tested on one hand and not the other. Patients should be asked permission to have a GS examination performed, and documentation of permission is suggested, as with other procedures. Some neuromuscular, neurologic, or anatomic conditions may preclude meaningful results for nutrition purposes unless normative tables are available for that specific population (11).

GS is performed for very different purposes by occupational therapists (OTs) or physical therapists (PTs) than for nutrition assessment. In fact, GS testing may be contraindicated for patients in whom these other professionals would perform an examination. OTs and PTs usually measure trends for persons with hand or arm injuries, assess neurologic deficit patterns, and measure progress or decline. These conditions may rule out GS testing for evaluation for PCM, depending on the nature of the hand or arm injury or other deficit. Therefore, GS results reported by OTs and PTs may not be useful for nutritional purposes. For example, such results would not be useful to the RDN if the OT reported results each week immediately after shoulder, arm, or hand surgery. Verification of standardized methodology is also critical if the RDN intends to use data provided by the OT or PT. If the GS methodology is identical and the patient is appropriate, the OT or PT result could be used as the basis for charting trends.

**Future**

In this author’s opinion, a number of activities could support increased use of GS examination in clinical practice:

1. Agreement by national organizations on an accepted, standardized protocol and methodology for GS testing specific for PCM would ensure aligned practices, methodology, procedures, and results interpretation for consistency among examiners.
2. Training modules are needed for clinicians and for dietician interns and undergraduate nutrition programs to ensure a common standardized method.
3. Professional experience and application of GS examination for specific disease populations and in specific care settings of clinical nutrition practice can differentiate populations and enhance use and appropriate clinical interpretation.
4. Handgrip strength testing provides a new opportunity for patient communication, health message teaching, and connecting the impact of the patient’s nutrition intake on his or her strength, functional abilities, and recovery from illness.
5. In appropriate clinic and treatment settings, GS measurement creates an opportunity to measure pre- and post-treatment results for patient improvements or declines in functional status that may be connected to nutritional status.
6. Identification of disease-specific or setting-specific population-normalized

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Tips and Tricks

Following are practical considerations in the operational management of grip strength (GS) examinations and equipment. These tips are based on collaboration with an occupational therapist certified in hand therapy and the author’s experience in training others.

1. Assure that the dynamometer is set to pounds (typical in the United States) or kilograms. Assure that the pounds or kilogram reference norms chart matches the dynamometer setting and are for the correct sex and hand. Sarcopenia measures may be kilograms or pounds, so be aware of the pounds or kilogram setting on the digital dynamometer and the area read on the dial dynamometer.

2. Monitor (or “spot”) the patient to make sure the arm remains at 90-degree angle and does not push forward or angle outward during the grip. If patient is frail, the examiner may want to keep a hand under the dynamometer or have the patient wear the hand strap to avoid dropping it and injuring the patient or examiner.

3. Completion of a worksheet before meeting with the client allows for easy and accurate referencing of normal results for the correct age, sex, and hand. A worksheet is included in the toolkit.

4. Typically, a patient who can benefit from the GS examination will have been in discussion with the registered dietitian nutritionist about his or her nutritional status and diet or have undergone a nutrition-focused physical examination for fat, muscle, and micronutrient assessment. It can be useful or appropriate to talk with the patient about GS during the course of other discussions and make an appointment for examination at another time as a separate event. The examiner can reflect on that discussion at the time of the test. Example: “We have been chatting about your nutrition and working to improve your diet and strength. Do you recall I mentioned we can have you complete a handgrip strength test? Is now a good time for me to get a baseline measure?”

5. Assure that rehabilitation or other physical event does not occur before the time of the examination, which can confound results due to previous muscle use or exhaustion.

6. Have writing utensils and paper at hand during the examination.

7. Ask permission and consider documenting others present for the examination.

8. Route newly purchased equipment through biomedical engineering for approval and item code labels before releasing it for use to clinicians. Some engineering departments may affirm that annual calibration may not be necessary and that calibration may be performed in-house rather than annually mailing to manufacturer. An approach to verify the best approach with your biomedical engineering department to periodically calibrate the equipment internally may be appropriate given the inherent risk in mailing and costs of recalibration with the manufacturer.

9. Testing approaches and culture vary among health systems, geographic locations, and clinicians. The author has found that patients enjoy the experience and are highly engaged in learning their results, which provides an excellent opportunity to teach about the relationships between diet, strength, and healing. A partnership approach, rather than a distant attitude in the person conducting the examination, is conducive to learning and can help motivate patients to improve their diets and reflect on progress being made in healing due to improved intake. Conducting the examination at eye level rather than having the examiner stand, looking down upon the patient, is a positive and professional approach. Separate any teaching from the actual examination to retain objectivity.

10. Report results to the patient thoughtfully. Examples:

   “This gives us a good baseline measure today. You are toward the low end of the normal range (a bit low, low, within normal, above the normal, etc.). You are working hard to eat the snacks and meals we have set up, so you’re on the right track.”

   “I will take the results of the test today and put them together with some other results for my evaluation. We have a good plan in place for your nutrition, so we will work on that, and we can take another measure next week.”

11. Greet the patient and introduce yourself. Upon completion of the examination, thank the patient and any family members present.

12. When setting up the patient for the examination, ensure that he or she is seated safely and will not slide off the side of the bed. Patients can be positioned in bed, with the back of the bed elevated to as close to 90 degrees as able and legs straight out front; sit on the side of the bed straight up with feet on floor; or sit in a chair straight up as possible, with feet on the floor. Pillows can be used behind the patient’s back. Examiners may need assistance from another person such as a nurse to verify a safe position for the patient.

13. Some digital dynamometers auto-calculate the mean of the three measures on each hand. However, we recommend setting the dynamometer for four right hand/left hand tests, manually recording each measure, and then manually calculating the average for each hand. If the dynamometer is set to three right hand/left hand measures, and the client or tester fumbles and causes a misread, that result would not be useable but could be included in the auto-calculation, thus distorting the true result. The dynamometer may have the ability to exclude a reading, but resetting and adjusting can delay the examination and easily confuse the examiner on the timing and pattern of the hand sequence exchange.

14. At the first measurement, clients are naive to the test. Holding and handling the dynamometer and demonstrating correct positioning can increase patient familiarity and reduce hesitancy to encourage maximal grip effort. Let the client hold and slightly squeeze the dynamometer to see how it does not move and feel the weight in the hand. However, the client should not squeeze with power because that uses muscle and fuel, thereby affecting true results. If squeezes improve with the three tests on a hand, the client likely has gained confidence or wanted to perform for the examiner or audience. This is one reason that three measures and the mean on each hand are recommended by the American Society of Hand Therapists. The problem is not evident after the first examination event because the patient is no longer naive to the methodology or dynamometer.

15. Pack an extra set of batteries and sanitary wipes in the case holding the equipment. Clean the dynamometer in the presence of the client, using an approved sanitary wipe, before starting and after completing the examination.

16. Keep a copy of the reference set of norms and worksheets in the case with the equipment. If more than one dynamometer is in the office, make sure they reside in the correctly labeled cases that were authorized by the biomedical engineers.

17. The movable handle on the Jamar® Plus® and Jamar® dial dynamometers should be at the second slot position from the long side. Rarely, a very small-handed person or a very large-handed person may require the handle to be at the first or third position setting, respectively. Such positions are very rarely needed; most persons even of small or large hand size hold the dynamometer correctly at the second setting. Moving the handle repeatedly may not be ideal for dynamometers because screws are involved in handle positioning. The hand position should not involve holding on with the fingertips or the hand wrapping so far around the handle that the fingers and hand touch.

18. Often health care organizations have contracts for rehabilitation equipment that can reduce the cost of the unit over buying online. Some manufacturers offer volume discounts. Check with the buyer of rehabilitation equipment for any potential contracted price benefit.

obtain reliable measurement results that can use the methodology at the bedside to according to two professional groups. RDNs ICD-10-CM diagnosis of sarcopenia, potentially a consideration in the identifying and documenting adult Academy/A.S.P.E.N.

Academy/A.S.P.E.N. adult PCM, as described in the assessment is a clinical characteristic of ability that is influenced by PCM. GS

Summary
The ASHT method for GS of maximal voluntary effort provides a standardized approach to measure a patient’s functional ability that is influenced by PCM. GS assessment is a clinical characteristic of adult PCM, as described in the Academy/A.S.P.E.N. Consensus statement for identifying and documenting adult malnutrition (undernutrition) and is potentially a consideration in the ICD-10-CM diagnosis of sarcopenia, according to two professional groups. RDNs can use the methodology at the bedside to obtain reliable measurement results that can contribute to making a nutrition diagnosis of PCM or sarcopenia.

Determination of accepted methodology by national professional organizations should benefit efforts to align clinical practices, move forward both patient care and research related to the diagnosis of PCM and sarcopenia, and provide more objective measurements of outcomes from nutrition intervention. RDN competence in GS assessment is an important skill to apply in clinical nutrition practice.

CPEU questions for this article can be accessed at dnsdpg.org.

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References

Online Access to Toolkit
Dietetic Practice Groups (DPGs) of the Academy of Nutrition and Dietetics are planning to provide online access to a prerecorded webinar, in-depth program materials, practice forms, and group training materials as a member benefit. Monitor announcements and newsletter messages from these DPGs to learn when access to the toolkit is open to members.

- Dietitians in Nutrition Support and affiliated groups https://dnspdg.org and www.nutritioncare.org
- Clinical Nutrition Management http://www.cnmdpg.org/
- Oncology Nutrition http://www.oncologynutrition.org/
- Medical Nutrition Practice Group http://www.mpngdpdg.org/
- Healthy Aging http://www.hadpg.org/

DPG members are encouraged to use the resources in the toolkit to self-train in small groups to reach competency and apply grip strength examination in clinical practice as well as teach future Registered Dietitian Nutritionists and Nutrition and Dietetic Technicians Registered these skills. Such training can aid in improving the identification, documentation, diagnosis, and prompt intervention of patients with protein-calorie malnutrition.

Three continuing professional education credit hours have been applied for from the Commission on Dietetic Registration for completion of the entire program.