

Supplemental Digital Content

Defining and validating criteria to identify populations who may benefit from home-based primary care

Supplemental Figures:

Figure 1s. Derivation of Validation Cohort using the 2011-2017 Waves of the National Health and Aging Trends Study (NHATS)

Supplemental Methods:

eMethods 1. RedCap Questionnaire MDP Round 1

eMethods 2. RedCap Questionnaire MDP Round 2

eMethods 3. RedCap Follow-up Poll MDP Round 4

Supplemental Tables:

Table 1s. Definitions and Data Sources of Potential and Chosen Criteria for Defining Home-Based Primary Care (HBPC) Target Populations

Table 2s. Panelist Survey Responses and Rankings of Potential HBPC Criteria

Table 3s. Preliminary Analyses for Focus Group Discussion of Potential HBPC Criteria

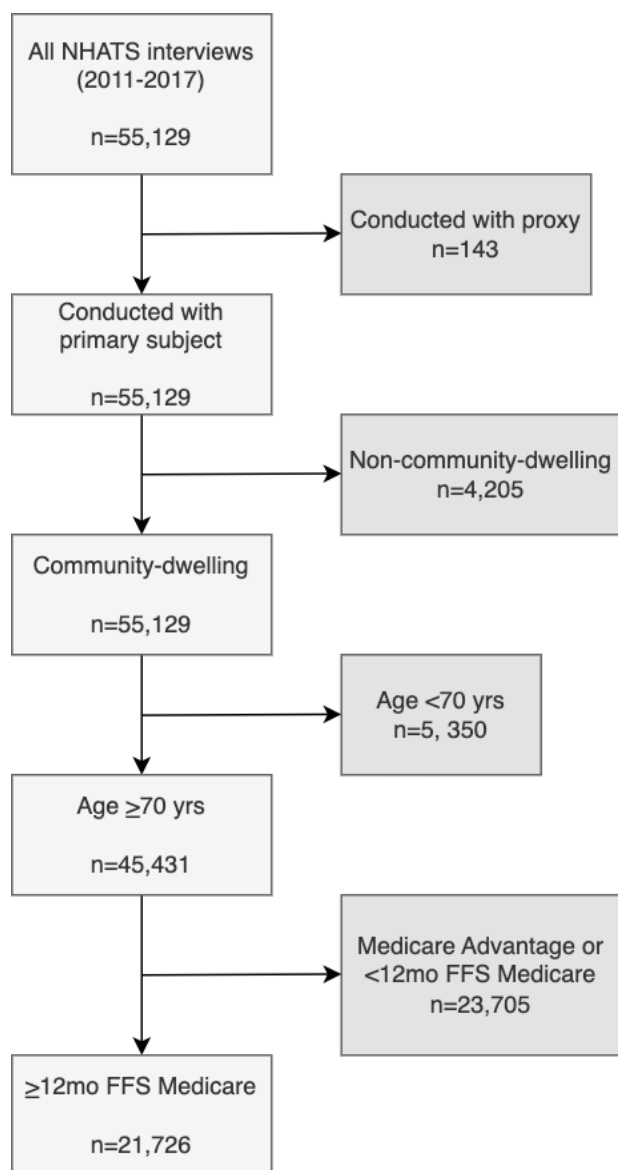
Table 4s. Summary of Focus Group Discussion

Table 5s. International Classification of Diseases (ICD-10) Codes Used to Define Criteria

Table 6s. International Classification of Diseases (ICD-9) Codes Used to Define Criteria

Table 7s. Characteristics of Home-Based Primary Care (HBPC) Working Group Members Participating in Modified Delphi Process (MDP)

Figure 1s. Derivation of Validation Cohort using the 2011-2017 Waves of the National Health and Aging Trends Study (NHATS)



The validation cohort was derived from the 2011-2017 waves of the National Health and Aging Trends Study (NHATS). We excluded interviews conducted with a proxy rather than the primary subject. Community-dwelling NHATS respondents included those who were living in residential or domiciliary settings (*e.g.*, assisted living facilities) and excluded those who were institutionalized (*e.g.*, long-term care or skilled nursing facilities). The validation cohort was further narrowed to those age ≥ 70 who had at least 12 months of continuous Fee-for-Service (FFS) Medicare coverage, representing 21,726 person-years of observation.

eMethods 1. Sample of Questionnaire Used in Modified Delphi Process Round 1

This is a research study in which we aim to get feedback from health system stakeholders and experts, such as yourself. Our study protocol has been reviewed by the Massachusetts General Brigham IRB. ***In the study, we will use a modified Delphi process to identify criteria that indicate a patient's need for home-based primary care (HBPC).*** Your input on this matter will be invaluable for future analyses of HBPC availability and efficacy.

This study will be conducted online in **3 distinct phases**, spread out over the course of a couple months. The first two phases will be **online questionnaires**, expected to take **approximately 20 minutes and 15 minutes**, respectively. The third phase will be a **1-hour (online) discussion forum** with other study enrollees. We aim to enroll approximately 30 panelists (minimum 20, maximum 50).

Your responses to the questionnaires will be de-identified and stored on an encrypted device behind a secure firewall. There are not thought to be any risks of participation in this study. Your participation is voluntary, and you can withdraw from the study at any time by emailing Maggie Salinger, MD, MPP at msalinger@mgh.harvard.edu.

We greatly appreciate your contributions to this effort. Unfortunately, we do not have funds to fully compensate participants, but we will be conducting a lottery drawing for three, \$25 Amazon gift cards at each round of the modified Delphi process.

Do you agree to participate?

MDP Round 1 Questionnaire

- ☐ Yes
☐ No

Thank you for your participation.

In this survey, we are defining home-based primary care (HBPC) as longitudinal outpatient care in the home setting that is billable through Medicare Part B and, at minimum, is provided by physicians, nurse practitioners, or physician assistants.

(In other words, HBPC does NOT include skilled home health services, personal health aides, podiatry, or hospital-at-home programs.)

We would like to hear from you about the ways in which you think HBPC can improve care delivery and quality.

Please rank these HBPC benefits from MOST important (1) to LEAST important (6)

| (One selection allowed per column) | 1 MOST important | 2 | 3 | 4 | 5 | 6 LEAST important |
|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------------|
| Improving access to care * | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Supporting unpaid caregivers * | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> reset |
| Identifying & mitigating environmental hazards (e.g., risk of falls) * | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> reset |
| Identifying & addressing social needs (e.g., food insecurity, isolation) * | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> reset |
| Lowering healthcare costs * | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> reset |
| Optimizing chronic disease management * | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> reset |

Please share why you selected the MOST important HBPC benefit to be "improving access to care."

Expand

Please share why you selected the LEAST important HBPC benefit to be "optimizing chronic disease management."

Expand

Now, we would like to get your input on the types of patients who might need or benefit from HBPC services. We will show you 21 patient criteria in total and will ask you to indicate how beneficial you think HBPC could be for the sub-populations described.

Note: Even if your own health system does not routinely collect or record these criteria, that is okay; the data sources that we often use for research can provide all of the information needed to define these criteria.

For patients meeting each the following descriptions, please state how beneficial you think it could be for them to receive in-person, longitudinal primary care at home.

This Likert scale question with space for free-response was asked of each potential criterion.

Currently completely or mostly homebound
In the past month, left home \leq 1 day/week

- ☐ Extremely beneficial
☐ Very beneficial
☐ Potentially beneficial
☐ Unlikely beneficial
☐ Not at all beneficial

reset

Comments, questions, suggestions? (Optional)

Please select and rank which five criteria you think are the best. (1= BEST)

(One selection allowed per column)

| | 1 (BEST) | 2 | 3 | 4 | 5 | |
|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-------|
| Receiving 40+ hrs/wk of unpaid caregiver support | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | reset |
| Currently completely or mostly homebound | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | reset |
| Persistently homebound | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | reset |
| Semi-homebound - requires assistance to leave home | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | reset |
| Moderate to severe dementia | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | reset |
| Enrolled in home hospice | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | reset |

The above grid included all criteria that a panelist had rated as "extremely," "very," or "potentially" beneficial.

Are there any additional criteria that we should consider in our efforts to identify a population that would benefit from home-based primary care (HBPC)?

Please tell us a bit about yourself.

Which of the following best describes your role(s) or your area(s) of expertise? (Please select all that apply.)

- ☐ Patient care -- home-based setting
- ☐ Patient care -- hospital or clinic setting
- ☐ Hospital system administration or executive
- ☐ Health insurance administration or executive
- ☐ Health services research
- ☐ Health policy analysis or advising
- ☐ Care coordination, case management, or social work
- ☐ Other

Which of the following best describes your place of work or the institution(s) with which you are affiliated? (Please select all that apply.)

- ☐ Veterans Health Administration
- ☐ Public insurer
- ☐ Private insurer
- ☐ Academic medical center or department
- ☐ Community-based medical center
- ☐ Government agency or office (other than VHA)
- ☐ Other

What is your gender?

- ☐ Male
- ☐ Female
- ☐ Gender expansive / non-binary
- ☐ Trans male
- ☐ Trans female
- ☐ Other
- ☐ Prefer not to say

[reset](#)

Which of the following best describes your race?

- ☐ Asian
- ☐ Black or African American
- ☐ White
- ☐ Native Hawaiian or Pacific Islander
- ☐ American Indian or Alaskan Native
- ☐ Other
- ☐ Prefer not to say

[reset](#)

Do you identify as Hispanic or Latino/a?

- ☐ Yes
- ☐ No

[reset](#)

What region of the US are you working in?

- ☐ Northeast
- ☐ Midwest
- ☐ South
- ☐ West

[reset](#)

Thank you for your continued participation in this study.

MDP Round 2 Questionnaire

In Round 1, we advanced the following 5 criteria:

- 1) Qualifying for "Independence At Home" (IAH), CMS demonstration
- 2) Receiving >40hrs/wk of unpaid caregiver support
- 3) Moderate-to-severe dementia
- 4) Currently completely or mostly homebound
- 5) Persistently completely or mostly homebound

In Round 2, try to think about ideal criteria for health systems and policy makers to apply as they determine which types of patients could benefit from home-based primary care. We can consider the constraints or practicalities of these ideal criteria at a later timepoint.

We also need to eliminate criteria that are thought to be "too broad" and/or "too narrow." The goal is to winnow down this list to 8 or fewer criteria.

Criteria were either new, modified, or combined criteria from round 1 were presented in this round using purple boxes. Criteria carried over from round 1 without changes were presented in blue boxes. Unless the criteria were new or combined, round 2 presented the proportions of round 1 responses that were "extremely/very" vs. "unlikely/not-at-all" beneficial.

Recertification of home health episode

PT required more than the allotted 60 days of home health, as indicated by a recertification (i.e., a second episode).

(The basis of payment for the Medicare Part A home health benefit is a 60-day episode, during which a patient may receive speech-language pathology, PT, OT, skilled nursing, aide, &/or medical social services)

Comments, questions, suggestions? (Optional)

☐ Extremely beneficial
☐ Very beneficial
☐ Potentially beneficial
☐ Unlikely beneficial
☐ Not at all beneficial

reset

Hoyer lift or hospital bed

(Note this criterion was modified; based off round 1 feedback, we removed home O2.)

Extremely/Very Beneficial: 59%

Unlikely/Not At All Beneficial: 4%

Comments, questions, suggestions? (Optional)

☐ Extremely beneficial
☐ Very beneficial
☐ Potentially beneficial
☐ Unlikely beneficial
☐ Not at all beneficial

reset

Semi-homebound; requires personal assistance to leave home

In the past month, did leave home more than 1 day/week but never left home without personal assistance

Extremely/Very Beneficial: 59%

Unlikely/Not At All Beneficial: 4%

Comments, questions, suggestions? (Optional)

☐ Extremely beneficial
☐ Very beneficial
☐ Potentially beneficial
☐ Unlikely beneficial
☐ Not at all beneficial

reset

Please select and rank which five criteria you think are the best. (1= BEST)

| (One selection allowed per column) | 1 (BEST) | 2 | 3 | 4 | 5 |
|---|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Serious illness (ICD-10) + Semi-homebound | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Graduated from hospice | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Non-healing wound (e.g. stage 4 sacral decubitus ulcer) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Received community-initiated home health in the past year | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Functional impairments | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Receiving meals on wheels | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Please select (up to) five criteria you would eliminate

| (One selection allowed per column) | 1 | 2 | 3 | 4 | 5 |
|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Functional impairments + Semi-homebound | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Functional impairments + Wheelchair or scooter use | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Home health recertification | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Hoyer lift or hospital bed | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Semi-homebound, requires personal assistance to leave home | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Semi-homebound, reports difficulty leaving home | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| ED visit but NO outpatient visit in the past year | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

| | |
|--|-------------------------------|
| <p>Are there any additional criteria that we should consider in our efforts to identify a population that would benefit from home-based primary care (HBPC)?</p> | <div></div> <div>Expand</div> |
|--|-------------------------------|

eMethods 3. Modified Delphi Process Round 4 Follow-Up Poll

Due in-part to under-reporting of pressure wound stage with ICD-9 codes, the numbers were too low to publish for participants with stage IV wound PLUS either ADL impairments or serious illness.

- ☒ YES - stage iv wound should be a stand-alone criterion
- ☐ NO - stage iv wound should be combined with either ADL impairments or serious illness

MDP Round 4 Follow-Up Poll

Do you think that a stage IV pressure wound should be a stand-alone criterion for receiving home-based primary care?

This RedCap poll was sent to panelists in the final round of the modified Delphi process to determine placement of stage IV pressure ulcer in the final HBPC algorithm.

Supplemental Table 1s. Definitions and Data Sources of Potential and Chosen Criteria for Defining Home-Based Primary Care (HBPC) Target Populations

| Shorthand Name | Criteria Summary | Data Source ¹ | Detailed Description |
|--------------------------------|---|--------------------------|---|
| IAH Eligible | Meeting criteria for 'Independence at Home' (IAH) demonstration program | Claims | The Center for Medicare & Medicaid Innovation defined eligibility for the IAH demonstration program as: non-elective hospitalization & home health or skilled nursing facility use & > 2 chronic conditions ² & dependent in > 2 ADLs ³ |
| Unpaid Caregiver Support | Receiving ≥40 hrs/wk of unpaid caregiver support | NHATS | n/a |
| Mod-Severe Dementia | Moderate-to-severe dementia | NHATS | Patient- or proxy-reported diagnosis OR > 2 cognitive interview impairments & difficulty with >1 ADLs ³ & > 1 iADL ⁴ OR AD-8 ⁵ score >3. |
| Currently Homebound | Currently completely or mostly homebound | NHATS | Reported that, in the past month, patient had left home ≤1 day/wk |
| Persistently Homebound | Persistently completely or mostly homebound | NHATS | On 2 consecutive annual assessments, reported that, in the past month, patient had left home ≤1 day/wk |
| Hoyer Lift / Hospital Bed | Use of Hoyer lift or hospital bed documented in claims data | Claims | Healthcare Common Procedure Coding System: Hoyer lift - E0630, E0635, E0649, E0640. Hospital bed - E0250, E0251, E0290, E0328, E0255, E0256, E0292, E0293, E0260, E0261, E-0294, E0295, E0329, E0301, E0302, E0303, E0304 |
| Hospice Discharge | Discharged from hospice | Claims | Discharged (alive) from hospice because patient remained alive after 6 months of hospice enrollment. |
| Stage IV Ulcer | Stage IV pressure ulcer | Claims | ICD-9: 70724, ICD-10: L89 |
| HH Recert | Home health (HH) recertification | Claims | Recertification of home health episode because patient required more than the allotted 60 days of home health. (Additional episode within 14 days of prior episode.) |
| Semi-Homebound (assistance) | Semi-homebound, needs assistance | NHATS | In the past month, did leave home more than 1 day/week but never left home without personal assistance |
| Semi-Homebound (difficulty) | Semi-homebound, difficulty leaving home | NHATS | In the past month, did leave home more than 1 day/week but reported difficulty doing so |
| ED Visit, No Outpatient Visit | Emergency department visit in past month but no outpatient visit in past yr | Claims | Outpatient visits using revenue center codes 0980 or 0450 to 0457 |
| Serious Illness (claims-based) | Serious Illness | Claims | ICD ¹ codes indicating > 1 of the following: metastatic or hematologic malignancy; CKD ⁶ stage 5 or ESRD ⁷ ; advanced liver disease or cirrhosis; diabetes + severe complication; ALS ⁸ or other neurodegenerative disease; AIDS ⁹ ; hip fracture; dementia; COPD ¹⁰ or ILD ¹¹ or CHF ¹² requiring home oxygen or hospitalization |
| Serious Illness (self-report) | Serious Illness, Self-report | NHATS | Self report of > 5 of the following: heart attack; heart disease (including angina & CHF ¹²); hypertension; arthritis; osteoporosis; diabetes; lung disease; stroke; dementia or Alzheimer disease; cancer; depression; anxiety; broken or fractured hip |
| Serious Mental Illness | Serious mental illness | Claims | Diagnosis of schizophrenia or schizoaffective disorder, bipolar disorder, major depression, &/or post-traumatic stress disorder PLUS >1 psych-related hospitalization or ED visit in the past year |
| Charlson | Charlson co-morbidity index ¹³ > 5 | NHATS | n/a |
| Frailty | Frailty ¹⁴ | NHATS | Physical frailty phenotype, meeting 3 of 5 criteria: exhaustion, low physical activity, weakness, slowness, shrinking |
| ADL Impairments | Impaired in >2 ADLs | NHATS | Activities of daily living include bathing or showering, dressing, getting in and out of bed or chair, walking, toileting, and eating |
| Wheelchair/Scooter | Wheelchair or scooter use in past month | NHATS | n/a |
| Transpo Barrier | Transportation barrier | NHATS | Unable to participate in social activities in past month due to transportation issue |
| HH Episode ¹⁵ | Home health (HH) episode | | Received >1 episode of skilled home health care in past year |
| HH Recert | Home health recertification | Claims | Recertification of home health episode because patient required more than the allotted 60 days of home health. |
| HH Community-Initiated | Received community-initiated home health in the past year | Claims | The referral for home health did not occur while the patient was hospitalized or in a long-term care facility. |
| Meals on Wheels | Receiving Meals on Wheels | NHATS | n/a |
| Home Hospice | Enrolled in home hospice | Claims | n/a |

1. Criteria were defined using the National Health and Aging Trends Study (NHATS) and/or Medicare claims data. Claims spanned the transition from version 9 codes to version 10 codes for the International Classification of Diseases (ICD). **Supplemental Table 5s** **Supplemental Table 6s** list relevant ICD-10 and ICD-9 codes, respectively.
2. Beneficiary chronic conditions were determined using CCW, the Chronic Conditions Data Warehouse (CCW) through the Centers for Medicare and Medicaid Services¹
3. Activities of daily living
4. Instrumental activities of daily living
5. AD-8 is a screening tool for dysfunction in memory, orientation, judgment, function.²
6. Chronic kidney disease
7. End stage renal disease
8. Amyotrophic lateral sclerosis
9. Acquired immunodeficiency syndrome
10. Chronic obstructive pulmonary disease
11. Interstitial lung disease
12. Congestive heart failure
13. Charlson comorbidity index is used to predict ten-year mortality for patients with multiple comorbidities.^{3,4}
14. Frailty was based upon Bandeen-Roche K *et al*'s classification using NHATS data.⁵ Exhaustion was determined by self-report of low energy or being easily exhausted enough to limit activities. Low physical activity was self-report of not participating in walking or vigorous activities. Presence of shrinking was determined by self-reported height and weight with corresponding BMI < 18.5 kg/m² or by unintentional 10lb weight loss in the past year. Low walking speed was defined as having a usual-pace walking trial (first of two) that was < 20th percentile of the weighted population distribution within four sex-by-height categories. Weakness was defined by having a maximum hand grip strength (dominant hand) < 20th percentile within eight sex-by-BMI categories. If participants were not tested (e.g., due to pain, incomplete attempt, etc.), then they were scored as a zero.
15. The basis of payment for the Medicare Part A home health (HH) benefit is a 60-day episode, during which a patient may receive speech-language pathology, physical therapy, occupational therapy, skilled nursing, aide, &/or medical social services.

For the modified Delphi process, the following criteria were also evaluated as pairs in the round 2 questionnaire: Serious Illness (ICD) + Transpo Barrier; ADL Impairments + Transpo Barrier; Serious Illness (ICD) + Semi-Homebound (either subtype); ADL Impairments + Semi-Homebound (either subtype); ADL Impairments + Wheelchair/Scooter Use.

Note that preliminary analyses that were conducted prior to the focus group (part of the modified Delphi process) applied a different definition of Serious Mental Illness; due to timing constraints, a simpler and broader NHATS-based definition was used.

Citations for Supplemental Table 1s.

1. Chronic Conditions Data Warehouse. Accessed September 18, 2023. <https://www2.cdwdata.org>
2. Hendry K, Green C, McShane R, et al. AD-8 for detection of dementia across a variety of healthcare settings. *Cochrane Database Syst Rev*. 2019;3:CD011121. doi:10.1002/14651858.CD011121.pub2
3. Charlson ME, Pompei P, Ales KL, MacKenzie CR. A new method of classifying prognostic comorbidity in longitudinal studies: development and validation. *J Chronic Dis*. 1987;40(5):373-383. doi:10.1016/0021-9681(87)90171-8
4. Quan H, Li B, Couris CM, et al. Updating and validating the Charlson comorbidity index and score for risk adjustment in hospital discharge abstracts using data from 6 countries. *Am J Epidemiol*. 2011;173(6):676-682. doi:10.1093/aje/kwq433
5. Bandeen-Roche K, Seplaki CL, Huang J, et al. Frailty in Older Adults: A Nationally Representative Profile in the United States. *J Gerontol Ser A*. 2015;70(11):1427-1434. doi:10.1093/gerona/glv133

Supplemental Table 2s. Panelist Survey Responses and Rankings of Potential Home-Based Primary Care (HBPC) Criteria

| Potential Criteria | Rated very / extremely beneficial ¹ (%) | Ranked top 5 ² | Rank value ² (max=5) (mean) | Weight value ³ | Weighted very / extremely beneficial rating ⁴ (%) | Rated unlikely / not at all beneficial ¹ (%) | Voted to remove ⁵ (%) |
|---|--|---------------------------|--|---------------------------|--|---|----------------------------------|
| IAH ⁶ Eligible | 96.6 | 19 | 4.3 | 3.8 | 368.7 | 0.0 | n/a |
| Receiving ≥40 hrs/wk of Unpaid Caregiver Support | 75.9 | 17 | 2.6 | 2.5 | 191.6 | 0.0 | n/a |
| Moderate-to-Severe Dementia | 89.7 | 21 | 2.6 | 2.9 | 258.6 | 0.0 | n/a |
| Currently Completely or Mostly Homebound | 86.2 | 19 | 4.2 | 3.8 | 323.4 | 0.0 | n/a |
| Persistently Completely or Mostly Homebound | 96.6 | 19 | 3.4 | 3.2 | 311.8 | 0.0 | n/a |
| Serious Illness + Transportation Barrier | 76.9 | 18 | 2.2 | 2.5 | 194.0 | 0.0 | 0.0 |
| Hoyer Lift / Hospital Bed | 92.3 | 15 | 2.3 | 2.3 | 214.8 | 0.0 | 3.8 |
| ADL ⁷ impairments + Transportation Barrier | 42.3 | 6 | 2.8 | 1.6 | 69.6 | 3.9 | 3.8 |
| Serious Illness + Semi-Homebound | 61.5 | 11 | 2.4 | 2.0 | 123.9 | 7.7 | 0.0 |
| ADL ⁷ impairments + Semi-Homebound | 53.9 | 8 | 2.1 | 1.6 | 88.7 | 0.0 | 0.0 |
| ADL ⁷ Impairments + Mobility Impairments | 26.9 | 0 | 0.0 | 1.0 | 26.9 | 7.7 | 3.8 |
| Hospice Discharge | 57.7 | 11 | 2.6 | 2.1 | 121.2 | 0.0 | 11.5 |
| Stage IV Pressure Ulcer | 50.0 | 5 | 2.8 | 1.5 | 76.9 | 0.0 | 19.2 |
| Home Health Recertification | 50.0 | 4 | 3.0 | 1.5 | 73.1 | 7.7 | 11.5 |
| Semi-Homebound, Needs Assistance | 65.4 | 7 | 3.9 | 2.1 | 134.1 | 11.5 | 7.7 |
| Semi-Homebound, Difficulty Leaving Home | 26.9 | 4 | 3.5 | 1.5 | 41.4 | 3.9 | 3.9 |
| ED Visit Past Month, No Outpatient Visit Past Year | 26.9 | 4 | 4.3 | 1.7 | 44.7 | 19.2 | 30.8 |
| Serious Illness, Claims-Based | 30.8 | 1 | 4.0 | 1.2 | 35.5 | 11.5 | 19.2 |
| Serious Illness, Self-Report | 30.8 | 0 | 0.0 | 1.0 | 30.8 | 11.5 | 26.9 |
| Serious Mental Illness | 34.6 | 6 | 4.5 | 2.0 | 70.5 | 19.2 | 34.6 |
| Charlson Co-Morbidity Index > 5 | 38.5 | 5 | 4.0 | 1.8 | 68.1 | 19.2 | 34.6 |
| Frailty | 69.2 | 10 | 3.8 | 2.5 | 170.3 | 3.9 | 7.7 |
| ADL ⁷ Impairments | 38.5 | 4 | 3.3 | 1.5 | 58.0 | 0.0 | 15.4 |
| Wheelchair / Scooter Use | 3.9 | 0 | 0.0 | 1.0 | 3.9 | 19.2 | 50.0 |
| Transportation Barrier | 19.2 | 0 | 0.0 | 1.0 | 19.2 | 34.6 | 23.1 |
| Home Health Episode | 15.4 | 0 | 0.0 | 1.0 | 15.4 | 30.8 | 65.4 |
| Received Community-Initiated Home Health | 15.4 | 0 | 0.0 | 1.0 | 15.4 | 23.1 | 34.6 |
| Receiving Meals on Wheels | 7.7 | 0 | 0.0 | 1.0 | 7.7 | 19.2 | 42.3 |
| Home Hospice Enrollment | 34.6 | 3 | 4.3 | 1.5 | 51.8 | 30.8 | 26.9 |

Members of The Home-Based Primary Care (HBPC) Working Group (n=29) participated in a modified Delphi process (MDP) to define criteria for defining HBPC target populations. After 2 rounds of online RedCap questionnaires, Delphi panelists were presented with this table to inform an in-depth focus-group discussion. Detailed criteria definitions are presented in **Supplemental Table 1s**.

- In the MDP, a threshold of ≥70% survey responses for either “very/extremely beneficial” or “unlikely/not-at-all beneficial” was used for criteria advancement or elimination, respectively. In the first MDP round, 5 criteria met the threshold for advancement (listed in the top 5 rows: “Meeting IAH Criteria” through “Persistently Completely or Mostly Homebound”). Since these five criteria were advanced from the first MDP round, they only represent aggregated responses from the initial questionnaire. The remaining rows present aggregated survey response data from the second questionnaire. In the second MDP round, 2 criteria met the threshold for advancement (listed in rows 6 and 7: “Serious Illness+ Transportation Barrier” and “Hoyer Lift/Hospital Bed”). In both MDP rounds, there were zero criteria that met the threshold for elimination based on the Likert scale ratings.
- In both the first and second round questionnaires, panelists were asked to rank the 5 best criteria. The mean rank values in this table were reverse coded so that higher = better; 5=maximum.
- The calculations for weight value use a denominator of 29 for the criteria that were advanced from MDP round 1 questionnaire and 26 for those that were derived from the MDP round 2 questionnaire responses. (This was based off the number of HBPC working group members who responded to each round of the questionnaire.) The weight values were derived from the following calculation, which was then added to 1: the number of times a criterion was ranked in the top 5 times the mean rank value (reverse coded) and divided the total number of panelist survey responses. For example, the weight value for the IAH criterion in row 1 is calculated by $1 + (4.3 \times 19 / 29) = 3.8$.
- The weight values were multiplied by the proportion of times panelists labeled a criterion as “very / extremely” beneficial.
- In the MDP round 2 questionnaire, panelists were asked to select up to 5 criteria that they would eliminate. This question used a threshold of ≥70% votes for criteria elimination, similar to the Likert scale threshold. No criteria met this threshold.
- Independence at Home (IAH)
- Activities of Daily living (ADL)

Supplemental Table 3s. Preliminary Analyses for Focus Group Discussion of Potential Home-Based Primary Care (HBPC) Criteria

| Total Validation Cohort ¹ (n unweighted/ n weighted population estimate) | Female (n/%) | Race/ Ethnicity ² (n/%) | | | Marital Status ³ (n/%) | | Age Category (n/%) | | | | | Household Income ⁴ \$/yr (mean/SD) | Mortality estimate ⁵ (n/%) |
|---|--------------|------------------------------------|--------------------|------------------|-----------------------------------|-------|--------------------|-----------|-----------|-----------|---------|---|---------------------------------------|
| | | White Non-Hispanic | Black Non-Hispanic | Hispanic + Other | Married + Partnered | Other | 70-74 yrs | 75-79 yrs | 80-84 yrs | 85-89 yrs | 90+ yrs | | |
| US Population Age ≥ 65, 2021 ACS ⁶ | | | | | | | | | | | | | |
| 55.9M | 54.9 | 75.6 | 9.2 | 9.0 | 56.3 | 43.7 | median =73 yrs | | | | | 64,000 in 2018 | n/a |
| IAH ⁷ Eligible | | | | | | | | | | | | | |
| 908 | 618 | 584 | 229 | 95 | 282 | 626 | 73 | 124 | 196 | 229 | 286 | 37,172 | 265 |
| 3,870,377 | 66.9 | 78.5 | 10 | 11.5 | 36.9 | 63.1 | 11.9 | 18 | 23 | 23.2 | 23.9 | 68,284 | 27 |
| Receiving ≥40 hours/week of Unpaid Caregiver Support | | | | | | | | | | | | | |
| 2,841 | 1451 | 1719 | 798 | 324 | 1533 | 1308 | 385 | 556 | 642 | 657 | 601 | 46,930 | 421 |
| 12,264,395 | 46.1 | 74.9 | 11.6 | 13.5 | 64.35 | 35.7 | 20.8 | 24 | 22.1 | 18.9 | 14.3 | 88,760 | 12 |
| Moderate-to-Severe Dementia | | | | | | | | | | | | | |
| 1,596 | 1080 | 926 | 459 | 211 | 480 | 1116 | 88 | 153 | 316 | 432 | 607 | 35,743 | 441 |
| 6,230,622 | 64.5 | 73.1 | 11.2 | 15.7 | 36 | 64 | 10.5 | 12.43 | 20.6 | 25.9 | 30.6 | 75,756 | 27 |
| Currently Completely or Mostly Homebound | | | | | | | | | | | | | |
| 1,734 | 1294 | 1035 | 449 | 250 | 457 | 1277 | 168 | 215 | 333 | 446 | 572 | 31,269 | 389 |
| 7,243,894 | 73.8 | 72.2 | 10.2 | 17.6 | 31 | 69 | 15.3 | 16.7 | 18.8 | 23.7 | 25.5 | 148,369 | 21 |
| Persistently Completely or Mostly Homebound | | | | | | | | | | | | | |
| 1,112 | 815 | 696 | 271 | 145 | 284 | 828 | 78 | 104 | 209 | 296 | 425 | 31,442 | 389 |
| 4,449,990 | 72.1 | 74.4 | 9.5 | 16.2 | 29.1 | 70.9 | 10.3 | 13.4 | 19.6 | 25.4 | 31.4 | 41,853 | 34 |
| Serious Illness + Transportation Barrier | | | | | | | | | | | | | |
| 211 | 160 | 125 | NR | NR | 32 | 179 | NR | NR | 49 | 56 | 39 | 40,042 | NR |
| 920789 | 73.6 | 73.6 | NR | NR | 15.9 | 84.1 | NR | NR | 23.7 | 25.2 | 15.1 | 395,085 | NR |
| Hoyer lift / Hospital Bed | | | | | | | | | | | | | |
| 1,264 | 780 | 684 | 464 | 116 | 416 | 848 | 125 | 199 | 290 | 322 | 328 | 36,164 | 224 |
| 4,818,517 | 60.7 | 73 | 15.6 | 11.4 | 37.3 | 62.7 | 15.8 | 18.3 | 22.2 | 22.5 | 21.2 | 61,931 | 17 |
| ADL ⁸ Impairments + Transportation Barrier | | | | | | | | | | | | | |
| 425 | 303 | 244 | 113 | 68 | 102 | 323 | 52 | 59 | 86 | 107 | 121 | 28,543 | 89 |
| 1,802,124 | 69.4 | 69.1 | 10.5 | 20.4 | 31.7 | 68.3 | 15.8 | 19.1 | 20.1 | 24.1 | 20.9 | 34,845 | 18 |
| Serious Illness + Semi-Homebound | | | | | | | | | | | | | |
| 504 | 312 | 333 | 129 | 42 | 165 | 338 | 89 | 119 | 121 | 104 | 70 | 38,263 | 61 |
| 2,270,287 | 60.6 | 78.9 | 11.1 | 10.1 | 38.6 | 61.4 | 24.6 | 26.2 | 23.2 | 16.7 | 9.4 | 48,437 | 11 |
| ADL ⁸ Impairments + Semi-Homebound | | | | | | | | | | | | | |
| 1,003 | 696 | 610 | 262 | 131 | 326 | 677 | 120 | 157 | 202 | 234 | 290 | 39,330 | 228 |
| 4,297,256 | 67 | 74.8 | 10.5 | 14.7 | 41 | 59 | 18.3 | 19.4 | 21.2 | 20.9 | 20.2 | 81,500 | 21 |
| ADL ⁸ Impairments + Mobility Impairments | | | | | | | | | | | | | |
| 699 | 474 | 403 | 221 | 75 | 223 | 476 | 66 | 101 | 138 | 165 | 229 | 42,473 | 208 |
| 2,850,812 | 67.9 | 76.1 | 12.9 | 11 | 38.6 | 61.4 | 14.7 | 16.7 | 21 | 21.9 | 25.8 | 96,857 | 28 |
| Hospice Discharge | | | | | | | | | | | | | |
| 481 | 310 | 336 | 116 | 29 | 173 | 308 | 39 | 75 | 112 | 123 | 132 | 37,062 | 79 |
| 2,032,048 | 64.2 | 82.5 | 10.1 | 7.4 | 41.5 | 58.5 | 9.5 | 19.8 | 26.2 | 23.3 | 21.3 | 72,958 | 16 |
| Stage IV Pressure Ulcer | | | | | | | | | | | | | |

| | | | | | | | | | | | | | |
|---|--------------|--------------|-------------|-------------|--------------|--------------|-------------|--------------|-------------|--------------|-------------|-------------------|-------------|
| 111 492,127 | 74 71.4 | NR NR | 41 14.6 | NR NR | 35 41.9 | 76 58.1 | NR NR | NR NR | NR NR | NR NR | NR NR | 39,792 50,925 | NR NR |
| Home Health Recertification | | | | | | | | | | | | | |
| 7,390 33,957,963 | 4821 64.1 | 5035 80.4 | 1664 8.8 | 691 10.8 | 2486 39 | 4905 61 | 951 19.4 | 1366 22.3 | 182 24 | 168 19.4 | 1568 15 | 41,661 103,383 | 711 8 |
| Semi-Homebound, Needs Assistance | | | | | | | | | | | | | |
| 1,124 4,573,904 | 883 77 | 682 73.4 | 284 10.4 | 158 16.3 | 286 32.7 | 838 67.3 | 84 12.6 | 131 15.3 | 223 21.9 | 278 23.4 | 408 26.8 | 37,586 83,528 | 237 21 |
| Semi-Homebound, Difficulty Leaving Home | | | | | | | | | | | | | |
| 3,105 14,822,936 | 2022 64.3 | 2228 82.5 | 632 8.1 | 245 9.4 | 1126 41.9 | 1979 58.2 | 536 25 | 626 23 | 783 23.8 | 651 17 | 509 11.3 | 44,013 88,102 | 258 7 |
| ED Visit Past Month, No Outpatient Visit Past Year | | | | | | | | | | | | | |
| 486 1,987,145 | 278 59.2 | 283 71.3 | 151 14.4 | 52 14.4 | 168 36.7 | 318 63.3 | 97 29 | 76 17.1 | 106 19 | 112 20.1 | 95 14.8 | 31,062 37,699 | 69 12 |
| Serious Illness, Claims-Based | | | | | | | | | | | | | |
| 2,446 12,944,886 | 1257 49.2 | 1704 80 | 523 8.3 | 219 11.8 | 1116 50.1 | 1330 49.9 | 562 31.2 | 638 29 | 567 19.9 | 438 13.5 | 241 6.4 | 52,733 146,995 | 220 8 |
| Serious Illness, self-report | | | | | | | | | | | | | |
| 1,398 7,226,643 | 886 62.9 | 1019 81.2 | 275 8.3 | 104 10.5 | 561 41.8 | 837 58.2 | 291 28.9 | 379 29.8 | 378 23.7 | 232 12.4 | 118 5.2 | 43,866 146,823 | 102 6 |
| Serious Mental Illness | | | | | | | | | | | | | |
| 3,002 14,739,304 | 1892 60.6 | 1920 75.3 | 690 8.8 | 392 15.9 | 1134 42.4 | 1868 57.6 | 580 28.9 | 666 25 | 707 21.2 | 581 14.8 | 468 10 | 50,436 608,311 | 405 11.4 |
| Charlson Co-Morbidity Index > 5 | | | | | | | | | | | | | |
| 2,398 12,539,095 | 1033 41.5 | 1541 77.7 | 635 10.6 | 222 11.7 | 1115 52 | 1283 48 | 672 38.8 | 586 25.5 | 530 18.2 | 387 11.9 | 223 5.7 | 50,856 94,736 | 265 9 |
| Frailty | | | | | | | | | | | | | |
| 4,226 18,812,531 | 2722 63.1 | 2718 77 | 1041 9.7 | 467 13.3 | 1477 41.4 | 2749 58.6 | 522 19.6 | 755 19.6 | 937 21.4 | 1033 20.9 | 979 16.2 | 39,157 117,022 | 739 16 |
| ADL⁸ Impairments | | | | | | | | | | | | | |
| 1,967 8,215,187 | 1359 67.3 | 1190 74.5 | 515 10.3 | 262 15.1 | 627 38.9 | 1340 61.1 | 196 15.4 | 283 18.5 | 389 20.6 | 474 22 | 625 23.5 | 36,273 67,283 | 514 24 |
| Wheelchair / Scooter Use | | | | | | | | | | | | | |
| 1,131 4,754,359 | 741 64.9 | 659 75.2 | 353 12.6 | 119 12.2 | 342 36.4 | 789 63.6 | 133 18.3 | 181 19.7 | 235 19.7 | 252 20.2 | 330 22.1 | 39,319 77,991 | 266 21 |
| Transportation Barrier | | | | | | | | | | | | | |
| 1,826 7,956,804 | 1406 76.6 | 1200 76.2 | 421 9.6 | 205 14.2 | 348 22.4 | 1478 77.6 | 187 15.3 | 253 16.6 | 425 23.2 | 485 25 | 476 19.9 | 31,542 145,015 | 218 11 |
| Home Health Episode | | | | | | | | | | | | | |
| 3238 14,597,344 | 2148 65.1 | 2115 78.9 | 823 9.9 | 300 11.2 | 1043 37.3 | 2195 62.8 | 389 19.2 | 579 21.5 | 722 22 | 758 19.9 | 790 17.3 | 40,694 120,528 | 520 14 |
| Received Community-Initiated Home Health | | | | | | | | | | | | | |
| 4,054 19,157,987 | 2514 60.7 | 2938 83.6 | 792 7.4 | 324 9 | 1596 44.9 | 2458 55.1 | 583 21.8 | 759 21.9 | 103 24.1 | 932 19.3 | 744 13 | 51,584 130,085 | 335 7 |
| Receiving Meals on Wheels | | | | | | | | | | | | | |
| 332 | 230 | 214 | 90 | 28 | 68 | 264 | 37 | 62 | 82 | 78 | 73 | 26,180 | 53 |

| | | | | | | | | | | | | | |
|--------------------------------|------|------|------|-----|------|------|------|------|------|------|------|--------|-----|
| 1,334,684 | 71.3 | 77.5 | 12.7 | 9.9 | 20.3 | 79.7 | 14.3 | 24 | 24.9 | 20.8 | 16.1 | 39,698 | 13 |
| Home Hospice Enrollment | | | | | | | | | | | | | |
| 2,094 | 1223 | 1491 | 465 | 138 | 856 | 1238 | 199 | 359 | 487 | 523 | 526 | 41,392 | 401 |
| 8,852,821 | 56.7 | 83.5 | 8.6 | 7.8 | 47.2 | 52.8 | 14.3 | 22.5 | 23.1 | 22.5 | 17.6 | 59,190 | 18 |

Members of The Home-Based Primary Care (HBPC) Working Group (n=29) participated in a modified Delphi process to define criteria for identifying HBPC target populations. After 2 rounds of online RedCap questionnaires, Delphi panelists were presented with this table to inform an in-depth focus group discussion. Sociodemographic characteristics were determined by self-report in the National Health and Aging Trends Study (NHATS). Some data are non-reportable (NR) due to cell size restrictions. Detailed criteria definitions are presented in **Supplemental Table 1s**.

1. The validation cohort was derived from the 2011-2017 waves of NHATS. We excluded interviews conducted with a proxy rather than the primary subject. The community-dwelling NHATS respondents in our cohort included those who were living in residential or domiciliary settings (*e.g.*, assisted living facilities) and excluded those who were institutionalized (*e.g.*, long-term care or skilled nursing facilities). The validation cohort was further narrowed to those age \geq 70 who had at least 12 months of continuous Fee-for-Service (FFS) Medicare coverage. In this table, we present unweighted numbers from the validation cohort and applied survey weights in all analyses.
2. Due to unreportable sample sizes, we had to consolidate race and ethnicity into a combined category. The same was true for Asian, Native Hawaiian, Alaska Native, Pacific Islander, Free response, and missing which were collapsed into the “other” race/ethnicity category.
3. The “other” marital status category consisted of divorced, separated, widowed, never married, and missing.
4. At this stage of preliminary data analysis, we presented panelists with mean (SD) household income levels. In construct validation, we examined median (IQR) income, since household income had a non-normal distribution.
1. At this stage, the 12-month mortality estimates were based upon the presence of a “Last Month of Life” supplement in the following year’s NHATS interview, which would likely under-estimate the actual 12-month mortality rate.
2. Independence at Home (IAH)
3. Activities of Daily Living (ADL)

| | |
|--|--|
| Focus Group Objective | Identify patients who could benefit from longitudinal HBPC ¹ . Shorten the list of potential criteria. |
| Data Source Reminder | Parameters of all listed criteria are available in NHATS ² or Medicare FFS ³ claims data. We plan to perform a construct validation by further characterizing populations meeting the chosen HBPC ¹ criteria and generating national estimates of their healthcare utilization/cost. |
| HBPC's Primary Purpose | The panelists have discussed many benefits of HBPC ¹ , such as identifying social needs or relieving unpaid caregivers, but some of these objectives can be met more affordably since they do not require the skill level of doctors; policy interventions can leverage physician extenders, nurses, physical/occupational therapists, social workers, etc. to fill some of the existing gaps in home care delivery. Thus, the chosen criteria should focus on HBPC's ¹ most central and valuable contribution: <i>improving access to longitudinal primary care</i> . |
| Social Vulnerability & Equity | Evaluate sociodemographic characteristics of populations meeting the proposed HBPC ¹ criteria to ensure equitable representation. Also consider that the availability of social support networks and/or other forms of social vulnerability are not reported in basic demographic data but are relevant factors for selecting HBPC ¹ criteria. |
| Rationale for Elimination | Though originally voted highly in the survey, the focus group discussed that the criterion for receiving ≥ 40 hrs of unpaid caregiver support may be too broad (resulting in too large of a population size) and relatively inequitable since 1) it describes a higher income group with a large majority of married men and 2) at the state level, there are potential supplements or substitutes to unpaid caregiver support (albeit with varying degrees of accessibility), such as Home and Community Based Services or Long-Term Care and Support Services. |
| Sensitivity vs. Specificity | Could select a range of HBPC ¹ criteria whereby some prioritize feasibility and apply to the most vulnerable populations while others are more idealistic/aspirational and apply to broader populations. |
| Actuarial Homogeneity | Payors and administrators will want to know the actuarial cost of HBPC ¹ target populations. Ideally, the various pathways to defining HBPC ¹ targets will focus on patient populations that are consistently costly. To achieve actuarial homogeneity, payors or administrators may also consider tiers (<i>e.g.</i> , quartiles) within a given HBPC ¹ criterion to further delineate and prioritize target subpopulations. |
| Cascading Algorithm | May create criteria combinations or cascades that include clinical, social, and cost-related factors to target highly vulnerable populations and achieve actuarial homogeneity. A cascading algorithm may also help account for redundancies or overlap among criteria (<i>e.g.</i> , a persistently homebound individual who also meets criteria for transportation barriers and functional impairments). |

Subject matter experts (n=29) joined to the HBPC Working Group that conducted a modified Delphi process (MDP) to define who could benefit from HBPC. The MDP consisted of four rounds in total and yielded an HBPC algorithm. An initial list of potential HBPC criteria was generated from the study team's literature review, collective healthcare experiences, and availability of data for the planned construct validation of chosen HBPC criteria. Delphi panelists provided feedback on HBPC criteria through online RedCap questionnaires in MDP Rounds 1 and 2. The third round consisted of a video focus group with 13 of the 29 panelists (based on their availability). The focus group discussion yielded an algorithmic approach to defining HBPC target populations, henceforth the HBPC Algorithm. In MDP round 4, a summary of the focus group's discussion was shared with the rest of the panelists to seek open-ended feedback. This summary (featured above) included a diagram of the proposed HBPC Algorithm (**Figure 2**) as well as a 1-question follow-up poll (**Supplemental eMethods 3**).

1. Home-based primary care (HBPC)
2. National Health and Aging Trends Study (NHATS)
3. Fee for service (FFS)

| | |
|--|---|
| Stroke¹ | |
| | G9731, G9732, I6000, I6001, I6002, I6010, I6011, I6012, I602, I6020, I6021, I6022, I6030, I6031, I6032, I604, I6050, I6051, I6052, I606, I607, I608, I609, I610, I611, I612, I613, I614, I615, I616, I618, I619, I6300, I63011, I63012, I63013, I63019, I6302, I63031, I63032, I63033, I63039, I6309, I6310, I63111, I63112, I63113, I63119, I6312, I63131, I63132, I63133, I63139, I6319, I6320, I63211, I63212, I63213, I63219, I6322, I6323, I63232, I63233, I63239, I6329, I6330, I63311, I63312, I63313, I63319, I63321, I63322, I63323, I63329, I63331, I63332, I63333, I63339, I63341, I63342, I63343, I63349, I6339, I6340, I63411, I63412, I63413, I63419, I63421, I63422, I63423, I63429, I63431, I63432, I63433, I63439, I63441, I63442, I63443, I63449, I6349, I6350, I63511, I63512, I63513, I63519, I63521, I63522, I63523, I63529, I63531, I63532, I63533, I63539, I63541, I63542, I63543, I63549, I6359, I636, I638, I639, I97810, I97811, I97820, I97821 |
| Liver Disease | |
| | I8500, I8501, I8510, I8511, K702, K7030, K7031, K7040, K7041, K7210, K7290, K740, K741, K742, K743, K744, K745, K7460, K7469, K766, K767, K7291 |
| Cancer | |
| | C153, C154, C155, C158, C159, C160, C161, C162, C163, C164, C165, C166, C168, C169, C220, C221, C222, C223, C224, C227, C228, C229, C250, C251, C252, C253, C254, C257, C258, C259, C33, C384, C450, C480, C481, C482, C488, C561, C562, C569, C5700, C5701, C5702, C5710, C573, C574, C710, C712, C713, C714, C717, C718, C719, C770, C771, C772, C773, C774, C775, C778, C779, C7800, C781, C782, C7830, C7839, C784, C785, C786, C787, C7880, C7889, C7900, C7901, C79011, C79019, C7902, C792, C7931, C7932, C7949, C7951, C7952, C7960, C7961, C7962, C7970, C7981, C7982, C7989, C800, C9100, C9102, C9110, C9112, C9190, C9192, C91Z0, C91Z2, C9200, C9202, C9210, C9212, C9220, C9222, C9230, C9232, C9240, C9242, C9250, C9252, C9262, C9290, C9292, C92A2, C92Z0, C92Z2, C9300, C9302, C9310, C9312, C9332, C93910, C9392, C93Z0, C93Z2, C9400, C9402, C9420, C9422, C9430, C9432, C9480, C9482, C9500, C9502, C9510, C9512, C9590, C9592 |
| Congestive Heart Failure² | |
| | I0981, I110, I130, I132, I501, I5020, I5021, I5022, I5023, I5030, I5031, I5032, I5033, I5040, I5041, I5042, I5043, I50810, I50811, I50812, I50813, I50814, I5082, I5083, I5084, I5089, I509 |
| COPD / Interstitial Lung Disease / Resp Failure² | |
| | J411, J418, J42, J430, J431, J432, J438, J439, J440, J441, J449, J470, J471, J479, J60, J61, J620, J628, J630, J631, J632, J633, J634, J635, J636, J64, J65, J660, J661, J662, J668, J670, J671, J672, J673, J674, J675, J676, J677, J678, J679, J684, J8410, J84112, J8417, J9600, J9601, J9602, J9610, J9611, J9612, J9620, J9621, J9622, J9690, J9691, J9692, J982, J983 |
| Neurodegenerative Disease | |
| | G10, G114, G120, G121, G122, G1220, G1221, G1222, G1223, G1224, G1225, G1229, G128, G129, G131, G132, G138, G230, G231, G232, G238, G239 |
| Parkinson's Disease³ | |
| | G20 |
| Durable Medical Equipment (DME)^{3,4} | |
| | HCPCS* Codes E0100, E0105, E0130, E0135, E0140, E0141, E0143, E0144, E0147, E0148, E0149, E0153, E0154, E0155, E0156, E0157, E0158, E0159, E0163, E0165, E0167, E0168, E0170, E0171, E0172, E0175, E0275, E0276, E0325, E0326, E0240, E0241, E0242, E0243, E0244, E0245, E0246, E0247, E0248, E0621, E0625, E0627, E0628, E0629, E0630, E0635, E0636, E0637, E0638, E0639, E0640, E0641, E0642, E0700, E0705, E0710, E0250, E0251, E0255, E0256, E0260, E0261, E0265, E0266, E0270, E0271, E0272, E0273, E0274, E0277, E0280, E0290, E0291, E0292, E0293, E0294, E0295, E0296, E0297, E0301, E0302, E0303, E0304, E0305, E0310, E0315, E0316, E0370, E0371, E0372, E0373, E1031, E1035, E1038, E1039, E1050, E1060, E1070, E1083, E1084, E1085, E1086, E1087, E1088, E1089, E1090, E1092, E1093, E1100, E1110, E1130, E1140, E1150, E1160, E1161, E1170, E1171, E1172, E1180, E1190, E1195, E1200, E1220, E1221, E1222, E1223, E1224, E1230, E1240, E1250, E1260, E1270, E1280, E1285, E1290, E1295, E1296, E1297, E1298, E0950, E0951, E0952, E0955, E0956, E0957, E0958, E0959, E0960, E0961, E0966, E0967, E0970, E0971, E0973, E0974, E0978, E0980, E0981, E0982, E0983, E0984, E0985, E0986, E0990, E0992, E0994, E0995, E1002, E1003, E1004, E1005, E1006, E1007, E1008, E1009, E1010, E1015, E1016, E1017, E1018, E1020, E1028, E1029, E1030, E1225, E1226, E1227, E1228, E2201, E2202, E2203, E2204, E2205, E2206, E2207, E2208, E2209, E2210, E2211, E2212, E2213, E2214, E2215, E2216, E2217, E2218, E2219, E2220, E2221, E2222, E2223, E2224, E2225, E2226, E2300, E2301, E2310, E2311, E2321, E2322, E2323, E2324, E2325, E2326, E2327, E2328, E2329, E2330, E2331, E2340, E2341, E2342, E2343, E2351, E2360, E2361, E2362, E2363, E2364, E2365, E2366, E2367, E2368, E2369, E2370, E2371, E2372, E2373, E2374, E2375, E2376, E2377, E2381, E2382, E2383, E2384, E2385, E2386, E2387, E2388, E2389, E2390, E2391, E2392, E2393, E2394, E2395, E2396, E2399, E2402, E2601, E2602, E2603, E2604, E2605, E2606, E2607, E2608, E2609, E2610, E2611, E2612, E2613, E2614, E2615, E2616, E2617, E2618, E2619, E2620, E2621, 0380, 0381, 0382, 0383, 0384, 0384,0385,0386,0387,0389,0391, E0424, E0425, E0430, E0431, E0434, E0435, E0439, E0440, E0441, E0442, E0443, E0444, E1390, E1391, E1392, E1399, E1405, E1406 |
| Dysphagia³ | |
| | R13,10 |
| Diabetes⁵ | |
| | E102, E1021, E1022, E1029, E105, E1052, E1059, E107, E108, E112, E1121, E1122, E1129, E115, E1152, E1159, E117, E118, E122, E125, E127, E132, E1321, E1322, E1329, E135, E1352, E1359, E137, E138, E142, E145, E147 |
| Peripheral Vascular Disease (PVD)⁵ | |
| | E0852, E0952, I70221, I70222, I70223, I70228, I70229, I70231, I70232, I70233, I70234, I70235, I70238, I70239, |

| | |
|--|---|
| | I70241, I70242, I70243, I70244, I70245, I70248, I70249, I7025, I70261, I70262, I70263, I70268, I70269, I70301, I70302, I70303, I70308, I70309, I70311, I70312, I70313, I70318, I70319, I70321, I70322, I70323, I70328, I70329, I70331, I70332, I70333, I70334, I70335, I70338, I70339, I70341, I70342, I70343, I70344, I70345, I70348, I70349, I7035, I70361, I70362, I70363, I70368, I70369, I70391, I70392, I70393, I70398, I70399, I70401, I70402, I70403, I70408, I70409, I70411, I70412, I70413, I70418, I70419, I70421, I70422, I70423, I70428, I70429, I70431, I70432, I70433, I70434, I70435, I70438, I70439, I70441, I70442, I70443, I70444, I70445, I70448, I70449, I7045, I70461, I70462, I70463, I70468, I70469, I70491, I70492, I70493, I70498, I70499, I70501, I70502, I70503, I70508, I70509, I70511, I70512, I70513, I70518, I70519, I70521, I70522, I70523, I70528, I70529, I70531, I70532, I70533, I70534, I70535, I70538, I70539, I70541, I70542, I70543, I70544, I70545, I70548, I70549, I7055, I70561, I70562, I70563, I70568, I70569, I70591, I70592, I70593, I70598, I70599, I70601, I70602, I70603, I70608, I70609, I70611, I70612, I70613, I70618, I70619, I70621, I70622, I70623, I70628, I70629, I70631, I70632, I70633, I70634, I70635, I70638, I70639, I70641, I70642, I70643, I70644, I70645, I70648, I70649, I7065, I70661, I70662, I70663, I70668, I70669, I70691, I70692, I70693, I70698, I70699, I70701, I70702, I70703, I70708, I70709, I70711, I70712, I70713, I70718, I70719, I70721, I70722, I70723, I70728, I70729, I70731, I70732, I70733, I70734, I70735, I70738, I70739, I70741, I70742, I70743, I70744, I70745, I70748, I70749, I7075, I70761, I70762, I70763, I70768, I70769, I70791, I70792, I70793, I70798, I70799, I7092, I7770, I7771, I7772, I7773, I7774, I7775, I7776, I7777, I7779, Z95820, Z95828 |
| Coronary Artery Disease (CAD)⁵ | |
| | I200, I201, I208, I209, I2101, I2102, I2109, I2111, I2119, I2121, I2129, I213, I214, I219, I21A1, I21A9, I220, I221, I222, I228, I229, I240, I241, I248, I249, I2510, I25110, I25111, I25118, I25119, I252, I2542, I255, I256, I25700, I25701, I25708, I25709, I25710, I25711, I25718, I25719, I25720, I25721, I25728, I25729, I25730, I25731, I25738, I25739, I25750, I25751, I25758, I25759, I25760, I25761, I25768, I25769, I25790, I25791, I25798, I25799, I25810, I25811, I25812, I2582, I2583, I2589, I259 |
| Chronic Kidney Disease (CKD)⁵ | |
| | I120, I1311, N184, N185, N186, N19, Z4931, Z4932, Z9115, Z992 |
| HIV⁶ | |
| | A150, A159, A310, A312, A318, A319, A4101, A419, A5139, A5149, A523, A528, A529, A812, B250, B258, B259, B3781, B387, B389, B451, B457, B459, B582, B5889, B589, B59, C460, C463, C467, C469, C8300, C8333, C8370, C8379, E43, E440, G02, G373, J9601, R627, R636, R64, R6510, R6520, R6521, R7881 |
| HIV complications⁶ | |
| | A150, A159, A310, A312, A318, A319, A4101, A419, A5139, A5149, A523, A528, A529, A812, B250, B258, B259, B3781, B387, B389, B451, B457, B459, B582, B5889, B589, B59, C460, C463, C467, C469, C8300, C8333, C8370, C8379, E43, E440, G02, G373, J9601, R627, R636, R64, R6510, R6520, R6521, R7881 |
| End Stage Renal Disease | |
| | I120, I1311, N185, N186, N19, Z4931, Z4932, Z9115, Z992 |
| Dementia | |
| | F0150, F0151, F0280, F0281, F0390, F0391, F051, F1027, F1097, G300, G301, G308, G309, G3101, G3109, G311, G3183, A8100, A8101, A8109, A811, A812, A818, A8181, A8182, A8183 |
| Hip Fracture⁷ | |
| | S72043A, S72042A, S72046A, S72044A, S72041A, S72045A, S72019C, S72001B, S72009B, S72001C, S72002B, S72009C, S72002C, S72019B, S7223XB, S72033C, S72099A, S72009A, S72002A, S72001A, S72026B, S72022C, S72022B, S72023B, S72021C, S72024C, S72025B, S72021B, S72024B, S72023C, S72025C, S72026C, S7226XB, S7226XC, S72043B, S72099B, S72033B, S72032C, S72031C, S72031B, S72036C, S72035C, S72034C, S72033C, S72034B, S72036B, S72032B, S72035B, S7222XA, S7223XA, S7224XA, S7226XA, S7225XA, S7221XA, S72012A, S72019A, S72011A, S7224XC, S7223XC, S7222XC, S7224XB, S7226XB, S7226XC, S7223XB, S7225XC, S7221XC, S7222XB, S7221XB, S7225XB, S72009C, S72046A, S7223XC, S72099C, S72032A, S72031A, S72034A, S72035A, S72033A, S72036A, S72143B, S72026B, S72099A, S72091A, S72065A, S72051A, S72059A, S72052A, S72066A, S72061A, S72092A, S72062A, S72063A, S72064A, S72146A, S72146A, S72142A, S72145A, S72143A, S72144A, S72141A, S72023A, S72023C, S72143A, S72021A, S72025A, S72022A, S72024A, S72023A, S72026A, S72036B S72146C, S72146A, S72146B, S72066C, S72065C, S72059B, S72066B, S72064C, S72063C, S72051C, S72099B S72063B, S72065B, S72091C, S72062C, S72061C, S72092B, S72062B, S72052B, S72064B, S72091B, S72092C, S72059C, S72052C, S72061B, S72051B, S72099C, S72009A, S72046B, S72026A, S72046C, S72126C, S72122B, S72134C, S72113B, S72131B, S72123C, S72102C, S72132C, S72133B, S72122C, S72121B, S72135B, S72115B, S72125C, S72109B, S72111C, S72102B, S72132B, S72113C, S72112B, S72116B, S72116C, S72136C, S72133C, S72114C, S72126B, S72109C, S72121C, S72124B, S72111B, S72114B, S72136B, S72112C, S72101B, S72131C, S72124C, S72135C, S72115C, S72123B, S72125B, S72101C, S72134B, S72109A, S72043C, S72144C, S72146B, S72142C, S72146C, S72141C, S72145C, S72141B, S72142B, S72143B, S72144B, S72145B, S72143C, S72043A S72033A, S72043B, S72041B, S72045B, S72043C, S72042B, S72044B, S72044C, S72045C, S72042C, S72046C S72041C, S72046B, S72124A, S72134A, S72116A, S72109A, S72133A, S72122A, S72114A, S72126A, S72101A S72132A, S72123A, S72121A, S72112A, S72113A, S72102A, S72131A, S72125A, S72136A, S72135A, S72111A S72115A, S72009B, S72143C, S7226XA, S72036A, S72036C, S72012B, S72011C, S72011B, S72019C, S72019B S72012C, S72033B, S72109B, S7223XA, S72026C, S72109C, S72019A, S72023B, S72091A, S72064A, S72063A S72116C, S72052C, S72124C, S72111C, S7224XA, S72113C, S72102A, S72051B, S72031A, S72132B, S72034A, S72144B, S72045C, S72045A, S72012C, S72115C, S72059A, S72134B, S72064C, S72041B, S72144C, S72024C S72136A, S72145C, S72091B, S72035C, S72011B, S72025C, S72124B, S72132A, S72063B, S72032A, S72042C S72142A, S7221XC, S7224XB, S72121C, S72066C, S72042B, S7225XB, S72134A, S72022A, S72092A, S72102B S72123B, S72115A, S72024B, S72125B, S72133C, S7224XC, S72133A, S72065A, S72125A, S72032B, S72133B S72092B, S72042A, S72025A, S72114B, S72059C, S72011A, S72125C, S72002B, S72122A, S72112A, S72145A S72101B, S72001C, S72052A, S72126A, S72116A, S72061C, S72062B, S72051C, S72101A, S72024A, S72135B |

| |
|--|
| S72126B, S72123A, S72064B, S72066B, S72045B, S72032C, S72124A, S72132C, S72121A, S72113B, S72022B S72021B, S72031B, S72012B, S72145B, S72044A, S72035B, S72111B, S72001B, S72144A, S72136B, S72002A S72034B, S72113A, S72126C, S72115B, S72041A, S72131C, S7222XC, S72034C, S72021A, S72123C, S72141B S72134C, S72142C, S72059B, S72112B, S72131B, S72122B, S7222XA, S72092C, S72062A, S72052B, S72061B S72114A, S72035A, S7225XC, S72066A, S72031C, S72041C, S72116B, S72135C, S72062C, S72002C, S72025B S72111A, S72121B, S72136C, S72044C, S72122C, S72141C, S72102C, S72063C, S72022C, S72021C, S72135A, S72012A, S72101C, S72112C, S72142B, S72114C, S7221XA, S7225XA, S72051A, S72131A, S72011C, S72091C, S7221XB, S7222XB, S72001A, S72061A, S72044B |
|--|

1. Stroke - Only if primary diagnosis of hospitalization
2. Congestive heart failure or lung disease - only if requiring home oxygen use or if primary diagnosis of hospitalization
3. Parkinson's - Only if concurrent use of durable medical equipment (DME) or diagnosis of dysphagia also present
4. Types of DME: cane, walker, commode, bedpan, urinal, bathing/toileting assistive device, lift, transfer board, safety belt, harness, vest, hospital bed, wheelchair, blood transfusion revenue center code, oxygen
5. Diabetes - Only if severe complications present, as indicated by codes for PVD, CAD, CKD
6. HIV - only if complications present or if AIDS-defining illness
7. Only if age>70

| | |
|---|--|
| Liver Disease | |
| | 456.0, 456.1, 456.2, 456.21, 571.0, 571.2, 571.5, 571.6, 571.8, 571.9, 572.3, 572.4, 572.8, V42.7 |
| Cancer | |
| | 150.0, 150.1, 150.2, 150.3, 150.4, 150.5, 150.8, 150.9, 151.0, 151.1, 151.2, 151.3, 151.4, 151.5, 151.6, 151.8, 151.9, 155.0, 155.1, 155.2, 157.0, 157.1, 157.2, 157.3, 157.4, 157.8, 157.9, 158.0, 158.8, 158.9, 162.0, 162.2, 162.3, 162.4, 162.5, 162.8, 162.9, 163.0, 163.1, 163.8, 163.9, 183.0, 183.2, 183.3, 183.4, 183.5, 183.8, 183.9, 191.0, 191.1, 191.2, 191.3, 191.4, 191.5, 191.6, 191.7, 191.8, 191.9, 196.0, 196.1, 196.2, 196.3, 196.5, 196.6, 196.8, 196.9, 197.0, 197.1, 197.2, 197.3, 197.4, 197.5, 197.6, 197.7, 197.8, 198.0, 198.1, 198.2, 198.3, 198.4, 198.5, 198.6, 198.7, 198.81, 198.82, 198.89, 199.0, 199.1, 199.2, 204.0, 204.01, 204.02, 204.1, 204.11, 204.12, 204.2, 204.21, 204.22, 204.8, 204.81, 204.82, 204.9, 204.91, 204.92, 205.0, 205.01, 205.02, 205.1, 205.11, 205.12, 205.2, 205.21, 205.22, 205.3, 205.31, 205.32, 205.8, 205.81, 205.82, 205.9, 205.91, 205.92, 206.0, 206.01, 206.02, 206.1, 206.11, 206.12, 206.2, 206.21, 206.22, 206.8, 206.81, 206.82, 206.9, 206.91, 206.92, 207.0, 207.01, 207.02, 207.1, 207.11, 207.12, 207.2, 207.21, 207.22, 207.8, 207.81, 207.82, 208.0, 208.01, 208.02, 208.1, 208.11, 208.12, 208.2, 208.21, 208.22, 208.8, 208.81, 208.82, 208.9, 208.91, 208.92, 289.0 |
| Congestive Heart Failure | |
| | 398.91, 402.11, 402.91, 404.11, 404.13, 404.91, 404.93, 428.0, 428.1, 428.2, 428.21, 428.22, 428.23, 428.3, 428.31, 428.32, 428.33, 428.4, 428.41, 428.42, 428.43, 428.9 |
| COPD / Interstitial Lung Disease / Resp Failure ¹ | |
| | 490.**, 491.**, 492.**, 492.8, 493.0, 493.01, 493.02, 493.1, 493.11, 493.12, 493.2, 493.21, 493.22, 493.81, 493.82, 493.9, 493.91, 494.**, 495.**, 496.**, 497.**, 498.**, 499.**, 500.**, 501.**, 502.**, 503.**, 504.**, 505.**, 506.4 |
| Neurodegenerative Disease | |
| | 335.2 |
| Diabetes ² | |
| | 250.4, 250.41, 250.42, 250.43, 250.5, 250.51, 250.52, 250.53, 250.6, 250.61, 250.62, 250.63, 250.7, 250.71, 250.72, 250.73, 250.9, 250.91, 250.92, 250.93 |
| Peripheral Vascular Disease (PVD) ² | |
| | 440.*, 441.2, 441.4, 441.7, 441.9, 443.1, 443.2, 443.8, 443.9, 447.1, 557.1, 557.9, V43.4 |
| Coronary Artery Disease (CAD) ² | |
| | 410, 410.01, 410.02, 410.1, 410.11, 410.12, 410.2, 410.21, 410.22, 410.3, 410.31, 410.32, 410.4, 410.41, 410.42, 410.5, 410.51, 410.52, 410.6, 410.61, 410.62, 410.7, 410.71, 410.72, 410.8, 410.81, 410.82, 410.9, 410.91, 410.92, 411, 411.1, 411.81, 411.89, 412, 413, 413.1, 413.9, 414, 414.01, 414.02, 414.03, 414.04, 414.05, 414.06, 414.07, 414.1, 414.11, 414.12, 414.19, 414.2, 414.3, 414.8, 414.9 |
| Chronic Kidney Disease (CKD) ² | |
| | 403.11, 403.91, 404.12, 404.92, 585.1, 585.2, 585.3, 585.4, 585.5, 585.6, 585.9, 586.**, V42.0, V45.11, V45.12, V56.0, V56.8 |
| HIV w/ Compilation or AIDS | |
| | 042.**, 043.**, 044.** |
| End Stage Renal Disease ³ | |
| | 403.11, 403.91, 404.12, 404.92, 586.**, V42.0, V45.11, V45.12, V56.0 |
| Dementia ⁴ | |
| | 290.0, 290.1, 290.11, 290.12, 290.13, 290.2, 290.21, 290.3, 290.4, 290.41, 290.42, 290.43, 291.2, 294.1, 294.11, 294.8, 294.9, 331.0, 331.11, 331.19, 331.2 |
| Hip Fracture ⁵ | |
| | 820.**, 785.5, 790.5, 791.5, 792.5 |

1. Congestive heart failure or lung disease – Only if requiring home oxygen or if listed as primary diagnosis of hospitalization

2. Diabetes - Only if severe complications present, as indicated by codes for PVD, CAD, CKD

3. Presence if end-stage renal disease indicator or any of the listed ICD9 codes

4. Dementia – Only if ≥ 2 of the listed ICD codes are documented

5. Hip Fracture – Codes 785.5, 790.5, 791.5, 792.5 also required CPT Code 27230-27248. Alternatively, hip fracture could be defined by the CPT code 27230-27248 PLUS another physician record within 2 days.

| | |
|--------------------------------------|----|
| Total n | 29 |
| Gender n | |
| Male | 20 |
| Female | 9 |
| Race n | |
| White | 20 |
| Black / African American | 2 |
| Asian | 3 |
| Other / Prefer Not to Say | 4 |
| Hispanic Ethnicity n | 1 |
| Region n | |
| Northeast | 21 |
| Midwest | 1 |
| South | 2 |
| West | 5 |
| Professional Role(s) n | |
| Health Services Research | 13 |
| Office-Based Patient Care | 13 |
| Home-Based Patient Care | 14 |
| Hospital System Admin / Exec | 9 |
| Health Insurance Admin / Exec | 3 |
| Health Policy Analysis / Advising | 3 |
| Care Coord. / Case Mgmt. / Soc. Work | 2 |
| Other | 2 |
| Affiliation(s) n | |
| Academic Medical Center | 20 |
| Community-Based Medical Center | 3 |
| Veterans Health Assoc. | 1 |
| Public Insurer | 1 |
| Private Insurer | 4 |
| Other | 6 |

The HBPC Working Group conducted a MDP to define criteria for identifying patients who may benefit from HBPC. MDP panelists (n=29) consisted of diverse subject matter experts, such as health services researchers, health system administrators, payors, and clinicians. Multiple types of clinicians were represented in the panel, such as nurse practitioners, registered nurses, social workers, and physicians, all of whom had extensive experience in general medicine, geriatrics, and/or palliative care. Panelist characteristics were self-reported through an online RedCap questionnaire. Panelists were allowed to select multiple categories for race, professional roles, and affiliations.