Planning Health Services for Seniors: Can We Use Patient's Own Perception?

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ABSTRACT

Objectives

The objectives of this study were to identify needs and to estimate whether self-reported health can be used as an indicator of service needs among seniors.

Methods

This was a cross-sectional survey. Age- and sex-adjusted logistic regression was used to estimate the link between functional status indicators and fair or poor self-reported health. Forward stepwise logistic regression was performed to identify the strongest contributors of poor health. Positive predictive value (PPV), sensitivity, and specificity were calculated to identify whether health perception could be used to identify people in need of physical rehabilitation services.

Results

142 seniors agreed to answer the survey, yielding a response rate of 73%. Among the respondents (mean age 79±7; 60% women), 40% rated their health as fair or poor. Seniors perceiving their health as fair or poor had higher odds of reporting impairments, activity limitations, and participation restrictions (OR ranging from 2.37 95%CI: 1.03-5-45 to 12.22 95%CI: 2.68-55.78) in comparison to those perceiving their health as good or better. The strongest contributors for poor/fair health were depression, difficulty performing household tasks, pain, and dizziness (c-statistic = 0.91 and a maximum adjusted r-squared of 0.60). Self-rated health used as single-item showed a positive predictive value (PPV) of 1, sensitivity of 52%, and specificity of 100%.

Conclusion

Our results indicate that all seniors participating in this study and reporting fair or poor health have indicators of need for

further rehabilitation services. Asking patients to rate their own health may be an alternate way of querying about need, as many older persons are afraid to report disability because of fear of further institutionalization.

Key words: self-rated health, mobility needs, geriatric rehabilitation

Introduction

Seniors are living longer and are the fastest growing segment of the population.[1] In 2000, 605 million people—or 11% of the world's population— were over 60 years old. This proportion is expected to double by 2025, amounting to 2 billion seniors worldwide.[2] While many seniors experience "Healthy Aging"(an aging process without significant impairments), the majority of older adults will have some degree of impairment. For instance, 25% of the Canadian elderly population have a disability, and this prevalence rises from 25% in persons 65 to 74 years of age to 45% in those aged 75 and over.[3]

Disability among seniors can be a factor contributing to increased use of healthcare services.[4-6] Across Canada, people over 75 years of age represent 16% of all hospital admissions. The admission rate per 100,000 seniors is 5 times higher for acute care and 22 times higher for complex continuing care than the rates for younger adults.[7]

After a hospital discharge, dealing with new disabilities can be difficult and even overwhelming.[8,9] For those with newly arising disabilities, such as occurring following stroke or hip fracture, post-discharge services are in place, targeting optimal recovery. For the vast majority of discharged seniors, no provisions are made to manage disabilities that are well known to lead to social disengagement and the onset of further functional decline. Some may recover on their own; some may not, and would need services post-discharge to prevent spiralling down towards frailty.[8]

Needs, defined by the World Health Organization (WHO) as health deficiencies requiring care — from promotion to palliation — can be self-perceived, professionally identified

(e.g., medical assessment), or scientifically established (e.g., imagery tests).[10] This umbrella term varies from person to person and therefore may refer to medical care, rehabilitation, social care, accommodation, transport, finance, for example.[11-13] A framework created by Andersen linking needs to healthcare utilization proposes the latter is determined by the interaction of individual needs, predisposing (i.e., age, sex, race), and enabling factors (i.e., social support, transportation access).[14] Among these three factors, individual needs explained nearly 60% of medical visits and 75% of hospital utilization by older adults.[13]

Ideally, service needs would match healthcare utilization. However, data from the National Population Health Survey (NPHS) and the Canadian Community Health Survey (CCHS) indicate that unmet needs are increasing.[15] Therefore, how can we optimize the identification of needs among seniors upon hospital discharge?

While a full assessment of disabilities prior to discharge would be an optimal approach to identifying needs, in a busy acute care hospital, this is an unlikely occurrence. Could patient's perceptions of how they are feeling be used as a marker of potential need for post-discharge services?

Figure 1 shows a conceptual model linking disability, health perception, and service needs which was developed to represent the question above. The association between disability and service needs is the model that guides the provision of rehabilitation services. For instance, therapists asses their clients, establish their impairments and limitations to then make use of the most appropriate therapies. Previous studies suggest that those with more functional limitations require more attention from the healthcare system.[5,8,16] Soldo and Morton, after combining disability and healthcare utilization, proposed that seniors with mobility and ADL limitations are the subgroups that need health services the most.[12,13]

In the presented model (Figure 1), health perception is in the pathway between disability and service needs and is a construct that represents how individuals integrate objective information they have about their health with how they feel about it.[17] This construct covers perceptions of both physical and mental health status.[17] This is an important construct because the majority of physician office visits are initiated by patients because of how they feel.[18,19] Many epidemiologic studies established the association between health perception and health outcomes (i.e., mortality, disability). For instance,

FIGURE 1. Conceptual model linking disability, health perception, and service needs

persons with low perceived health have higher mortality rates.[16,20-22] According to the Canadian Institute for Health Information (CIHI), seniors reporting their health status as fair or poor are more likely to have multiple chronic conditions, requiring on average six prescribed medications.[23] Studies have determined the ability of perceived health to predict health outcomes;[16,20,24,25] but none had indicated whether rehabilitation needs can be inferred from health perception.[26]

Understanding patients' needs in a timely manner may allow services to be allocated to those at highest risk for deterioration.[27] Health perception is among the indicators that can be applied to understand patient needs from a burden of disease perspective.[11] Other indicators of health needs (i.e., health services utilization, mortality measures, risk factors, economic burden) require that more complex information be gathered.[11,28]

Hence, the primary goal of this study was to estimate the extent to which self-reported health can be used as an indicator of service needs among vulnerable seniors recently discharged from a teaching hospital. Estimation of mobility needs was the secondary goal.

METHODS

Design

A cross-sectional survey was carried out following discharge from acute-care hospital. Patients were identified from discharge records.

Participants

Two McGill University-teaching hospitals participated in this cross-sectional study. The target population consisted of community dwelling seniors, aged 70 years and older, recently discharged from either participating hospitals. Subjects newly discharged with orthopaedic or cardiac surgery, or with stroke or myocardial infarction, were excluded as formal rehabilitation is part of the usual care plan for these conditions. Also excluded were people with dementia as identified on the medical chart and those with communication barriers.

Procedure

Ethics approval was granted by the McGill University Health Centre (MUHC) Genetic and Population Research Ethics Committee. A list of discharged patients who met our eligibility criteria was generated by the MUHC Office of Quality Management. Participants were sent a postcard inviting them to participate in the study. The research team subsequently contacted subjects by telephone. The initial verbal contact took place, on average, 45 days after hospital discharge. Participants answered the survey either by phone or by mail. For those answering the survey by mail, a reminder was sent 4 weeks after.

Measures

The first part of this survey consisted of questions related to housing condition, financial status, access to healthcare services, health literacy, and perceived health. The latter was measured using the same item used in the SF-36.[18] The second part contained questions about physical and social activities such as walking and community ambulation, stairs ability, household tasks, physically demanding activities, recreational activities, and driving. These latter items came from the Preference Based Stroke Index (PBSI) [28] as they were judged to be relevant to an older population. The third part had questions about the severity of symptoms and was generated after consensus was reached among four clinicians-researchers.

Statistical Analysis

Descriptive statistics were used to characterize participants on personal and environmental factors and on prevalence of impairments, activity limitations, and participation restrictions. Prevalence between men and women were compared using Chi-square and Fisher Exact tests.

Self-reported health was dichotomized. Persons rating their health as excellent, very good, or good formed the "Good" health category, whereas those rating their health as fair or poor comprised the "Poor" health category. A regression model estimated the association between self-reported impairments, activity limitations, and participation restrictions and health perception, dichotomized as "good" and "poor" as above. Each variable was assessed separately, adjusted for age and sex, using logistic regression. Additionally, forward stepwise multivariate logistic regression was performed to identify the strongest contributors of poor/fair self-rated health, also adjusting for age and sex. The threshold for variable selection was p < .05 and model selection was guided by c-statistic, maximum rescaled R^2, AIC, and SC. Higher values of maximum rescaled R^2 and c-statistic and lower values of AIC and SC tests indicate a better model.[29,30] C-statistic values greater than 0.7 indicate acceptable prediction and greater than 0.8, excellent prediction.[29] Goodness of fit was further assessed with Hosmer and Lemeshow test and finally, presence of interaction terms and regression assumptions were verified. Regression parameters yielded odds ratios (OR) and 95% confidence intervals (CI).

A diagnostic analysis was used to identify whether health perception could be used to identify people in need of physical rehabilitation services. Positive predictive value (PPV), sensitivity, and specificity were calculated. Service needs were inferred from criteria associated with services admission[12,13] (i.e., pain, or difficulty walking, climbing stairs, or performing household tasks) and were dichotomized as "need" (moderate to severe pain, difficulty walking climbing stairs, performing household tasks) vs. "no need" (no pain, no difficulty walking climbing stairs, performing household tasks).

Missing data was low (< 10%) and was imputed. All statistics analyses were carried out using SAS Version 9.3.

Sample size

Given that the prevalence of mobility limitations in the Canadian population is near to 50%, a sample of 100 respondents was required to yield 80% power for detecting disability prevalence rates with accuracy within ± 10 percentage points.[31]

RESULTS

Figure 2 shows the selection of subjects for the survey. From the list of 1,172 eligible persons, 668 could not be reached, either because the telephone number was incorrect or disconnected since discharge. An additional 94 persons were not eligible and 268 refused. The reasons for refusal are listed in Figure 2.

One hundred and forty-two participants agreed to answer the questionnaire and 103 seniors provided full answers, yielding a response rate of 73%. Table 1 shows that responders and non-responders were similar with respect to age, sex, self-reported health, and indications for service's needs.

Table 2 presents key characteristics of the survey respondents. On the positive side, 55% lived with another person, ~ 90% had a family physician with whom they felt comfortable asking questions regarding their condition, and 72% had adequate financial resources. However, only 40% had capacity to access health information using a computer, ~ 30% usually did no physical activity or no social activity during the week, and 40% of participants perceived their health as fair or poor.

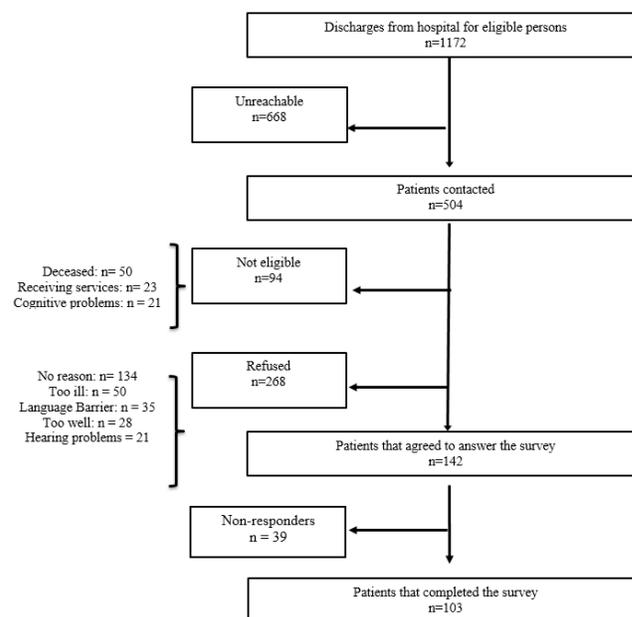Table 3 illustrates prevalence of physical and mental impairments. Seventy-five per cent of participants reported "some"

FIGURE 2. Flowchart of participants

TABLE 1.
Characteristics of responders and non-responders to survey

Characteristic	Responders (n = 103)	Non-responders (n = 39)
Age (y), mean ± SD	79 ± 1	81 ± 2
Women, n (%)	62 (60)	20 (50)
Self-reported health, n (%)		
Excellent	2 (2)	0 (0)
Very good	10 (10)	3 (8)
Good	51 (49)	18 (46)
Poor	35 (34)	16 (41)
Fair	5 (5)	2 (5)
Indications for service needs, n (%)[a]	71 (69)	26 (68)
Survey mode of contact, n (%)		
Telephone	54 (52)	0 (0)
Mail	49 (48)	39 (100)

[a]Dichotomized as "need" (moderate to severe pain, difficulty walking climbing stairs, performing household tasks) vs. "no need" (no pain, no difficulty walking climbing stairs, performing household tasks).

or "severe" fatigue and 61% reported "some" or "severe" pain, one of the indicators for need for rehabilitation services; at least half reported shortness of breath, frustration, and sadness.

Table 4 presents prevalence of activity limitations and participation restrictions in order of most to least challenging. Physically demanding activities was the area most impacted upon with 57% reporting being unable. Going up and down more than one flight of stairs was also a challenging activity, with 62% reporting being unable or partially unable. [Note: The variables indicated with an asterisk in Tables 3, 4, and 6 are those indicating need for physical rehabilitation services.]

Merging this information with that from Figure 2 provides an estimate of the service need for older persons discharged from acute care, which is shown in Table 5. Of the 504 people who had valid contact information from hospital records, three groups of discharged seniors were identified: 37.5% for whom no information was available; 12.5% who were well at time of contact; and 50% who had a poor outcome of hospitalization, either death or an outcome that required additional services, and this would include those with cognitive impairment.

Table 6 presents the results of the logistic regression used to estimate the association between a rating of "Poor" vs. "Good" health and each of the functional status indicators. Those reporting the presence of certain symptoms and having difficulty with daily activities and social participation had higher odds of reporting poor health. Except for memory loss, a strong association was observed between outcome and all exposures. Of note, anxiety, depression or fatigue were the strongest individual impairments associated with poor health (OR > 10), whereas household tasks and physically demanding activities ranked among the strongest individual activity indicators (OR > 10).

Table 7 presents the results of a forward stepwise multivariate logistic regression analysis and identifies the strongest contributors of poor self-rated health among vulnerable seniors. The baseline model included depression alone. The second model included depression and household tasks. The third model entailed depression, household tasks, and pain. The fourth model indicated that depression, household tasks, pain, and dizziness were the contributors of poor health (c-statistic = 0.91; maximum rescaled R^2 = 0.60). Odds ratio and 95% confidence intervals for this last model are presented.

Table 8 presents the positive predictive value (PPV), sensitivity, and specificity of self-rated health used as a single item. PPV refers to the probability that subjects with a positive screening test truly have the disease/outcome. In our case, self-rated health used as single item indicates that, among those reporting fair or poor health, the probability of needing rehabilitation services was 100%. Since PPV is prevalence-dependent, we also calculated sensitivity and specificity. Sensitivity refers to the ability of a test to correctly identify those patients with the disease/outcome, whereas specificity refers to the ability of a test to correctly identify those patients without the disease/outcome.[32] In this study, self-rated health had a specificity of 100%, indicating that this screening question has a perfect ability of identifying those who are not in need of rehabilitation services. Nonetheless, a sensitivity of 51% indicates a high rate of false–negatives (those who say they have good health but still need services).

DISCUSSION

Our results indicated that enduring impairments, activity limitations, and participation restriction are common among seniors recently discharged from the hospital. More than 50% of participants reported moderate-to-severe fatigue, pain, psychological disorders, and shortness of breath. Regarding

TABLE 2.
Key environmental, personal, and health characteristics of survey responders

Characteristic	Participants n (%)
Housing conditions, n (%)	
Living with significant other	46 (45)
Living with a family member	11 (10)
Living alone	46 (45)
Family Physician, n (%)	
Yes	92 (89)
Comfortable asking question to MD, n (%)	
Yes	93 (90)
Computer access to health information, n (%)	
Yes	41 (40)
Financial situation meets needs, n (%)	
Yes	74 (72)
Partially	25 (24)
No	4 (4)
Use of external rehabilitation services, n (%)	
Yes	51 (49)
Physical activity, n (%)	
0 times/week	32 (31)
1-3 times/week	37 (36)
>4 times/week	34 (33)
Social activity, n (%)	
0 times/week	31 (30)
1-3 times/week	59 (57)
>4 times/week	13 (13)
General Health Perception, n (%)	
Excellent	2 (2)
Very good	21 (20)
Good	39 (38)
Fair	32 (31)
Poor	9 (9)

TABLE 3.
Prevalence (% of 103 respondents) of physical and mental impairments among seniors recently discharged from a hospital

Impairments	None	Some	Severe
Fatigue,%	25	58	18
*Pain,%	39	47	14
Feeling frustrated ,%	44	49	7
Shortness of breath ,%	49	42	8
Feeling sad ,%	51	40	9
Feeling annoyed, %	52	42	6
Feeling anxious,%	54	38	8
Coughing,%	60	37	3
Appetite loss,%	62	36	3
Swelling	63	36	2
Bladder accident,%	65	33	2
Dizziness,%	69	27	4
Fearing the future,%	70	25	5
Memory loss,%	70	28	2
Choking,%	83	16	1

* criteria for service needs

TABLE 4.
Prevalence (% of 103 respondents) of activity limitations and participation restriction among seniors recently discharged from a hospital

Activity limitations and Participation restrictions	No limitations	Some limitations	Unable
Physically demanding activities,%	15	28	57
*Going up and down stairs,%	38	50	12
*Walking ,%	40	33	27
Recreational activities ,%	40	34	26
Driving,%	40	14	46
*Household activities,%	44	37	20
Community ambulation,%	52	33	14

* criteria for service needs

activity limitations and participation restriction, 50% of our sample had moderate-to-severe limitations in some of the most common daily tasks, such as walking, climbing stairs, and household tasks. For these tasks, we noticed a difference between men and women, which is likely secondary to differences in strength and muscle mass.[33] Similar to our findings, Census Data indicates that 45% of Canadian 75 years and older have a disability.[3,34] More specifically, the most recent Canadian Census showed that pain, mobility, and flexibility are among the most prevalent disabilities in seniors.[2]

We also found that a large proportion of vulnerable seniors perceived their health as fair or poor, which is not surprising after hospital discharge. According to Krummholz, this is a period of vulnerability in which seniors are at risk of experiencing a range of other health events.[8] Poor self-rated health was influenced by many individual indicators of disability; nonetheless the strongest contributors to low health ratings were depression, difficulties in performing household tasks, pain, and dizziness. Similar findings have been reported in the literature regarding depression and pain. [35-37] In seniors, dizziness and difficulty with household tasks are associated with decreased physical functioning. [38,39] Along these lines, previous studies had shown that poor levels of self-rated health not only predicts mortality,[20,25]

TABLE 5.
Outcome status of the 504 seniors who were contactable after
hospital discharge

Outcome Status	N	%	Summary
Not known[a]	134	26.5	
Language barrier	35	7	
Deaf	21	4	37.5
Too good to receive services	28	5.5	
No need			
Respondents	22	5	
Non-respondents	11	2	12.5
Need			
Respondents	81	15.5	
Non-respondents	28	5.5	
Receiving services	23	5	
Cognitive Impairment	21	4	
Too ill to receive services	50	10	
Dead	50	10	50.0

[a]No reason given for refusing follow-up.

but also is associated with loss of physical functioning.[40] Furthermore, Lee indicated that, among 7,527 persons aged 70 years or above living in the community, those reporting fair or poor health had higher odds of having functional limitations compared with those reporting better heath (OR = 1.56 95%CI = 1.20, 2.03).[41]

Finally, according to our results, self-rated health used as single item, showed a high positive predictive value (PPV), indicating that seniors reporting fair or poor health would have been correctly identified by this item as in need of rehabilitation services. In fact, rating of health as poor or fair is sufficient to indicate service needs; rating of health as good or better is neither necessary nor sufficient to indicate no need, and this group would need to be specifically evaluated.[42] In addition, self-rated health used as single item, had a high specificity and a moderate to low sensitivity. Studies had shown that only 30% of seniors discharged from acute care fully recover to similar levels prior hospitalization.[43,44] Thus, it is imperative to promptly identify those in need upon hospital discharge.

Choosing between sensitivity and specificity depends on the severity of the disease/outcome in question and the implications of identifying false–positives or missing false–

TABLE 6.
Functional indicators associated with a rating of "Poor" vs. "Good"[a] health

Parameter	Odds Ratio	95%CI
Impairment Indicators		
Memory loss	1.79	0.74-4.31
Shortness of breath	2.37	1.03-5-45
Appetite loss	2.48	1.06-5.83
Dizziness	4.95	1.95-12.54
Swelling	5.04	1.94-13.09
Urinary incontinence	5.58	2.14-14.53
*Pain	5.98	2.16-16.10
Anxiety	10.63	3.92-28.80
Depression	11.32	4.17-30.73
Fatigue	12.22	2.68-55.78
Activity Limitations and Participation Restriction Indicators		
*Difficulty climbing stairs	3.22	1.25-8.33
*Difficulty walking	3.63	1.53-8.61
Difficulty walking in the community	3.85	1.45-10.07
Difficulty performing recreational activities	4.14	1.63-10.54
*Difficulty with household tasks	10.21	3.60-28.96
Difficulty performing physically demanding activities	12.14	1.52-96.78

[a]Poor health combined ratings of Fair and Poor; Good health combined ratings of Excellent, Very good and Good. Estimates derived from logistic regression; all estimates are adjusted for age and sex.
Model: Y(Health Poor vs. Good) = Indicator(1.k) + age + sex.
* criteria for service needs.

TABLE 7.
Contributors of poor/fair self-rated health among vulnerable seniors

Model	Parameter	Max R^2	C-statistic	AIC	SC	OR^a	$95\%CI^a$
1	Depression	0.34	0.78	114	124	7.98	2.25-28.27
2	+ Household tasks	0.50	0.87	97	110	11.50	2.66-49.61
3	+ Pain	0.58	0.89	88	103	7.38	1.62-33.55
4	+ Dizziness	0.60	0.91	81	99	5.39	1.26-22.98

[a]Estimates for Model 4.
Model 1: poor/fair health = depression;
Model 2: poor/fair health = depression and household tasks;
Model 3: poor/fair health = depression and household tasks and pain.
Model 4: poor/fair health = depression and household tasks and pain and dizziness.
Max R^2 and C-statistic values = the higher, the better model
AIC and SC values = the lower, the better model

TABLE 8.
Positive predictive value, sensitivity, and specificity of self-rated health[a] used as single-item to screen for service needs[b]

Parameter	$Need^b$ (n= 81)	No $Need^b$ (n=22)	PPV	Sensitivity	Specificity
Poor health[a] (n=41)	41	0	1	0.51	1
Good health[a] (n = 62)	40	22			

[a]Dichotomized as "Poor health" (Fair and Poor self-rated health) vs. "Good health" (Excellent, Very good and Good self-rated health).
[b]Dichotomized as "need" (moderate to severe pain, difficulty walking climbing stairs, performing household tasks) vs. "no need" (no pain, no difficulty walking, climbing stairs, performing household tasks).

negatives. Our results indicate that all seniors reporting fair or poor health have indicators of need for further rehabilitation services. The question posed in this article's title may be an alternate way of querying about need, as many older persons are afraid to report disability because of fear of further institutionalization.

A key implication of this study is that 58% of the 1,172 discharges seniors had no valid contact information and could not receive follow-up (see Figure 1). In some instances, the person may have moved to a relative's home or have been place in a residence or in palliative care. However, the proportion in incorrect numbers raises a quality assurance concern, as it would be impossible to provide follow-up services for this half of the population. Of those 504 who could be contacted, 49.5% had one or more indications of poor outcome: death or in need of additional services (see Table 5).

Two viable possibilities for increasing the provision of post-discharge services for seniors are through telehealth and self-management support. Telehealth connects patients and providers and is able to reach a substantial part of the population, thus reducing barriers to services access.[45-47] Self-management programs intend to develop skills necessary to manage chronic conditions.[48-50] Both approaches are patient-centred and optimize patient education and empowerment.[51,52]

Study Limitations
This analysis is based on cross-sectional data; therefore, only associations between variables at one point in time

can be examined; neither causality nor temporal ordering can be inferred. Another limitation of this study is that patients were identified several weeks after discharge as we used hospital discharge records. Therefore, upon initial contact some patients may have fully recovered. Although recruitment rate was low, survey respondents consisted of community-dwelling seniors in need of services and who will most likely benefit from them. Those who refused to be part of the study were well (11%), too ill (21%), or had language barriers (13%). Moreover, some of the 95%CI were wide. This phenomenon is related to the sample size of the study and, while it may impact precision, it does not bring any bias to the study.

The study excluded those discharged with orthopaedic/ cardiac surgery and stroke/myocardial infarction as these patients are likely to be receiving services. Furthermore, seniors with dementia were excluded to avoid measurement bias. Thus, the findings of this study should be generalized to a population of seniors who are not cognitively impaired and who are not referred to services upon hospital discharge.

CONCLUSION

Our findings suggest that although having functional limitations, not being physically active and not being equipped to search for and retrieve information to maintain and improve their health, seniors are being discharged home with minimal provisions. Fair or poor self-rated health,

asked as a single item, is strongly associated with higher odds of reporting persistent impairments, as well as activity limitations and participation restrictions. In a vulnerable population, such as recently discharged seniors, this sample screening question could be used at hospital discharge to identify a high degree of need for further follow-ups and services to promote recovery.

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CONFLICT OF INTEREST DISCLOSURES

The authors declare that no conflicts of interest exist.

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