

Clinical Question: Does the literature indicate that patients with a stroke have better outcomes after receiving rehabilitation from an acute rehabilitation facility than from a skilled nursing facility?

The purpose of "Evidence in Practice" is to illustrate the literature search process to obtain evidence that can guide clinical decision making. This article is not a case report. The examination, evaluation, and intervention sections are purposely abbreviated.

A 76-year-old, right-hand dominant man awoke with slurred speech and left-sided weakness and was admitted to the acute hospital facility where I (DKM) was completing a clinical education requirement for my doctor of physical therapy degree. The patient was a retired guitar player who lived at home with his wife. Before his hospitalization, the patient was independent in activities of daily living (ADLs) and community ambulation without an assistive device, and he enjoyed an active lifestyle, including taking daily walks with his wife, gardening, and playing his guitar. Evidence of a recent lacunar infarction in the right internal capsule was found on a computed tomography (CT) scan, and he was diagnosed with an embolic stroke. After 2 days of medical care (including aspirin and heparin), his condition had stabilized, and he was referred to the physical therapy department by the attending neurologist for examination, evaluation, and discharge recommendations.

This patient's medical history included transient ischemic attacks, hypertension, hypercholesterolemia, and a previous left cerebrovascular accident (CVA)—a thalamic infarct—that was noted in the most recent radiology report. He did not experience any residual effects from that CVA and was discharged home from acute care. No rehabilitation services were recommended, and he was independent with all mobility and ADLs following the CVA. The patient had a history of glaucoma, cataracts, and benign prostatic hypertrophy. He stated that he quit smoking 5 years ago (50 packs/year) and that he did not drink large amounts of alcohol.

The patient was alert and oriented to person and time and was able to follow 1- and 2-step commands. He had mild dysarthria, no evidence of expressive or receptive aphasia, and no evidence of left-side neglect. At rest, his vital signs were within normal limits with the exception of blood pressure, which was 130/80 on hypertensive medication. His

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hemodynamic responses to activity were reassessed after examining bed mobility and were found to be appropriate.

The patient was nonambulatory. He required maximum assistance from 1 person to complete the task of rolling to the right. He could initiate rolling to the left without assistance, but required moderate assistance from 1 person to complete the roll. To rise from a supine position to a sitting position on the left side of his bed, he required maximum assistance from 1 person. With right upper-extremity support, the patient was able to sit at the edge of the bed independently, but trunk weakness kept him from maintaining his balance in midline for more than 30 seconds without upper-extremity support. Sit-to-stand transfers required moderate assistance because he was unable to support his weight through his left lower extremity, and he required moderate assistance from 1 person to maintain standing.

Muscle force in the right upper and lower extremities was within functional limits based on Kendall et al.¹ The patient had no active movement in his left hand or wrist, and only a trace of movement at his elbow. When he was asked to raise his left upper extremity, scapular elevation occurred immediately. He could isolate movement at the shoulder through partial range of motion when gravity was minimized. He was able to initiate left hip flexion against gravity and extend the left knee from 90 degrees to 70 degrees of flexion. He had no active movement in the left ankle. No impairments were noted in passive range of motion or in sensory integrity.

The CT scan suggested that the size of the infarct was relatively small; however, because of the concentration of descending motor fibers in the internal capsule, the patient had moderate to severe strength deficits. People who have had a CVA with purely motor system deficits often reach higher functional levels compared with those with motor and sensory deficits or with motor, sensory, and visual deficits.² This patient had only motor system involvement, whereas his cognition, sensation, perception, and vision were preserved. I determined that he had a good prognosis for improvement in functional status and that he was a good candidate for rehabilitation.

Upon completion of my initial examination, I discussed discharge possibilities with my clinical instructor and then with the patient's physician and case manager. The patient wanted to participate in physical therapy and rehabilitation with the hope of returning home with his wife. They lived in a single-story home, with one step to enter, and they had 2 adult sons living in the area. His wife was in good health and fully independent and thus was capable of providing care at home for him if needed. She recognized the severity of his current limitations, however, and agreed with the rehabilitation team that he was unsafe to return directly home at the time. We discussed discharge possibilities, including acute rehabilitation and skilled nursing facilities (SNFs), and the case manager presented both options for the patient. The family inquired about transferring the patient to a SNF close to their home; however, I was inclined to recommend that this patient be discharged to an acute rehabilitation facility where he would receive more intensive therapy compared with that provided by a SNF.

I had no prior experience in the acute care setting in making a discharge recommendation for a patient after a stroke. In order to make the most appropriate discharge recommendation for this patient, I wanted to know whether the type of rehabilitation setting influenced outcomes in patients who have had a stroke. Because of the current emphasis on cost containment at my facility, discharge to the least expensive facility that provided effective recovery for the patient was encouraged. Although I wanted to ensure that I was being fiscally responsible to all parties involved in the rehabilitation of this patient, I also wanted to provide a recommendation based on what I thought was the best health care advice available. I was not familiar with the literature comparing the effectiveness of rehabilitation in an acute rehabilitation setting to rehabilitation at a SNF, so I decided to search the literature.

■ Database used for search: CINAHL

The *Cumulative Index to Nursing and Allied Health* (CINAHL) (www.cinahl.com)* is a database of more than 1,600 journals related to nursing and allied health that is updated monthly. I chose this database as an alternative to the popular MEDLINE database because CINAHL indexes more journals related to allied health professions than MEDLINE.³ As I later discovered during my search, the indexing terms in CINAHL (analogous to the Medical Subject Heading [MeSH] terms in MEDLINE) also provide greater specificity related to physical therapy. For example, the common terms for "acute rehabilitation" in MEDLINE and CINAHL are: "brain injury," "spinal cord injury," "middle aged," "aged," "rehabilitation centers," and "rehabilitation." CINAHL supplements those terms with: "clinical assessment tools," "cerebrovascular accident," and "functional status." Because functional outcomes for patients with CVAs who have received rehabilitation were my primary interest, I thought this database would provide a more efficient search of the literature for this case. I accessed CINAHL through my university's subscription to OVID (www.ovid.com)† on August 29, 2004.

■ Keywords for initial search: stroke, acute rehabilitation, and skilled nursing facility

Above the keyword box on the main search page is a check box labeled **Map Terms to Subject Headings**. I was unsure of its function, so I unchecked the box before beginning my search. I then typed **stroke** in the keyword box, intending to combine this search and a second search using **acute rehabilitation** as the keywords (Table: search lines 1 and 2). Next, I typed **1 and 2** in the keyword box to combine the search lines from my first 2 searches, which returned 51 references. I scanned the titles for those that seemed to address rehabilitation settings related to outcomes for patients after stroke and found 4 that appeared to be relevant to my question (Fig. 1). I clicked the box next to each citation to save them (Table:

* Cinahl Information Systems, 1509 Wilson Terrace, Glendale, CA 91206.

† Ovid Technologies, 100 River Ridge Dr, Norwood, MA 02062.

Table. Search History

Search Line No.	Search String	Results
Initial search using keywords^a:		
1	stroke	7,332
2	acute rehabilitation	237
3	1 and 2	51
4	from line 3 keep citations 2 (Chen et al), 13 (Keith et al), 25 (Smithard), 45 (Schmidt et al) ^b	4
5	skilled nursing facility	168
6	1 and 5	5
Revised search using subject headings^c:		
7	acute rehabilitation (with subheadings "rehabilitation centers," "cerebral vascular accident," "rehabilitation," or "functional status")	16,513
8	skilled nursing facility (all subheadings)	907
9	7 and 8	93
10	from line 9 keep 18 (Chen et al), 37 (Angelelli et al), 43 (Kramer et al [2000]), 51 (Skinner), 55 (Berg and Intrator), 65 (Despande et al), 72 (Kramer et al [1997, JAMA]), 76 (Kramer et al [1997, Top Stroke Rehabil]), 84 (Frolich and Folgelman) ^d	9

^a Map Terms to Subject Headings box clicked off.

^b For citations see Figure 1.

^c Map Terms to Subject Headings box clicked on.

^d For citations see Figure 5.

search line 4). Most of the titles of the other articles indicated that they were about medical therapies, particular interventions, or other topics unrelated to my search. In a fourth search, I used **skilled nursing facility** as my keyword. As I had done previously with **stroke** and **acute rehabilitation**, I combined the search of **skilled nursing facility** (the fifth search line) with my initial search on **stroke** (the first search line) by typing **1 and 5** into the query box (Table: search line 6). This resulted in 5 references.

I scanned the titles, again focusing on rehabilitation settings related to poststroke outcomes; however, this revealed only one relevant article, which was the same article by Keith et al (Fig. 1: citation 2) found by my search on **stroke** and **acute rehabilitation**. I read the abstracts for all 4 articles by clicking on the **Abstract** link below each citation. After reading the abstracts, I found that only 2 articles (Fig. 1: citations 1 and 2) were appropriate for my question. I retrieved the full text of these articles at my university's library. I was dissatisfied, however, with the small number of articles identified with this first search attempt; consequently, I decided to change my search strategy.

1. Chen CC, Heinemann AW, Granger CV, Linn RT. Functional gains and therapy intensity during subacute rehabilitation: a study of 20 facilities. *Arch Phys Med Rehabil.* 2002;83:1514-1523.

*2. Keith RA, Wilson DB, Gutierrez P. Acute and subacute rehabilitation for stroke: a comparison. *Arch Phys Med Rehabil.* 1995;76:495-500.

3. Smithard DC. Management of stroke: acute, rehabilitation and long-term care. *Hosp Med.* 2003;64:666-672.

4. Schmidt J, Drew-Cates J, Dombovy M. Severe disability after stroke: outcome after inpatient rehabilitation. *Neurorehabil Neural Repair.* 1999;13:199-203.

Figure 1. Citations selected from initial search—**stroke AND acute rehabilitation** (Table: search lines 1-6). Citations that were selected for further examination are highlighted in red. Asterisk indicates a citation that was also retrieved by a search of **stroke AND skilled nursing facility**.

○ V I D Mapping Display ? Help

Combine selections with: OR

Your term mapped to the following Subject Headings:
Click on a subject heading to view more general and more specific terms within the tree.

Include All Subheadings

Select	Subject Heading	Explode	Focus	Scope
<input type="checkbox"/>	Brain Injuries	<input type="checkbox"/>	<input type="checkbox"/>	<input type="button" value="i"/>
<input type="checkbox"/>	Spinal Cord Injuries	<input type="checkbox"/>	<input type="checkbox"/>	<input type="button" value="i"/>
<input checked="" type="checkbox"/>	Rehabilitation Centers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="button" value="i"/>
<input type="checkbox"/>	Clinical Assessment Tools	<input type="checkbox"/>	<input type="checkbox"/>	<input type="button" value="i"/>
<input checked="" type="checkbox"/>	Cerebral Vascular Accident	<input type="checkbox"/>	<input type="checkbox"/>	<input type="button" value="i"/>
<input checked="" type="checkbox"/>	Rehabilitation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="button" value="i"/>
<input type="checkbox"/>	Aged	<input type="checkbox"/>	<input type="checkbox"/>	<input type="button" value="i"/>
<input type="checkbox"/>	Middle Age	<input type="checkbox"/>	<input type="checkbox"/>	<input type="button" value="i"/>
<input checked="" type="checkbox"/>	Functional Status	<input type="checkbox"/>	<input type="checkbox"/>	<input type="button" value="i"/>
<input type="checkbox"/>	Inpatients	<input type="checkbox"/>	<input type="checkbox"/>	<input type="button" value="i"/>
<input type="checkbox"/>	acute rehabilitation.mp. search as Keyword			

Hints:

- Click on a **Subject Heading** to view its tree - related terms that are more general and more specific.
- Select the **Explode** box if you wish to retrieve results using the selected term and all of its more specific terms.
- Select the **Focus** box if you wish to limit your search to those documents in which your subject heading is considered the major point of the article.
- If your search did not map to a desirable subject heading, select the box **Search as Keyword**.
- If you select more than one term, you can combine them using a boolean operator (AND or OR).
- If you wish to see the scope note for any term or heading, click on the information *i* icon, when available.

Figure 2. CINAHL subject headings for "acute rehabilitation" as displayed in Ovid Online. Reproduced with permission of Ovid Technologies Inc.

■ **Keywords for revised search:** acute rehabilitation and skilled nursing facility

My main goal was to find literature comparing (1) outcomes for patients with stroke who had received rehabilitation in an acute rehabilitation facility with (2) outcomes for patients with stroke who had received rehabilitation in a SNF. I, therefore, combined the terms **acute rehabilitation** and **skilled nursing facility** instead of combining each term individually with **stroke**. I also explored the subject headings (roughly equivalent to MEDLINE's MeSH terms), choosing to leave the **Map Terms to Subject Heading** box checked, rather than searching for my terms only as keywords. The difference between using subject headings and searching for

terms as keywords is that the keyword option limits the search by the *specific* keyword or phrase in the title, abstract, or text of the article, whereas the subject heading allowed me to find all articles related to the subject heading as well as those that included *similar* terms (eg, stroke and cerebral vascular accident versus stroke only). I considered switching to the MEDLINE database as well; however, as mentioned above, I found that the subject headings in CINAHL were more specific to the information I was attempting to retrieve. It is possible to combine and simultaneously search multiple databases when using OVID; however, this eliminates the possibility of using the **Map Terms to Subject Headings** checkbox. Because I had decided to try my search with subject headings, I chose to continue with a single database.

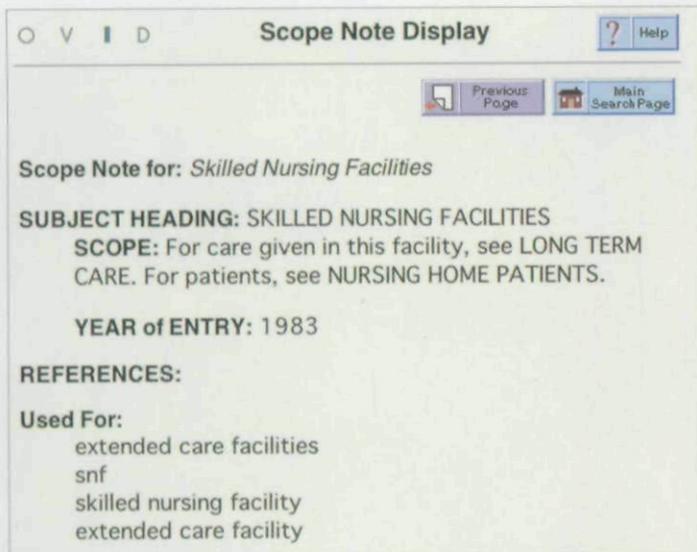


Figure 3. CINAHL's Scope Note Display screen for "skilled nursing facilities" in Ovid Online. Reproduced with permission of Ovid Technologies Inc.

I retyped **acute rehabilitation** in the keyword box and clicked **Perform Search**, which brought me to a Mapping Display page with subject headings (Fig. 2). One of the subject headings under acute rehabilitation was "cerebral vascular accident." Without using "stroke" as a keyword, I was still able to incorporate the topic into my search using the subject headings. To the far right of each subject heading is a **Scope** button that connects to a page outlining the scope of the subject heading. I used this tool to confirm that the subject headings **rehabilitation centers**, **cerebral vascular accident**, **rehabilitation**, and **functional status** were relevant to my search. On the **Mapping Display** page, I checked the box next to each of those subject headings to include them in my search (Fig. 2).

I also had the option to "explode" or "focus" my search from the Mapping Display page (Fig. 2). Exploding the search would allow me to expand my search to include all of the related terms for the respective subject heading (which can be found by clicking on the subject heading). Focusing the search narrows the search to articles that have the specific subject heading as the focus. I chose not to use the **Focus/Explode** feature to (1) avoid retrieving articles outside the scope of my search and (2) avoid limiting my search as I had done previously by using only keywords.

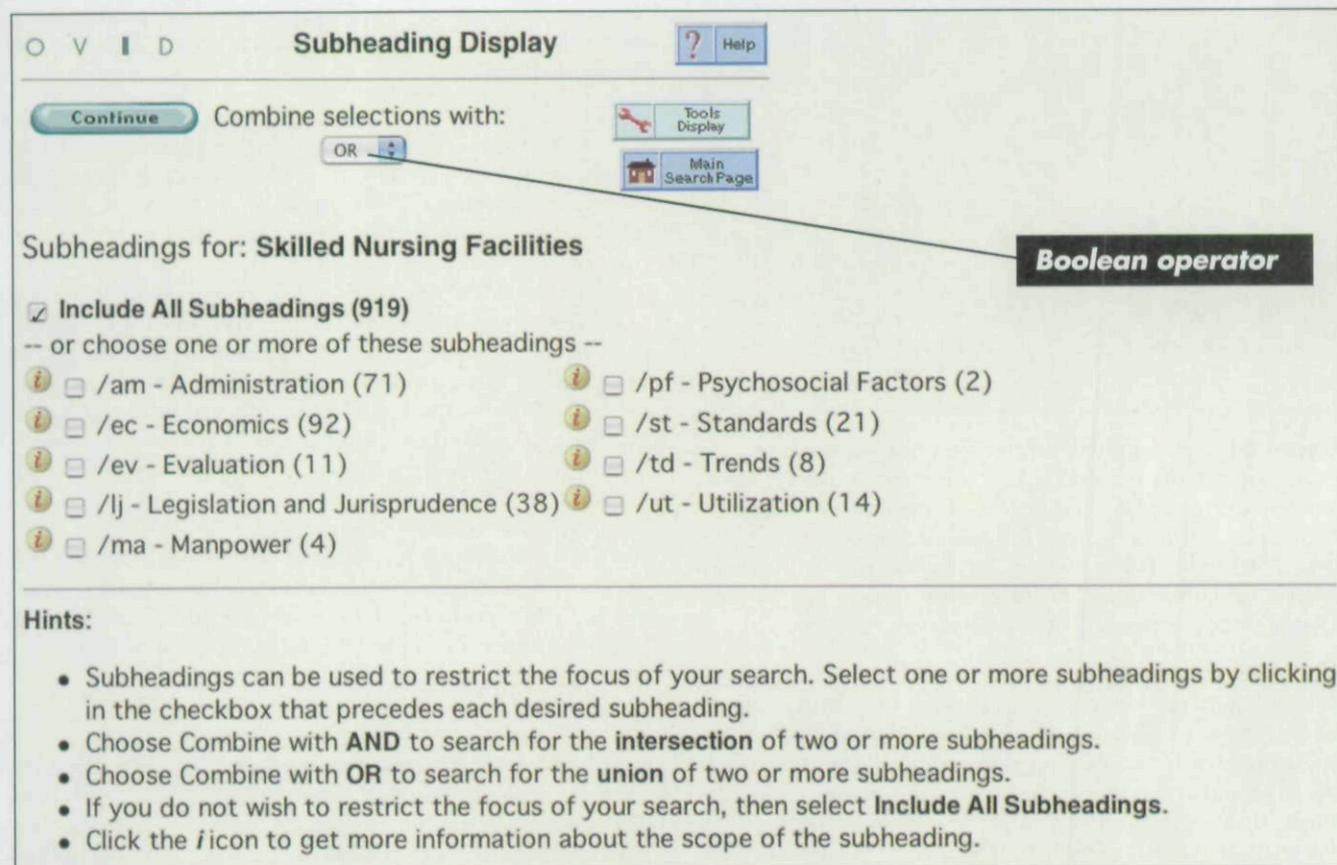


Figure 4. CINAHL's Subheading Display screen for subject heading "skilled nursing facilities" in Ovid Online. Reproduced with permission of Ovid Technologies Inc.

*1. Chen CC, Heinemann AW, Granger CV, Linn RT. Functional gains and therapy intensity during subacute rehabilitation: a study of 20 facilities. *Arch Phys Med Rehabil.* 2002;83:1514.

2. Angelelli JJ, Wilber KH, Myrtle R. A comparison of skilled nursing facility rehabilitation treatment and outcomes under Medicare managed care and Medicare fee-for-service reimbursement. *Gerontologist.* 2000;40:646-653.

3. Kramer AM, Kowalsky JC, Lin M, et al. Outcome and utilization differences for older persons with stroke in HMO and fee-for-service systems. *J Am Geriatr Soc.* 2000;48:726-734.

4. Skinner N. Acute, subacute, postacute, or skilled nursing facility: where should your patient go? *Inside Case Management.* 1998;5(7):5-8.

5. Berg K, Intrator O. Postacute care following stroke or hip fracture: single services and combinations used by Medicare beneficiaries (1987-1992). *J Aging Health.* 1999;11:27-48.

6. Deshpande SA, MacNeill SE, Lichtenberg PA, et al. Functional outcome differences in acute versus subacute rehabilitation. *Topics in Geriatric Rehabilitation.* 1998;13(4):30-38.

7. Kramer AM, Steiner JF, Schlenker RE, et al. Outcomes and costs after hip fracture and stroke: a comparison of rehabilitation settings. *JAMA.* 1997;277:396-404.

8. Kramer AM, Schlenker RE, Eilertsen TB, Hrinkevich CA. Stroke rehabilitation in nursing homes. *Top Stroke Rehabil.* 1997;41:53-63.

9. Frolich WH, Fogelman L. Short-term rehab maximizes patient potential. *J Long Term Care Adm.* 1994;22:4-8.

Figure 5. Citations of the articles from revised search—*acute rehabilitation* (with subheadings “rehabilitation centers,” “cerebral vascular accident,” “rehabilitation,” or “functional status”) **AND** *skilled nursing facilities* (all subheadings) (Table: search lines 7–10)—that were relevant for further review. Citations selected for further review are highlighted in red. Asterisk indicates a citation retrieved by the initial search.

Remaining on the Mapping Display page, I chose to combine my selections by selecting the Boolean operator “OR” from the dropdown list at the top right of the page, so that my search would result in articles addressing any or all of the subject headings. (Choosing “AND” would only return articles that included all of my subject headings.) I then clicked on Continue to resume my search, which resulted in 16,513 references (Table: search line 7). I completed the same procedure for *skilled nursing facility*. For this phrase, *skilled nursing facilities* was the only subject heading offered. I read the scope

1. Keith R, Wilson D, Gutierrez P. Acute and subacute rehabilitation for stroke: a comparison. *Arch Phys Med Rehabil.* 1995;76:495-500.

2. Chen C, Heinemann A, Granger C, Linn R. Functional gains and therapy intensity during subacute rehabilitation: a study of 20 facilities. *Arch Phys Med Rehabil.* 2002;83:1514-1523.

3. Kramer A, Kowalsky J, Lin M, et al. Outcome and utilization differences for older persons with stroke in HMO and fee-for-services systems. *J Am Geriatr Soc.* 2000;48:726-734.

4. Kramer A, Steiner J, Schlenker R, et al. Outcomes and costs after hip fracture and stroke: a comparison of rehabilitation settings. *JAMA.* 1997;277:396-404.

5. Deshpande SA, MacNeill SE, Lichtenberg PA, et al. Functional outcome differences in acute versus subacute geriatric rehabilitation. *Top Geriatr Rehabil.* 1998;13:30-38.

Figure 6. Articles retrieved from CINAHL that were chosen for further review based on title and abstract. Citations 1 and 2 were retrieved from the first search (Table: search lines 1–6), citations 3–5 were retrieved from the revised search (Table: search lines 7–9). Citations selected for critical appraisal are highlighted in red.

(Fig. 3), and again I decided against either exploding or focusing the search, thus I clicked on **Previous Page** to go back. After clicking **Continue** from the Mapping Display page, I was taken to a Subheading Display page (Fig. 4), which displayed subheadings such as “economics,” “evaluation,” and “utilization.” Because I did not want to restrict the focus of my search, I clicked the box **Include All Subheadings**, and kept the Boolean operator as “OR.” I clicked on **Continue**, and the search produced 907 references (Table: search line 8). At this point, I was ready to combine these 2 searches to locate literature combining acute rehabilitation and skilled nursing facilities. I typed **7 and 8** in the keyword box, which returned 93 citations (Table: search line 9). I scanned the titles of these citations for articles that seemed appropriate for my clinical question, and I found 9 additional articles for review, one of which I had already found in the first search (Fig. 5: citation 1). Again, I was looking for titles that suggested the article made some form of comparison between different rehabilitation settings and effect on outcome.

■ **Selection of articles for review:** I read the abstracts, when available, for each of these articles. When an abstract link was not available, clicking on **Bibliographic Links** took me to the PubMed Web site (www.ncbi.nlm.nih.gov/PubMed) and the abstract. An abstract was unavailable for the Frohlich and Fogelman article (Fig. 5: citation 9). Unfortunately, my university’s library did not subscribe to this journal, so I excluded this article from my search. I could have retrieved the article

through interlibrary loan; however, this was not an option because it typically takes 2 or 3 weeks to receive an article and I had only 1 or 2 days before the patient would be transferred. After reading the abstracts from citations 2, 4, and 5 (Fig. 5), I determined that they were not appropriate for my clinical question (eg, the studies did not compare the 2 settings, did not discuss outcomes related to rehabilitation setting). The first citation listed in Figure 5 was the duplicate from my first search, for which I already had the full-text article. Based on the abstracts, the remaining 4 articles (Fig. 5: citations 3, 6-8) were relevant, and the full text of these articles was available to me, either through Ovid or through the library.

I obtained the full text of the articles from both searches and read the articles to see if they addressed my topic specifically enough. I then used the CAT (critically appraised topic) format as described by Fetters et al⁴ to examine those articles that were specific to my question. According to Fetters et al,⁴ a CAT is a standardized one-page summary of a research article "organized around a clinical question." A CAT provides a critique of the evidence (based on the methods used and on statistical criteria such as internal, external, and statistical validity) and a statement about the clinical relevance of the results. The citations for the 5 articles are listed in Figure 6. I evaluated the threats to, and the strengths associated with, internal, external, and statistical validity in each article. This process enabled me to formulate a clinical bottom line—that is, the clinical actions I would take—based on my clinical question and the applicability of each study's results to my patient. After reading through the Chen et al and the Deshpande et al articles (Fig. 6: citations 2 and 5), I realized that they did not address my topic specifically enough. Deshpande et al (citation 5) addressed geriatric rehabilitation broadly, and Chen et al (citation 2) focused only on subacute rehabilitation, without comparisons to other settings. Therefore, I performed a critical appraisal of articles 1, 3, and 4 listed in Figure 6.

Keith R, Wilson D, Gutierrez P. Acute and subacute rehabilitation for stroke: a comparison. *Arch Phys Med Rehabil.* 1995 June; 76: 495-500.

Subacute rehabilitation, a recent innovation, is a less intense form of traditional inpatient rehabilitation. This study is a retrospective comparison of stroke treatment in a comprehensive inpatient service (acute rehabilitation) and subacute rehabilitation in a skilled nursing facility. Consecutive records during 1990 and 1991 resulted in 331 patients at the acute level and 97 at the subacute. Analysis of patient characteristics found few major differences between the two populations. Scrutiny of billing records found that acute program patients had twice as much treatment during a stay, twice the daily treatment hours, and twice the average charge per day. Acute rehabilitation patients showed substantially greater gains in functional impairment measures (FIM), but the proportion

of patients discharged to the community varied little. Cost-effectiveness analysis found that the charge per successful discharge was more than double for acute rehabilitation. The charge per one point of FIM gain also was substantially higher. Although subacute rehabilitation was found to be more cost-effective than acute, additional research is needed to establish policies regarding rehabilitation services.

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Although I specified acute rehabilitation and SNFs in my clinical question, I was still interested in this study because it compared acute rehabilitation with subacute rehabilitation, which provides less intense therapy. In this study, the patient characteristics were similar for both groups (ie, no statistical difference was noted), and, more important, the characteristics of my patient were similar to the characteristics of the patients in this study with regard to sex, race, admission from an acute care hospital, and age. The authors reported limited variability between groups; however, their results did show a significant, albeit small, difference ($P=.007$) in the proportion of patients discharged to the community, with 71% of the acute rehabilitation group returning to a residential setting and 67% of the subacute rehabilitation group returning to the community.

The Functional Independence Measure (FIM) was used to measure functional outcome. Average FIM scores were not statistically different at admission between the 2 groups. At discharge, there was no statistical difference in total FIM scores between groups; however, the change in total functional gain was significantly different between groups, with the acute rehabilitation group having a greater improvement in total FIM scores. In addition, changes in the following individual FIM items were significantly higher for patients in acute rehabilitation: all areas of self-care, bowel and bladder management, toilet and tub/shower mobility, and walking/wheelchair locomotion. The authors performed stepwise regression analysis to determine the extent to which the independent variables (admission FIM score, age at admission, onset days to admission, days out of treatment, length of stay, therapy hours, and type of facility) predicted change in the FIM scores. Although this analysis did not show a relationship between a change in FIM score and facility type, according to Keith and colleagues, it did demonstrate that the other 6 variables—admission FIM score, age at admission, onset days to admission, days out of treatment, length of stay, and therapy hours—did predict change in FIM scores, suggesting that variations in intensity of treatment do influence outcomes.

This study had a number of threats to internal validity. There was a large difference in number of subjects between groups (331 in the acute rehabilitation group compared with 97 in the subacute rehabilitation group at baseline). Subjects were recruited from only 2 facilities, which limits generalizability to other facilities. The retrospective design of the study may have contributed to subject selection bias. Authors were vague in reporting results, which made it difficult to accept their results and conclusions. They did not report *P* values in the text, and, although they reported *P* values in the tables, it was unclear which results were being statistically compared (ie, within-group versus between-group comparisons). Based on my interpretation of their reported results, however, rehabilitation services received at either type of rehabilitation facility appeared to foster discharge to the community for patients after a stroke, and, based on individual FIM items, higher functional outcomes were achieved when rehabilitation was received at an acute rehabilitation facility. Although this study had limitations, the results encouraged me to consider acute rehabilitation for my patient.

Kramer A, Kowalsky J, Lin M, Grigsby J, Hughes R, Steiner J. Outcome and utilization differences for older persons with stroke in HMO and fee-for-services systems. *J Am Geriatr Soc.* 2000 July; 48(7): 726-734.

OBJECTIVES: To compare treatment and outcomes for older persons with stroke in Medicare health maintenance organizations (HMOs) and fee-for-service (FFS) systems. **DESIGN:** Inception cohort stratified by payer and followed for 1 year. **SETTING:** Six HMOs and five FFS systems with large Medicare populations in the West, Midwest, and Eastern United States. **PARTICIPANTS:** A total of 429 randomly selected stroke patients receiving rehabilitation in nursing homes or rehabilitation hospitals (RHs) from June 1993 to June 1995. **MEASUREMENTS:** Improvement in activities of daily living (ADLs) during rehabilitation, and ADL recovery, community residence, and utilization until 12 months after stroke. Outcomes were adjusted for pre-morbid function, marital status, comorbid illness, post hospital function, cognition, psychological problems, and stroke deficits. **RESULTS:** At baseline, HMO patients were more likely to be married, and less likely to be blind or have psychiatric diagnoses. HMO patients had shorter hospitalizations ($P < .001$), were less likely to be admitted to RHs (13% vs 85%, $P < .001$), and received fewer therapy and physician specialist visits ($P < .001$) but more home health visits ($P < .001$). During rehabilitation, FFS patients made greater improvement in ADLs (difference, 0.73 ADLs; 95% CI, .37-1.09). At 1 year, there was no difference in ADL recovery (difference, -0.24 ADL; 95% CI, -0.64-0.16), but FFS patients were more likely to reside in the community (adjusted OR, 1.8; 95% CI, 1.1-3.1), and HMO patients were more likely to reside in nursing homes (adjusted OR, 2.4; 95% CI, 1.1-5.5). **CONCLUSION:** Study findings suggest that short-term functional outcomes and eventual community residence rates are poorer for Medicare HMO patients with stroke than for stroke patients receiving FFS care, consistent with

the lower intensity of rehabilitation (in nursing homes vs RHs) and less specialty physician care.

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The title of this article did not suggest a direct comparison of acute rehabilitation and SNFs, but the study did compare the two indirectly by way of comparing outcomes and utilization of rehabilitation services for patients with Medicare insurance coverage through a health maintenance organization (HMO) versus fee-for-service (FFS) plans. The authors reported that 85.3% of patients with FFS insurance were discharged from the hospital to an acute rehabilitation facility compared with only 12.8% of patients with HMO insurance. I interpreted these results to imply that patients with FFS insurance are more likely to receive rehabilitation in an acute rehabilitation facility, whereas patients served through an HMO are more likely to receive rehabilitation in a SNF. In my analysis of this article, therefore, I used FFS interchangeably with acute rehabilitation and HMO interchangeably with SNF rehabilitation.

My patient was similar to the sample of patients in this study, including having: a diagnosis of stroke, an age greater than 65 years, Medicare coverage, an acute hospital stay within the previous 30 days of admission to rehabilitation, and no prior SNF or rehabilitation hospital admission for the current stroke. Of the 429 subjects in this study, 96 patients died during the study; however, the authors stated that the deceased subjects were comparable to the remaining sample ($n=333$). Both groups were similar at admission to rehabilitation, except that the HMO group ($n=236$) had better social support and the FFS group ($n=193$) had more subjects who were blind and had more psychiatric diagnoses. Adjusting for those covariates, Kramer et al reported that the FFS group had significantly greater improvement in Katz Index of ADL scores (a measure of function in ADLs) and FIM scores at discharge from rehabilitation. There was no significant difference between groups in the number of ADLs recovered to the pre-morbid level of function at follow-up. The likelihood of residing in the community was greater for the FFS group at 9 and 12 months despite the fact that the HMO group received a greater number of physical therapy and occupational therapy visits during the year after discharge from rehabilitation. Although this study demonstrated functional improvement after rehabilitation, the type of Medicare insurance or rehabilitation setting did not appear to influence the number of ADLs recovered to pre-morbid functional level during the year following discharge from rehabilitation. In spite of this, patients receiving rehabilitation at an acute rehabilitation hospital were 1.8 times more likely to return to community residence and less likely to reside in a nursing home.

In my critique of this study, I noted potential limitations in how the authors measured changes in ADL status. In comparing ADL status within each group at follow-up, the authors limited their outcome measures to a self-report tool and a method of counting the number of ADLs that returned to a person's pre-morbid level only. This may have underestimated the differences between groups. In addition, the authors

failed to report reliability and validity for these measurements as well as power for the statistical analysis. Given the outcome measures that were used, the FFS group made larger gains in ADLs compared with the HMO group at the completion of the rehabilitation period. The lack of a performance measure that was more sensitive to change, however, may have limited the authors' ability to detect greater differences in ADL status. Finally, differences in utilization patterns after discharge existed between groups, which may have had an effect on outcomes at follow-up. Given that the FFS group was more likely to reside in the community 1 year after discharge from rehabilitation, it is possible that their need for assistance with ADLs may have been less than that of the HMO group, placing the FFS group at a higher functional level during the follow-up compared with the HMO group.

The results from this study suggest that rehabilitation services received in acute rehabilitation facilities are associated with better outcomes for patients after a stroke. The study sample was similar to my patient as well, which suggested that I could generalize this information to him.

Kramer AM, Steiner JF, Schlenker RE, Eilertsen TB, Hrinkevich CA, Tropea DA, Ahmad LA, Eckhoff DG. Outcomes and costs after hip fracture and stroke: a comparison of rehabilitation settings. *JAMA*. 277(5):396-404, 1997 Feb 5

Objective: To assess whether outcomes and costs differ for elderly patients admitted to rehabilitation hospitals, subacute nursing homes, and traditional nursing homes. **Design:** Inception cohort stratified by provider type and followed prospectively for 6 months. **Setting:** A total of 92 hospital-based units and freestanding facilities from 17 states. **Patients:** A total of 518 randomly selected patients with hip fracture and 485 stroke patients admitted from November 1991 to February 1994. **Main Outcome Measures:** At 6 months comparing community residence, recovery to premorbid levels in 5 activities of daily living (ADLs), Medicare costs, and the number of therapy and physician visits. Outcomes were adjusted for premorbid residence and function, caregiver availability, comorbid illness, admission function, cognition, depression, sensory deficits, and mobility impairments. **Results:** On admission, rehabilitation hospital patients were more likely ($P < .001$) to have caregivers and better cognitive and physical function. Hip fracture patients admitted to rehabilitation hospitals did not differ from patients admitted to nursing homes in returning to the community (adjusted odds ratio [OR], 1.3; 95% confidence interval [CI], 0.6-2.6) or in the number of ADLs recovered to premorbid level (difference, 0.09 ADL; 95% CI, -0.27-0.44), but stroke patients admitted to rehabilitation hospitals were more likely to return to the community (adjusted OR, 3.3; 95% CI, 1.5-7.2) and recover ADLs (difference, 0.63 ADL; 95% CI, 0.20-1.07). Subacute nursing home patients with stroke were more likely than traditional nursing home patients to return to the community (adjusted OR, 6.8; 95% CI, 2.2-21.4), there was no difference in return to the community for patients with hip fracture (adjusted OR, 1.6; 95% CI, 0.7-3.6), and

there were no differences in recovery of ADLs for either condition. Medicare costs were greater ($P < .001$) for rehabilitation hospital patients than for subacute nursing home patients, and the costs for subacute nursing home patients were greater ($P = .03$ for stroke and $.009$ for hip fracture) than for traditional nursing home patients. **Conclusions:** Study findings are consistent with enhanced outcomes for elderly patients with stroke treated in rehabilitation hospitals but not for patients with hip fracture. Subacute nursing homes were more effective than traditional nursing homes in returning patients with stroke to the community, despite comparable functional outcomes.

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This article assessed outcomes and costs for patients with hip fractures or strokes who were admitted to rehabilitation facilities, subacute nursing homes (a term used synonymously with "subacute SNFs" by the authors), and traditional nursing homes (synonymous with "traditional SNFs"); therefore, I reviewed only the results from this study pertaining to patients with strokes. Complete data were available for 366 of the original 485 patients in this study. In the results, the authors reported data for 450 subjects, including those with incomplete data; however, they did not account for a missing 35 subjects. The unadjusted results suggest that patients who received rehabilitation services in an acute rehabilitation facility ($n = 271$) were more likely to be residing in the community 6 months after admission than patients who received rehabilitation services in a traditional SNF ($n = 71$; odds ratio [OR] = 3.3, 95% confidence interval [CI] = 1.5-7.2). I continued to be primarily interested in the results pertaining to subacute care, because it is a viable alternative in our health care system. Including patients with incomplete data, those who were admitted to subacute SNFs ($n = 108$) also were more likely to be residing in the community (OR = 6.8, 95% CI = 2.2-21.4) than those admitted to traditional SNFs. Patients in either type of SNF who had had a stroke had significantly more ADL difficulties at 6 months than patients who were admitted to an acute rehabilitation facility. Unadjusted results showed that patients admitted to subacute SNFs had significantly greater recovery of function for transferring, walking 6 m (20 ft), and toileting than patients admitted to traditional SNFs. After adjusting for age, Barthel Index score, hemiplegia, and depression ($R^2 = .41$), differences remained between acute rehabilitation facilities and SNFs, but did not exist between subacute and traditional SNFs.

A limitation of this study was the use of self-reports for an ADL score, which may not represent actual changes in performance of ADLs. A strength of this study was the comparison of patients who declined to participate in the study to the actual study sample. The authors found no significant differences between groups, except that patients with stroke who chose not to participate were more likely to have psychiatric diagnoses. The authors also compared data from subjects who did not complete the study to data from the remaining sample and found no significant difference between groups. I agreed with their conclusion that their data suggested better function

as well as a higher likelihood of return to community living for patients with stroke 6 months after admission to an acute rehabilitation facility. Based on the similarity of my patient to the study sample (again he met the inclusion criteria of having an ICD-9-CM code for a diagnosis of stroke, he was covered by Medicare, he was greater than 65 years of age, he was in an acute care hospital from which he would be transferred within 30 days, and he did not have previous SNF or rehabilitation admission for stroke), I felt confident generalizing these findings to his case.

■ **Clinical decision:** I encountered initial difficulty determining the best approach to this literature search. My low success using keywords prompted me to change direction and use subject headings. In the process, I gained insight into useful tools (eg, mapping terms to subject headings) for more efficient and effective searching of the literature. In this situation, however, my search resulted in a small number of relevant citations, which could be the result of a lack of published research (as noted by the authors themselves) comparing the different levels of care. My search did not yield a systematic review or a meta-analysis that could have summarized multiple studies. I also chose to use CINAHL as my database, which might have limited my search results. I decided to use CINAHL because it contained more journals specific to allied health professions than MEDLINE. Because I was not researching a particular physical therapy intervention, I may have found additional articles by including another database. I also made the decision not to include articles with an emphasis on specialized stroke rehabilitation units, because the acute rehabilitation facility in question for this patient did not have a specialized stroke unit (the article by Keith et al, however, did utilize a rehabilitation hospital with a team dedicated to stroke rehabilitation). Additional research exists, such as a meta-analysis by Langhorne and Duncan⁵ that shows better outcomes for patients participating in inpatient multidisciplinary rehabilitation in specialized stroke units compared with unspecialized units; however, this was outside the scope of my clinical question, given this particular patient's limited options.

The combined results of my literature search enhanced my decision regarding discharge recommendations for this patient. The literature suggested better functional outcomes at discharge for those patients who received rehabilitation in an acute rehabilitation facility compared with those who had been in subacute or SNF rehabilitation facilities. In addition, the likelihood of return to community living was highest following acute rehabilitation. Although limitations existed, no study suggested a poorer outcome after acute rehabilitation, nor did any study suggest any increase in adverse events in the acute rehabilitation setting versus the subacute setting or the SNF setting. Concluding that acute rehabilitation can promote better outcomes, I then considered the applicability of my search results to my patient.

My patient met the inclusion criteria for each of the studies, suggesting that he had similar characteristics to the patients included in these studies, which enabled me to generalize these findings to him. Based on his potential for recovery, his desire to return home, his family support, and my review of the literature on the difference in outcomes associated with different rehabilitation settings, I recommended that this patient receive rehabilitation services in an acute rehabilitation facility. I was more confident in discussing options with the patient, his family, and his case manager, because I had evidence to support my recommendation. The family accepted my recommendation, and the case manager was able to confirm admission for transfer to an acute rehabilitation facility.

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