

Original article

The Clinical Pathway with Regional Alliance (CPRA) system for proximal femoral fractures in the southern region of Ibaraki prefecture: comparison of the proportion of patients who return to living at home from acute care and rehabilitation (kaihukuki) hospitals

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Abstract

Objective: We investigated whether elderly patients treated for a proximal femoral fracture would be able to return home.

Patients and Methods: The subjects of this study were 834 patients. We defined the acute care hospital group as patients who returned home from the acute care hospital and the kaihukuki group as patients who were transferred from an acute care hospital to a rehabilitation hospital. We recorded the proportion of patients who returned home. We also analyzed walking ability and the Barthel index (BI) of patients.

Results: After 2013, the proportion of patients who returned home from the acute care hospital fell below 20%. The proportion of patients who returned home from the kaihukuki hospital stayed within the 75–85% range. The BI before injury and at discharge was 86 and 76 points, respectively, in the acute care hospital group. The acute care hospital group included patients who walked without an aid before the injury or when leaving the hospital. In the kaihukuki group, the BI before an injury, at admission, and at discharge from the rehabilitation hospital was 85, 56, and 74 points, respectively. In the kaihukuki group, the ability of patients to walk recovered more slowly than that of patients in the acute care hospital group.

Conclusion: Walking ability and BI are important factors for determining whether patients with a proximal femoral fracture are able to return home.

Key words: proximal femoral fracture, kaihukuki hospital, regional alliance system

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Introduction

The Clinical Pathway with Regional Alliance (CPRA) system is intended to facilitate early recovery so patients can return home from acute care or kaihukuki hospitals. This system is built for medical institutions within the regional alliance, where patients are treated in a systematic way¹⁾. In the CPRA system, hospitals share roles, including informing other member hospitals about treatment plans. In kaihukuki hospitals, the medical staff receives information about patients in advance so they can start effective rehabilitation seamlessly. A CPRA system is a self-contained medical system in a given medical area.

Our hospital is in the Toride-Ryugasaki medical area, located in the southern region of Ibaraki prefecture. It has 414 beds and attends to secondary emergencies. It is an acute care hospital that provides treatment for proximal femoral fractures.

We started the CPRA system for proximal femoral fractures in 2007 and began with five hospitals (1 acute care and 4 kaihukuki hospitals). By the end of 2016, this network had increased to 15 hospitals (2 acute care and 13 kaihukuki hospitals). We studied 10 years of follow-up data from the CPRA system regarding elderly patients with proximal femoral fractures who returned to living at home, comparing outcomes such as the Barthel index (BI)²⁾ and walking ability in patients discharged to home from acute care and kaihukuki hospitals.

Patients and Methods

From January 2007 to December 2016, we identified 834 patients over the age of 65 years (868 hips) with proximal femoral fractures. We excluded 21 patients because they

Table 1 Patient background in the two groups

| | Acute care hospital group | Kaihukuki group |
|---|---------------------------|-----------------|
| Average age: y.o. (range) | 80 (65–98) | 82 (65–104) |
| Female/Male: cases | 166/56 | 205/64 |
| Femoral neck fracture/Trochanteric fracture: cases | 131/91 | 122/147 |
| Average admission period at the acute care hospital: days (range) | 28 (6–71) | 31 (10–93) |
| Average admission period at the kaihukuki hospital: days (range) | (-) | 70 (10–154) |

died during their acute care hospital stay. Subjects consisted of 813 patients (847 hips), including 360 patients transferred from an acute care hospital to a kaihukuki hospital.

The mean age was 82 years (range, 65–104 years). There were 603 female patients and 210 male patients. We performed open reduction and internal fixation in 567 patients for nondisplaced femoral neck fractures and bipolar hemiarthroplasty in 280 patients for displaced femoral neck fractures^{3, 4, 6}. Until the end of 2007, we used a compression hip screw and a femoral short nail together. Beginning in 2008, we used only a femoral short nail⁵.

During the 10 years since the start of the CPRA system, our orthopedic medical staff of five included two attending physicians. We had only one type of clinical pathway: we regularly performed surgery a few days after the injury and patients were not confined to bed after postoperative day 1. Patient activities, including weight-bearing, were unrestricted. Patients remained in the acute hospital for 3–4 weeks. The mean length of stay was 28 days at the acute care hospital and 70 days at the kaihukuki hospital.

We recorded the proportion of patients who directly returned home from the acute care hospital and from the kaihukuki hospital and investigated changes over the 10 years.

We defined the acute care hospital group as patients who returned directly home from the acute care hospital and the kaihukuki group as patients who returned home after being transferred from an acute care hospital to a kaihukuki hospital. There were 222 patients (27%) who returned home from the acute care hospital and 269 patients (75%) who returned home from a kaihukuki hospital (Table 1). We had a conference every week with co-workers, physical therapists, nursing staff, and medical social workers, and we evaluated whether patients could go home or whether they needed more rehabilitation. We chose patients who would transfer to the kaihukuki hospital. We analyzed walking ability and BI² before the injury and at the time of acute hospital discharge in the acute care hospital group. Walking ability is generally classified into five groups: (5) patients able to walk without support, (4) patients able to walk with a cane, (3) patients able to walk with support, (2) patients able to stand with support, (1) patients requiring a wheelchair. We analyzed walking ability^{1, 7} and BI before the injury, at the time

of transfer and at the time of kaihukuki hospital discharge in the kaihukuki group. The BI at the time of acute hospital discharge and at the time of kaihukuki hospital admission was the same value.

We used the Mann-Whitney's U-test to compare the two groups with regards to walking ability and BI.

A *P* value of less than or equal to 5% was considered statistically significant.

This study was conducted in accordance with the ethical principles of the Declaration of Helsinki and was approved by the Ethics Committee of JA Toride Medical Center.

Results

After 2013, the proportion of patients who returned home directly from the acute care hospital fell below 20%. The proportion of patients who returned home from the kaihukuki hospital stayed in the 76–88% range (Figures 1, 2).

We showed walking ability before the injury, at discharge from the acute care hospital, and at discharge from the kaihukuki hospital in the two groups (Figures 3, 5).

Walking ability before the injury and at discharge from the acute care hospital (at admission from the kaihukuki hospital), was statistically different in the two groups.

BI before the injury and at discharge was 86 and 76 points, respectively, in the acute care hospital group (Figure 4).

In the kaihukuki group, BI before the injury, at admission, and at discharge from the kaihukuki hospital was 85, 56, and 74 points, respectively (Figure 6). BI at discharge from the acute care hospital (at admission from the kaihukuki hospital) was statistically different in the two groups.

Discussion

In 1980, the critical pathway system was implemented with the aim of providing safe and effective medical care in the United States. It was introduced in Japan in 1990 with the expectation of standardizing medical care with evidence-based medicine.

The CPRA system was implemented in Japan in 2007. In the CPRA system, patient data flows directly from the acute

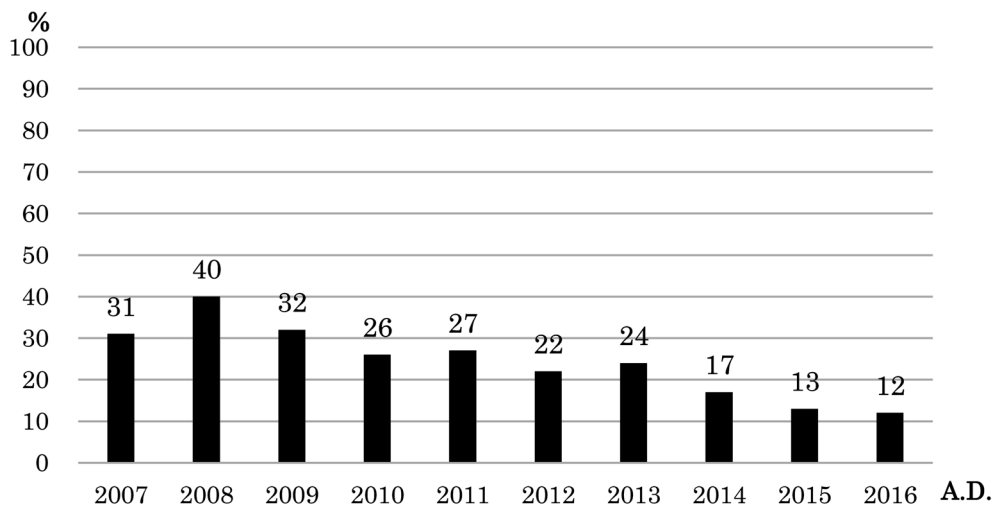


Figure 1 The secular changes of the proportion of patients who returned home directly from the acute care hospital group.

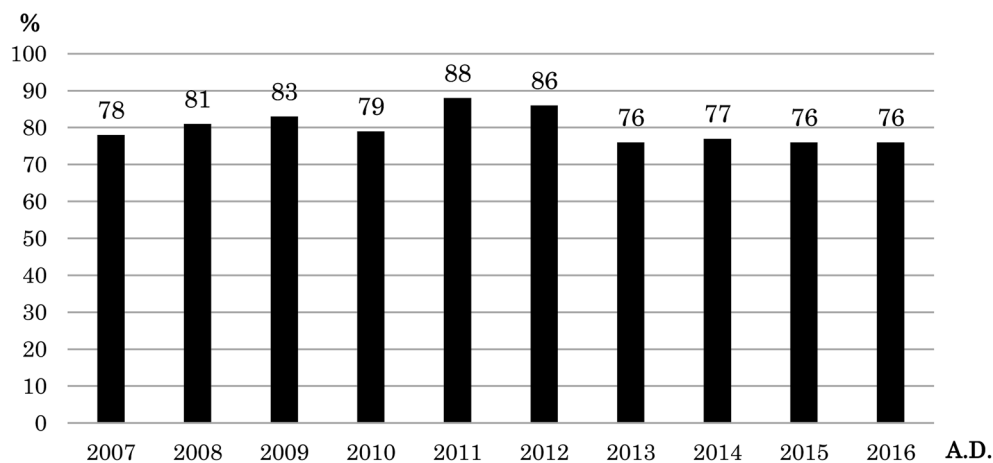


Figure 2 The secular changes of the proportion of patients who returned home directly from the kaihukuki group.

care hospital to the kaihukuki hospital. Duplicative assessments do not need to be performed, and patients can start a rehabilitation program earlier. Thus, we can have a self-contained medical system in each medical area that uses the CPRA system.

In our medical area, the Toride-Ryugasaki area, the proportion of patients who returned home directly from the acute care hospital gradually decreased to under 20%, while the proportion of patients who returned home from the kaihukuki hospital stayed around 80% since the start of the CPRA system. Since the social environment changes year to year, we have to evaluate geriatric medical care year to year as well. A coordination meeting before admission to the kaihukuki hospital plays an important function in selecting patients who can return home after rehabilitation. The health care system

from 2015 onwards suggests that patients in kaihukuki hospitals can return home directly upon discharge.

Kyo *et al.*⁸⁾ reported better functional prognosis in patients whose walking ability recovered to at least pre-injury levels. Our results also suggested that patients in the acute care hospital group could walk without support before their injury and with a cane at the time of hospital discharge. Patients who had good walking ability were able to return home after a proximal femoral fracture. Patients who were able to perform independent activities of daily living before their injury could return home after a proximal femoral fracture.

In the kaihukuki group the walking ability and BI at discharge from the acute-care hospital were inferior to the walking ability and BI of the acute care hospital group. Patients in the acute care hospital group may have superior

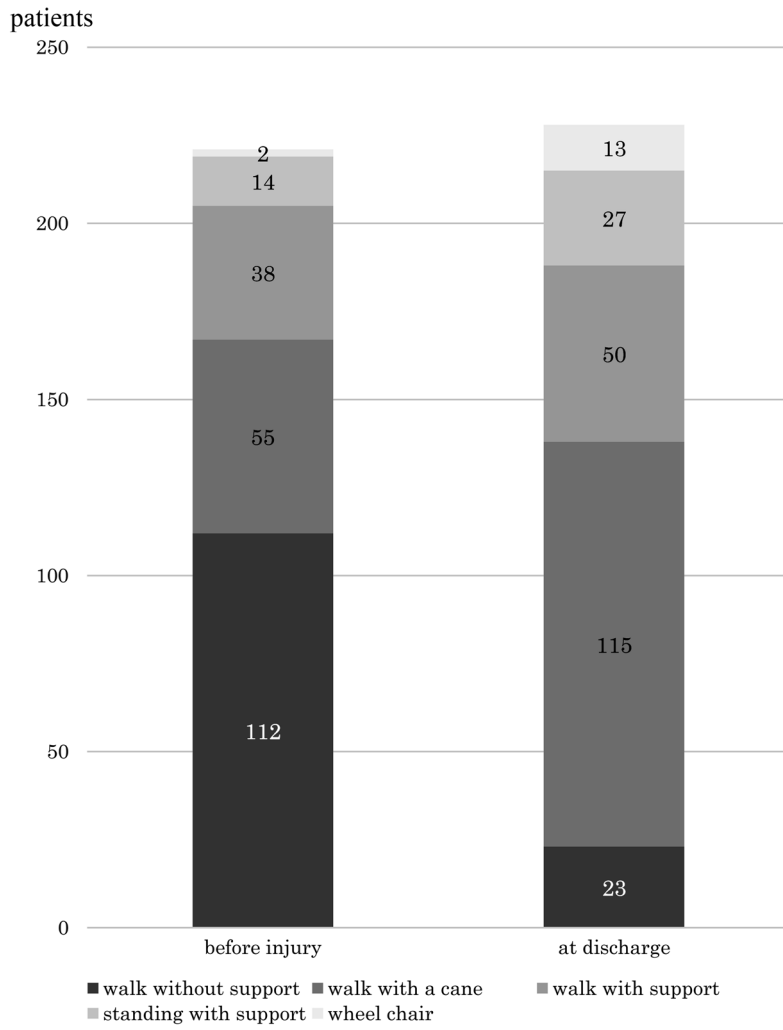


Figure 3 Walking ability in the acute care hospital group.

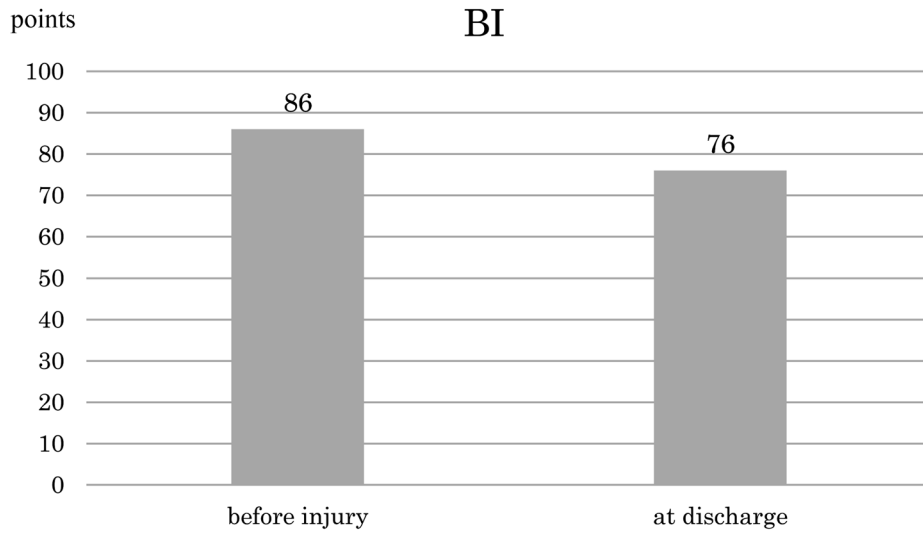


Figure 4 Barthel index in the acute care hospital group.

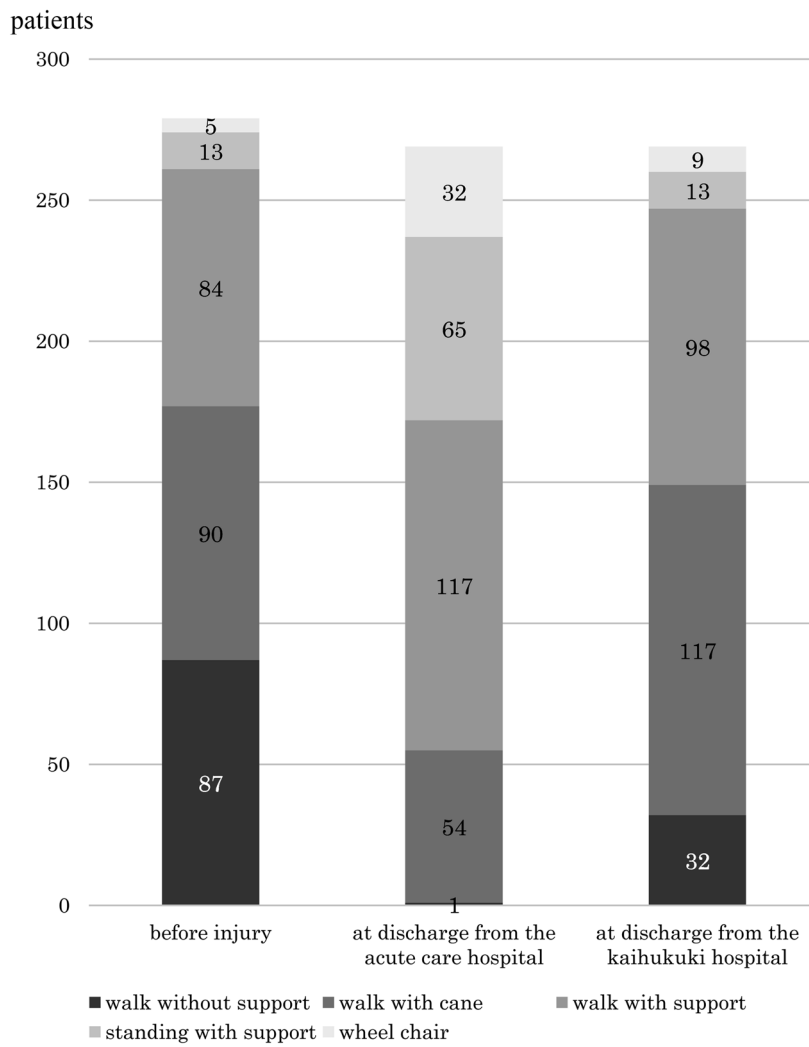


Figure 5 Walking ability in the kaihukuki group.

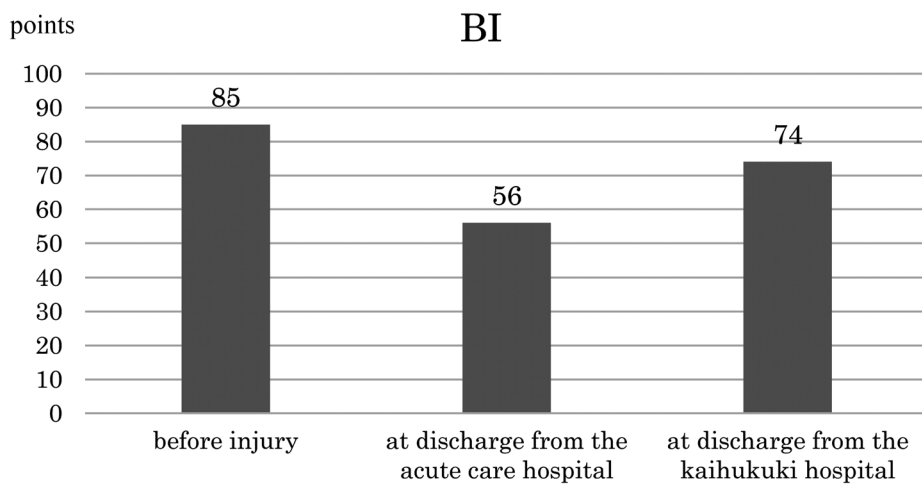


Figure 6 Barthel index in the kaihukuki group.

recovery abilities than patients in the kaihukuki group. In the acute care hospital group, more than half of the patients could walk without support or with a cane at the time of discharge from the acute care hospital. In the kaihukuki group, only 20% of patients could walk without support or with a cane at admission, but more than half of the patients could walk without support or with a cane at the time of discharge from the kaihukuki hospital. In the kaihukuki group, the BI at kaihukuki hospital discharge recovered to the same level as the BI of the acute care group at hospital discharge. The average admission period was 28 days in the acute care hospital group and 70 days in the kaihukuki group. From the time of admission, walking ability and BI recovered slowly in the kaihukuki group. These results suggest that rehabilitation is needed in the subacute phase. Abe *et al.*⁹⁾ reported that a 4-week rehabilitation program is more efficacious than an 8-week program, with fewer complications and hospitalization costs but no difference in terms of the proportion of patients who recovered the ability to walk. What constitutes the appropriate rehabilitation period is a difficult research question.

The kaihukuki ward and CPRA system for elderly patients with proximal femoral fractures originated in Japan. Based on 10 years of follow-up data on the CPRA system, we support the CPRA system, because some patients recovered during subacute rehabilitation and were able to return home. Regarding the CPRA system, Yoshii *et al.*¹⁾ reported that dementia is an important factor that affects walking ability, however, their study had a 4 year follow-up in a rural medical area, whereas our study was done in a suburban area. Moreover, there is a need to investigate how the home environment and the ability of family members to care for elderly patients affects walking ability.

The content and duration of rehabilitation (one unit of rehabilitation lasts for 20 minutes) is different in each kaihukuki hospital. In the cohort study by Hoenig *et al.*¹⁰⁾ with 1,880 patients in 284 hospitals, physical therapy and occupational therapy for 5 days a week increased survival rate and walking ability. Therefore, we need to standardize rehabilitation programs.

Our study had a limitation; our CPRA system is a local system in a suburban area (southern Ibaraki prefecture), so our findings might not apply to other areas. March *et al.*¹¹⁾ reported negative results of the clinical pathway system, which only contributed to reducing the length of stay in the acute care hospital; mortality at four months after injury and living situation after hospital discharge were not affected by

the introduction of the clinical pathway. Before launching a CPRA system, we recommend that regional characteristics should be considered.

Conflicts of interest: The authors declare that there are no conflicts of interest.

References

1. Yoshii I, Satake Y, Kitaoka K, *et al.* Relationship between dementia degree and gait ability after surgery of proximal femoral fracture: review from clinical pathway with regional alliance data of rural region in Japan. *J Orthop Sci* 2016; 21: 481–486. [[Medline](#)] [[CrossRef](#)]
2. Mahoney FI, Barthel DW. Functional evaluation: Barthel Index. *Md State Med J* 1965; 14: 61–65. [[Medline](#)]
3. Chiu FY, Lo WH, Yu CT, *et al.* Percutaneous pinning in undisplaced subcapital femoral neck fractures. *Injury* 1996; 27: 53–55. [[Medline](#)] [[CrossRef](#)]
4. Lu-Yao GL, Keller RB, Littenberg B, *et al.* Outcomes after displaced fractures of the femoral neck. A meta-analysis of one hundred and six published reports. *J Bone Joint Surg Am* 1994; 76: 15–25. [[Medline](#)] [[CrossRef](#)]
5. Bridle SH, Patel AD, Bircher M, *et al.* Fixation of intertrochanteric fractures of the femur. A randomized prospective comparison of the gamma nail and the dynamic hip screw. *J Bone and Joint Surg* 1991; 73-B: 330–334. [[CrossRef](#)]
6. Zuckerman JD, Skovron ML, Koval KJ, *et al.* Preoperative complications and mortality associated with operative delay in older patients who have a fracture of the hip. *J Bone and Joint Surg* 1995; 77-A: 1551–1556. [[CrossRef](#)]
7. Kitamura S, Hasegawa Y, Suzuki S, *et al.* Functional outcome after hip fracture in Japan. *Clin Orthop Relat Res* 1998; 29–36. [[Medline](#)]
8. Kyo T, Takaoka K, Ono K. Femoral neck fracture. Factors related to ambulation and prognosis. *Clin Orthop Relat Res* 1993; 215–222. [[Medline](#)]
9. Abe T, Tsuchida N, Ishibashi H, *et al.* [Comparison between the short program and the long program of post-operative rehabilitation of hip fracture for making the critical path]. *Nippon Ronen Igakkai Zasshi* 2001; 38: 514–518 (in Japanese). [[Medline](#)] [[CrossRef](#)]
10. Hoenig H, Rubenstein LV, Sloane R, *et al.* What is the role of timing in the surgical and rehabilitative care of community-dwelling older persons with acute hip fracture? *Arch Intern Med* 1997; 157: 513–520. [[Medline](#)] [[CrossRef](#)]
11. March LM, Cameron ID, Cumming RG, *et al.* Mortality and morbidity after hip fracture: can evidence based clinical pathways make a difference? *J Rheumatol* 2000; 27: 2227–2231. [[Medline](#)]