frequency of treatment and electrical stimulation, and the length of the therapeutic effect.

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Preventing Delirium in Hospitalized Older Patients

Inouye SK, Bogardus ST, Charpentier PA, et al. A multicomponent intervention to prevent delirium in hospitalized older patients. N Engl J Med 1999; 340:669-76.

Clinical question **Does a multicomponent delirium-prevention protocol reduce the incidence and severity of delirium in elderly hospitalized patients?**

Background Delirium is a dangerous and costly medical condition, doubling the risk of death and tripling the risk of residential care among hospitalized elderly patients.[1] A recent systematic review found essentially no effect of multidisciplinary team interventions on preventing delirium, but stated that more research was necessary because of the methodologic limitations of the studies reviewed.[2]

Population studied The authors studied 852 patients, aged 70 years or older, admitted to a general internal medicine (not intensive care) teaching service at a tertiary care center. Inclusion criteria were age greater than 70 years, no delirium on admission, and intermediate or high risk for delirium at baseline. The risk for delirium was assessed using a validated predictive model previously published by the authors.[3] Patients were excluded for inability to participate in an interview, coma or terminal illness, a hospital stay of 48 hours or less, prior enrollment in this study, or unavailability of the examiner or patient.

Study design and validity This was a controlled clinical trial using a prospective matching technique instead of randomization. The authors chose this technique because of the difficulties associated with randomization into an experimental unit in an overcrowded hospital. The authors admit to some difficulty in finding matching controls for those at the extreme ends of the matching criteria (eg, age), but overall the matching was done carefully. Patients who were excluded, those who refused, and those who could not be matched were not significantly different from the experimental group. Patients were assessed on admission with a battery of previously validated cognitive tests and severity of medical illness scores.

The intervention group was subjected to a delirium risk factor modification program (the Elder Life Program) implemented by a highly trained health care team. Six risk factors were targeted for intervention: cognitive impairment, hearing impairment, sleep deprivation, immobility, visual impairment, and dehydration. Each risk factor had a preventive protocol associated with it, and the combination of protocols was individualized to the patients on the basis of a patient's risk factors. The control group received standard hospital care. The attending physicians and residents cared for patients in both groups. Patients were followed daily throughout their hospitalization for evidence of dementia assessed using 3 cognitive tests (the Mini-Mental State Examination, the Digit Span test, and the Confusion Assessment Method rating). On discharge or day 5 of hospitalization, whichever came first, the patients were re-assessed for delirium risk factors, and their charts were reviewed for evidence of delirium.

Outcomes measured The primary outcome was delirium, as assessed by the Confusion Assessment Method criteria (acute onset and fluctuating course of delirium, inattention, and either disorganized thinking or altered level of consciousness). Total days of delirium and the number of episodes of delirium in each hospitalization were also recorded. Outcomes were appropriately assessed using an intention-to-treat analysis.

Results No significant differences in baseline characteristics (demographic factors, dementia risk factors, or reason for admission) were found between the intervention and control groups. Of note, 25% of the patients had a Mini-Mental State Examination score of 20 or less at entry; this study did not exclude demented patients, which adds to its usefulness. The risk of a first episode of delirium was reduced by 5.1% in the intervention group. This means that a physician would need to apply this intervention to 20 patients for the first 5 days of hospitalization to prevent the first episode of delirium in 1 patient (number needed to treat = 20). The total number of days of delirium were reduced in the intervention group (105 vs 161, $P = .02$) as were the total number of episodes of delirium (62 vs 90, $P = .03$). The authors felt that the largest benefit was obtained in preventing the first episode of delirium. There were no adverse effects noted from the intervention, and adherence to the intervention program was 87%. Noncompliance resulted from refusal by the patient, unavailability of the patient or the intervention staff, or medical contraindications. The cost of the intervention was $6341 per case of delirium prevented.

Recommendations for clinical practice **This well-designed study demonstrates the efficacy of a hospital-based intervention protocol to reduce the incidence of delirium for at-risk elderly hospitalized patients. These results represent the most**

encouraging evidence to date that we can prevent this serious side effect of acute hospitalization in elderly patients. As the authors correctly point out, this intervention should be subjected to studies of its effect on morbidity and mortality and its cost-effectiveness before global adoption.

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Disclaimer: This information is the opinion of the authors and should not be construed as official policy of the Department of Defense or the Department of the Navy.

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A Meta-Analysis of the Treatment of Intermittent Claudication

Girolami B, Bernardi E, Prins MH, et al. Treatment of intermittent claudication with physical training, smoking cessation, pentoxifylline, or nafronyl: a meta-analysis. Arch Int Med 1999; 159:337-45.

Clinical question **What are the relative benefits of nonsurgical therapy in the treatment of intermittent claudication?**

Background Intermittent claudication results from atherosclerotic narrowing of peripheral arteries and arterioles that prevents adequate tissue perfusion at the time of heightened tissue demand for oxygen during exercise. Available treatments include nonpharmacologic approaches (smoking cessation, exercise therapy), pharmacologic therapy (pentoxifylline, nafronyl), and surgical revascularization procedures. This meta-analysis reviewed the English language literature to assess the relative effectiveness of nonsurgical therapy in the treatment of intermittent claudication.

Population studied Studies in the analysis included only patients with stage II intermittent claudication (able to walk between 50 and 200 meters before the onset of pain). All studies of special populations (eg, patients with diabetes or hypertension) were excluded.

Study design and validity The authors performed a MEDLINE search of the English language medical literature from 1976 to December 1996 using the key words "atherosclerosis," "arteriosclerosis obliterans," "peripheral vascular disease," and "intermittent claudication." Studies were eligible for inclusion if they evaluated primary treatment of patients with intermittent claudication at stage II of disease and measured any of the following: pain-free and total walking distance or time, ankle-brachial index before or after exercise, rest and peak blood flow, or ankle pressure. Along with studies of restricted populations, those without control groups or comparing one treatment approach with another were excluded. Trials were divided into 4 groups according to treatment. The quality of the study was rated as level 1, 2, or 3. Level 1 indicated at least observer-blinded randomized trials, level 2 unblinded randomized trials, and level 3 nonrandomized controlled trials. No specific mention of the statistical methods used to combine results was given. Data were extracted from the studies by 2 independent observers using a standardized form. Tests of homogeneity revealed no heterogeneity.

Outcomes measured The primary patient-oriented outcomes were individual and pooled means for pain-free and total walking distance or time. Disease-oriented outcomes included the ankle-brachial index before or after exercise, rest and peak blood flow, and ankle pressure. Outcomes were pooled only for data at the end of each study period.

Results Physical training as reported in six level 2 and four level 3 studies resulted in significant increases in pain-free and total walking distances (by 130 meters and 179 meters, respectively) when compared with controls. There was no difference observed in ankle-brachial index at rest or after exercise, or in calf blood flow at rest or after exercise.

Four studies of smoking cessation were included, but none of these studies reported similar outcomes, making summary calculations impossible. Results from individual trials of smoking cessation did not show statistically significant improvements in walking distances, ankle-brachial index, or ankle pressures. One study noted larger numbers of failed revascularization procedures among continuing smokers.

In level 1 trials, pentoxifylline and nafronyl were each found to have a statistically significant but clinically questionable increase in pain-free and total walking distances of between 20 and 60 meters. There were no differences in ankle-brachial indexes. Ankle pressure results were not reported.

Recommendations for clinical practice **Among nonsurgical treatments for claudication, physical training has the greatest potential to increase pain-free and total walking distances (by up to 180 meters among patients with stage II intermittent**