Does daily monitoring of blood glucose predict hemoglobin A1c levels?

EVIDENCE-BASED ANSWER

Hemoglobin A1c (HbA1c) levels correlate closely, though not perfectly, with blood glucose levels in patients with diabetes (strength of recommendation [SOR]: **A**, based on systematic reviews).

Correlation is higher for blood glucose levels later in the day than earlier in the day, higher for blood glucose levels in the most recent 30 days than from the prior 31–120 days, and higher for patients with type 2 diabetes compared with patients with type 1 diabetes (SOR: **A**, based on cohort studies).

EVIDENCE SUMMARY

Four cohort studies of patients with diabetes have compared overall mean blood glucose levels with HbA1c levels.[1–4] All but one[4] were limited to patients with type 1 diabetes. Study periods ranged from 1 to 6 months, and frequency of blood glucose measurement ranged from 2 to 4 times per day.

Correlation coefficients between mean blood glucose levels and HbA1c levels ranged from 0.71 to 0.86, implying that 50% to 74% of the variance in HbA1c is explained by the mean blood glucose (in each study, correlation was significant [P<.02]).

We found 5 studies comparing blood glucose measurements at specific times of day with HbA1c levels (see **Table**). Data from 3 studies comparing blood glucose values after lunchtime with those earlier in the day suggest that the lunchtime levels are more closely associated with HbA1c levels.[5,7,9] No consistent difference was shown between preprandial and postprandial blood glucose levels in their strength of association with HbA1c levels. In 1 of these studies, a blood glucose level of ≤150 mg/dL 2 hours after lunch predicted a HbA1c of ≤7% with 85% sensitivity and 85% specificity.[7] One study provided only limited information on blood glucose–HbA1c correlations in relation to mealtimes but did report that the times of day at which the 2 were best correlated were in the periods from midnight to 5:00 AM and between noon and 3:00 PM.[9] One study compared patients with type 1 and type 2 diabetes and found a higher correlation between blood glucose and HbA1c levels in the latter.[6]

The relationship between HbA1c and blood glucose levels is such that blood glucose levels from the preceding 30 days determine about 50% of the total HbA1c.[10] This relationship may be altered by uremia, intake of vitamins C or E, and conditions that affect erythrocyte turnover.[11]

CONTINUED

What is a Clinical Inquiry?

Clinical Inquiries answer real questions that family physicians submit to the Family Practice Inquiries Network (FPIN), a national, not-for-profit consortium of family practice departments, residency programs, academic health sciences libraries, primary care practice-based research networks, and individuals with particular expertise.

Questions chosen for Clinical Inquiries are those considered most important, according to results of web-based voting by family physicians across the U.S.

Answers are developed by a specific method:

- First, extensive literature searches are conducted by medical librarians.
- Clinicians then review the evidence and write the answers, which are then peer reviewed.
- Finally, a practicing family physician writes a commentary.

TABLE

Correlation coefficients between blood glucose levels and hemoglobin A1c levels

Study	Rohlfing et el, 2002[5]	Prendergast et al, 1994[6]	Prendergast et al, 1994[6]	Avignon et al, 1997[7]	Bastyr et al, 2000[8]	Levetan et al, 2001[8]
Diabetes type	Type 1	Type 1	Type 2	Type 2	Type 2	Unspecified
N	1439	104	234	66	135	44
Frequency of blood glucose measurement*	Quarterly over 6.5 y	"Periodically" over 3 y†	"Periodically" over 3 y†	Once only	Twice on separate days	Continuously for 3 days
Correlation coefficients						
Pre-breakfast	0.69	0.38	0.61	0.62	0.22	<0.30
Post-breakfast	0.67	0.27	0.51		0.33	
Pre-lunch	0.72			0.65		
Post-lunch	0.77			0.81		
Pre-dinner	0.75			0.78		
Post-dinner	0.78					0.34
Bedtime	0.76					

*Blood glucose measurements from Avignon et al, 1997[7] were taken at fixed times of day; time designations are based on average mealtimes in the study population.

†Frequency of blood glucose measurements not specified.

It remains unclear whether management strategies that focus on minimizing HbA1c levels are optimal for prevention of diabetic complications.

Although HbA1c levels correlate with the risk of some complications, aspects of glycemia not reflected in the HbA1c level, such as the heights of glycemic "excursions" from the mean, may independently affect the risk of complications of diabetes.[12] If so, quantitative analysis of day-to-day blood glucose levels might yield a better estimation of the risk of diabetic complications than HbA1c levels.

RECOMMENDATIONS FROM OTHERS

No official statement by any organization was found relating to the quantitative relationship between blood glucose levels from daily monitoring and HbA1c levels. However, the American Diabetes Association (ADA) specifies treatment goals for both HbA1c and blood glucose levels. An ADA expert panel recently concluded, "There are insufficient data to determine accurately the relative contribution of fasting plasma glucose and postprandial plasma glucose to HbA1c."[13]

Eric Rose, MD, *Department of Family Medicine, University of Washington, Seattle;* ***Debra Ketchell, MLS,*** *Health Sciences Libraries, University of Washington, Seattle*

CONTINUED

CLINICAL COMMENTARY

In practice, glycemic control is fundamental in managing patients with diabetes. I believe that treatment targets need to be individualized. Patient education about the importance of both HbA1c and self blood glucose monitoring are crucial in accomplishing this goal. While HbA1c <7% is strongly associated with reduction of microvascular complications, the blood glucose results are very useful in preventing hypoglycemia, as well as adjusting medication and insulin doses, diet, and exercise. The new, minimally invasive at-home glucometers and HbA1c test kits, which were recently approved by the Food and Drug Administration, improve compliance and help patients take control of their diabetes management.

Tsveti Markova, MD, *Department of Family Medicine, Wayne State University, Detroit, Mich*

REFERENCES

1. Hempe JM, Gomez R, McCarter RJ Jr, Chalew SA. High and low hemoglobin glycation phenotypes in type I diabetes: a challenge for interpretation of glycemic control. *J Diabetes Complications* 2002; 16:313–320.
2. Kovatchev BP, Cox DJ, Straume M, Farhy LS. Association of self-monitoring blood glucose profiles with glycosylated hemoglobin in patients with insulin-dependent diabetes. *Methods Enzymol* 2000; 321:410–417.
3. Peterson CM, Jones RL, Dupuis A, Levine BS, Bernstein R, O'Shea M. Feasibility of improved blood glucose control in patients with insulin-dependent diabetes mellitus. *Diabetes Care* 1979; 2:329–335.
4. Ditzel J, Kjaergaard JJ. Haemoglobin A1c concentrations after initial treatment for newly discovered diabetes. *Br Med J* 1978; 1:741–742.
5. Rohlfing CL, Wiedmeyer HM, Little RR, England JD, Tennill A, Goldstein DE. Defining the relationship between plasma glucose and HbA(1c): analysis of glucose profiles and HbA(1c) in the Diabetes Control and Complications Trial. *Diabetes Care* 2002; 25:275–278.
6. Prendergast C, Smyth O, Murray F, Cunningham SK, McKenna TJ. The relationship of blood glucose and haemoglobin A1 levels in diabetic subjects. *Ir J Med Sci* 1994; 163:233–235.
7. Avignon A, Radauceanu A, Monnier L. Nonfasting plasma glucose is a better marker of diabetic control than fasting plasma glucose in type 2 diabetes. *Diabetes Care* 1997; 20:1822–1826.
8. Bastyr EJ 3rd, Stuart CA, Brodows RG, et al. Therapy focused on lowering postprandial glucose, not fasting glucose, may be superior for lowering HbA1c. *Diabetes Care* 2000; 23:1236–1241.
9. Levetan CS, Jeng LM, Thornton KR, Want L, Ratner RE. When do glucose values best correlate with hemoglobin A1c? *Diabetes* 2001; 50(2 suppl):A124.
10. Tahara Y, Shima K. The response of GHb to stepwise plasma glucose change over time in diabetic patients. *Diabetes Care* 1993; 16:1313–1314.
11. Sacks DB, Bruns DE, Goldstein DE, Maclaren NK, McDonald JM, Parrott M. Guidelines and recommendations for laboratory analysis in the diagnosis and management of diabetes mellitus. *Clin Chem* 2002; 48:436–472.
12. Goldstein DE, Little RR, Lorenz RA, Malone JI, Nathan D, Peterson CM. Tests of glycemia in diabetes. *Diabetes Care* 1995; 18:896–909.
13. American Diabetes Association. Postprandial blood glucose. *Diabetes Care* 2001; 24:775–778.

Are antibiotics helpful for acute maxillary sinusitis?

EVIDENCE-BASED ANSWER

The inability of clinical criteria to accurately differentiate bacterial from viral disease makes routine use of antibiotics inappropriate for clinically diagnosed maxillary sinusitis (strength of recommendation [SOR]: **C**, based on inconsistent systematic reviews and randomized controlled trials).

Antibiotics can provide symptomatic relief, best demonstrated in patients with bacterial maxillary sinusitis confirmed by computed tomography (CT) or sinus aspiration (SOR: **A**, based on 1 systematic review). However, this benefit does not persist in trials that better reflect general practice by using clinical diagnostic criteria (SOR: **C**, inconsistent studies).

In trials showing improvement with antibiotics, symptoms decrease, at best, 2 to 3 days sooner than with placebo, and, regardless of treatment, at least two thirds of patients are improved in 14 days (SOR: **A**, based on multiple systematic reviews).[1]

No evidence suggests that antibiotics decrease complication rates. Newer broad-spectrum antibiotics are no better at relieving symptoms or improving cure rates than "first-line" agents such as amoxicillin (SOR: **A**, based on multiple randomized controlled trials).[2,3]

EVIDENCE SUMMARY

Nearly all trials comparing placebo with antibiotics for maxillary sinusitis are confounded by the difficulty in identifying true bacterial disease. The gold standard, sinus aspiration, offers the best diagnostic accuracy. CT scanning and plain radiography lack sufficient diagnostic accuracy to be useful alone, though CT scans offer better sensitivity.

One systematic review, limited to randomized controlled trials that required either radiographic or aspiration evidence of sinusitis, found penicillin superior to placebo,[4] but all patients recovered in a few weeks regardless of treatment. Given that radiographs have poor diagnostic accuracy[5] and that sinus aspiration is impractical in outpatient practice, such efficacy studies are less meaningful than effectiveness studies that use clinical criteria for study entry and outcome measurement.

No accurate clinical diagnostic criteria have been established. In ear, nose, and throat practices where bacterial sinusitis prevalence is high, clinical criteria identify only 70%–80% of cases compared with the sinus aspiration.[6] In general practice, where the pretest probability of bacterial disease is far lower, clinical criteria are even less reliable,[1] which confounds the interpretation of most clinical trials.

Accordingly, some placebo-controlled, primary-care–based clinical trials have shown symptomatic benefit of antibiotics for maxillary sinusitis[7,8,9] while others have shown no benefit whatsoever.[10,11,12] In those trials that demonstrated a significant difference, antibiotics were always more likely than placebo to cause side effects, and no control group fared worse than its matched antibiotic group by the end of a follow-up period of at least 25 days.

It is likely that antibiotics would be more useful if the subgroup of patients with bacterial disease could be accurately identified in outpatient practice. For the present, given that no such reliable criteria exist, that withholding antibiotics in these patients appears to be safe, and that antibiotic overuse has clear harm to individuals and society, sinusitis symptoms should be treated without antibiotics until the clinical course strongly suggests nonviral illness.

RECOMMENDATIONS FROM OTHERS

An evidence report from the Agency for Health Care Policy and Research recommends "initial symptomatic treatment or the use of clinical criteria to guide treatment."[1] The American Academy of Family Physicians "recognizes inappropriate use of antibiotics as a risk to both personal and public health and encourages only the appropriate use of these medications,"[13] but has not published sinusitis guidelines. The Centers for Disease Control and most authorities suggest that bacterial disease can be inferred in those with signs or symptoms that suggest bacterial rather than viral illness (eg, overall duration of symptoms, so-called "double-sickening," unilateral symptoms) and justify use of antibiotics in these patients.

Jim Theis, MD, *Department of Family and Community Medicine, Tulane University Health Sciences Center, New Orleans, La;* ***Tomeka Oubichon, MLS,*** *Tulane University, New Orleans, La*

CLINICAL COMMENTARY

The challenge in using antibiotics appropriately for acute maxillary sinusitis is in our inability to accurately determine bacterial vs viral causes based on clinical symptoms alone. Symptoms lasting <1 week are unlikely to be bacterial in origin. Patients *without* persistent purulent discharge and maxillary/facial tenderness or tooth pain are unlikely to have a bacterial infection.[14]

The key point: most patients will improve with or without antibiotic treatment. Withholding antibiotics does not increase the risk of developing complications. Balancing this against the potential for increasing antibiotic resistance should lead to prudent use. Antibiotics should be reserved for patients with severe or prolonged symptoms. Amoxicillin, doxycycline, and trimethoprim-sulfamethoxazole are efficacious and inexpensive initial options if therapy is warranted.

Debra J. Barnette, *PharmD, BCPS, CDE, Coastal Area Health Education Center, Wilmington, NC*

CONTINUED

REFERENCES

1. Lau, et al. Evidence report/technology assessment: Diagnosis and treatment of acute bacterial rhinosinusitis. AHCPR Publ. No. 99-E016. Rockville, Md: Agency for Health Care Policy & Research; 1999.
2. deFerranti SD, Ioannidis JP, Lau J, Anninger WV, Barza M. Are amoxicillin and folate inhibitors as effective as other antibiotics for acute sinusitis? A meta analysis. *BMJ* 1998; 317:632–637.
3. Piccirillo JF, Mager DE, Frisse ME, Brophy RH, Goggin A. Impact of first-line vs. second-line antibiotics for the treatment of acute uncomplicated sinusitis. *JAMA* 2001; 286:1849–1856.
4. Williams JW Jr, Aguilar C, Makela M, et al. Antibiotics for acute maxillary sinusitis. *Cochrane Database Syst Rev* 2002: CD000243. Updated quarterly.
5. Engels EA, Terrin N, Barza M, Lau J. Meta-analysis of diagnostic tests for acute sinusitis. *J Clin Epidemiol* 2000; 53:852–862.
6. Varonen H, Makela M, Savolainen S, Laara E, Hilden J. Comparison of ultrasound, radiography, and clinical examination in the diagnosis of acute maxillary sinusitis: a systematic review. *J Clin Epidemiol* 2000; 53:940–948.
7. De Sutter AI, DeMeyere MJ, Christiaens TC, Van Driel ML, Peersman W, De Maeseneer JM. Does amoxicillin improve outcomes in patients with purulent rhinorrhea? A pragmatic randomized double-blind controlled trial in family practice. *J Fam Pract* 2002; 51:317–323.
8. Haye R, Lingaas E, Hoivik HO, Odegard T. Azithromycin versus placebo in acute infectious rhinitis with clinical symptoms but without radiological signs of maxillary sinusitis. *Eur J Clin Microbiol Infect Dis* 1998; 17:309–312.
9. Lindbaek M, Hjortdahl P, Johnsen VL. Randomised, double-blind, placebo controlled trial of penicillin V and amoxycillin in treatment of acute sinus infections in adults. *BMJ* 1996; 313:325–329.
10. Stalman W, van Essen GA, van der Graaf Y, de Melker RA. The end of antibiotic treatment in adults with acute sinusitis-like complaints in general practice? A placebo-controlled double-blind randomized doxycycline trial. *Br J Gen Pract* 1997; 47:794–799.
11. Stalman W, van Essen GA, van der Graaf Y, de Melker RA. Maxillary sinusitis in adults: an evaluation of placebo-controlled double-blind trials. *Fam Pract* 1997; 14:124–129.
12. Van Buchem FL, Knottnerus JA, Schrijnemaekers VJ, Peeters MF. Primary-care-based randomised placebo-controlled trial of antibiotic treatment in acute maxillary sinusitis. *Lancet* 1997; 349:683–687.
13. American Academy of Family Physicians. Clinical recommendations. Antibiotics. Available at: http://www.aafp.org/x2584.xml. Accessed on May 6, 2003.
14. Snow V, Mottur-Pilson C, Hickner JM. Principles of appropriate antibiotic use for acute sinusitis in adults. *Ann Intern Med* 2001;134:495–497.

What is the most effective nicotine replacement therapy?

EVIDENCE-BASED ANSWER

No single nicotine replacement therapy is most effective for all smokers. All forms of nicotine replacement therapy (gum, transdermal patch, spray, inhaler, and lozenge) are equally effective, increasing smoking cessation rates by about 150% to 200%.[1,2]

A Cochrane Review found that 17% of smokers who had used nicotine replacement therapy successfully quit at follow-up vs 10% of smokers in the control group.[1] Except in special circumstances (medical contraindications, smoking <10 cigarettes daily, pregnancy, or breastfeeding), all smokers attempting to quit should be offered nicotine replacement therapy (strength of recommendation [SOR]: **A**).[3]

Higher doses of nicotine gum or lozenge (4 mg vs 2 mg) increase quit rates in heavy smokers.[1,2] Use of high-dose patches (>21 mg) may benefit heavy smokers or those relapsing due to nicotine withdrawal (SOR: **B**).[3] For relapsed smokers, combination therapy improves long-term abstinence rates (estimated abstinence 28.6% vs 17.4% for monotherapy) (SOR: **B**).[3]

EVIDENCE SUMMARY

A Cochrane Review of 110 trials evaluating the efficacy of nicotine replacement therapy in 35,600 smokers found higher quit rates among heavy smokers using 4-mg compared with 2-mg nicotine gum (odds ratio [OR], 2.67; 95% confidence interval [CI], 1.69–4.22).[1] However, patients often chew too few pieces of nicotine gum daily, resulting in underdosing.[3] Smokers should use the gum on a fixed schedule (at least 1 piece every 1 to 2 hours).[3]

The Cochrane Review finds borderline evidence of a small benefit in abstinence rates (OR, 1.21; 95% CI, 1.03–1.42) with higher-dose nicotine patches (>21 mg/24 hr or 15 mg/16 hr) for heavy or relapsed smokers.[1] Combining methods

TABLE 1

Nicotine replacement therapy selection guide

	Moderate smokers (10–20 cigarettes/d)	Heavy smokers (>30 cigarettes/d)	Weight concerns
Gum	✓	✓ (4 mg vs 2 mg gum enhances quit rates)	✓ (All nicotine replacement therapies delay weight gain, specifically nicotine gum)
Transdermal patch	✓	✓ (Small benefit of dosing >21 mg)	
Inhaler	✓	✓	
Nasal spray	✓	✓	
Lozenge	✓	✓ (Reserve 4 mg for heavy smokers)	
Combination		✓	

that maintain constant drug levels (transdermal patch) with those having more rapid effects (gum, spray, inhaler, lozenge) is more effective than monotherapy (OR, 1.9; 95% CI, 1.3–2.6).[3] Reserve combination therapy for smokers who relapse following monotherapy.

Regarding concerns about weight gain, all nicotine replacement therapies delay but do not prevent weight gain. There is a dose-response relationship between nicotine gum and weight gain: smokers who use more gum gain less weight.[3]

Although abstinence rates are comparable across the 5 available forms of nicotine replacement, smokers unwilling to give up oral and behavioral rituals of smoking may perceive the inhaler as being more helpful (**Table 1**).[4]

Decisions about the best form of therapy can be based on patient preference, on degree of nicotine dependence (a Fagerström Test of Nicotine Dependence Scale score ≥5 [**Table 2**], or habitually smoking the first cigarette within 30 minutes of awakening),[5] or nicotine replacement therapy history, which includes number and outcome of previous quit attempts, specific method used, duration, side effects, and proper usage.

RECOMMENDATIONS FROM OTHERS

The Cochrane Review states: "All of the commercially available forms of nicotine replacement therapy are effective as part of a strategy to promote smoking cessation. They increase quit rates approximately 1.5 to 2 fold regardless of setting. Use of nicotine replacement therapy should be preferentially directed to smokers who are motivated to quit, and have high levels of nicotine dependency. Choice of which form to use should reflect patient needs, tolerability and cost considerations. Patches are likely to be easier to use than gum or nasal spray in primary care settings."[1]

The US Department of Health and Human Services Clinical Practice Guideline states: "All patients attempting to quit should be encouraged to use effective pharmacotherapies for smoking cessation except in the presence of special circumstances."[3] Heavy smokers should use 4-mg nicotine gum. Combining the nicotine patch with a self-administered form of nicotine replacement therapy (gum or nicotine nasal spray) is more efficacious than a single form of therapy. Patients should be encouraged to use combined treatments

CONTINUED

TABLE 2

Fagerström test for level of nicotine dependence (abridged)

How soon after waking do you smoke first cigarette?		_____ **Points**
Less than 5 minutes: 3 points		
5 to 30 minutes: 2 points		
31 to 60 minutes: 1 point		
How many cigarettes do you smoke per day?		_____ **Points**
More than 30 per day: 3 points		
21 to 30 per day: 2 points		
11 to 20 per day: 1 point		
		_____ **Total Points**
Interpretation		
Total points	**Level of dependence**	**Nictotine replacement therapy**
5–6 points	heavy nicotine dependence	consider 21-mg nicotine patch
3–4 points	moderate nicotine dependence	consider 14-mg nicotine patch
0–2 points	light nicotine dependence	consider 7-mg nicotine patch or no patch

if unable to quit using a single form of first-line pharmacotherapy.[3]

Lisa J. Diefenbach, PsyD, and Patrick O. Smith, PhD, *Department of Family Medicine, University of Mississippi Medical Center, Jackson, Miss;* ***Joan Nashelsky, MLS,*** *Iowa City, Iowa*

REFERENCES

1. Silagy C, Lancaster T, Stead L, Mant D, Fowler G. Nicotine replacement therapy for smoking cessation. The Cochrane Library, Volume (Issue 4), 2002.
2. Shiffman S, Dresler CM, Hajek P, Gilburt SJ, Targett DA, Strahs KR. Efficacy of a nicotine lozenge for smoking cessation. *Arch Intern Med* 2002; 162:1267–1276.
3. Fiore MC, Bailey WC, Cohen SJ, et al. *Treating Tobacco Use and Dependence*. Clinical Practice Guideline. Rockville, Md: US Dept of Health and Human Services, Public Health Service, June 2000.
4. Schneider NG, Olmstead R, Nilsson F, Vaghaiwalla Mody, F, Franzon M, Doan K. Efficacy of a nicotine inhaler in smoking cessation: a double-blind, placebo-controlled trial. *Addiction* 1996; 91:1293–1306.
5. Heatherton TF, Kozlowski LT, Frecker RC, Fagerström KO. The Fagerström Test for Nicotine Dependence: a revision of the Fagerström Tolerance Questionnaire. *Br J Addict* 1991; 86:1119–1127.

CLINICAL COMMENTARY

Now that nicotine replacement therapy is available over the counter, prescribers may not consider or discuss delivery options with patients as much as they did in the past. As this Clinical Inquiry illustrates, there are situations when one approach may be recommended over another.

For example, the relapsed smoker who has tried 1 nicotine replacement product may not even be aware that other methods, including combination therapy, are possible. Considering the enormous potential health improvement that is achieved through smoking cessation, this may be one of the most important topics to revisit regularly with patients.

Erik Lindbloom, MD, MSPH, *Department of Family and Community Medicine, University of Missouri–Columbia*

CONTINUED

Get More POEMs in EVIDENCE-BASED PRACTICE

Complement your subscription to **THE JOURNAL OF FAMILY PRACTICE** with EVIDENCE-BASED PRACTICE, a monthly newsletter from the editors of the Patient-Oriented Evidence that Matters feature.

A subscription to EVIDENCE-BASED PRACTICE includes **online access** to the entire collection of **POEMs**—more than 1000 in all! The EVIDENCE-BASED PRACTICE **POEMs** database gives you the information you need by subject and month, and the level of evidence for each, so you and your patients can **benefit from *all* the evidence.**

www.ebponline.net

CME Credits

Makes a great gift!

Subscribe today!

EVIDENCE-BASED PRACTICE

YES! I want my patients to benefit from the latest medical evidence with EVIDENCE-BASED PRACTICE.

☐ U.S. individual EVIDENCE-BASED PRACTICE newsletter with **POEMs** database access $149

☐ Add 36 hours of CME to my subscription $75

Total_____

(Please e-mail **ebp@dowdenhealth.com** for international rates)

Name_____ _____

Address_____ _____

City_____State ___ _____ ZIP_____

Check enclosed for _____ _____

Charge my ☐ Mastercard ☐ Visa ☐ Ar an Express ☐ Bill me

Card # _____ Ex _____

E-mail☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

All orders must be paid in U.S. funds drawn on a U.S. bank. Prices do not apply in Japan. Contact Nankodo Co., Ltd, Tel: #81-33811-5031. All rates are subject to change without notice.

Dowden Health Media, 110 Summit Ave, Montvale, NJ 07645-9894
Telephone: 1-800-707-7040 E-mail: ebp@dowdenhealth.com
www.ebponline.net

What is the prognosis of postherpetic neuralgia?

EVIDENCE-BASED ANSWER

Postherpetic neuralgia occurs rarely among patients aged <50 years with herpes zoster. The incidence, duration, and severity of postherpetic neuralgia increases with age, but older patients usually have only mild pain. Most cases resolve spontaneously within 3 months.[1,2]

Even in the highest-risk group, people aged >70 years, 25% had some pain at 3 months, but only 10% had pain at 1 year, and none had severe pain. Only a few patients have pain that persists for years (strength of recommendation: **A**, based on a well-done prospective cohort study).

EVIDENCE SUMMARY

Postherpetic neuralgia is defined as pain that persists more than 1 month following onset of herpes zoster. The annual incidence of herpes zoster in population-based studies ranges from 1/1000 to 2/1000.[1,3] Among adults aged >60 years, the annual incidence increases to 3.6/1000 for men and 5.6/1000 for women.[1]

In a prospective study performed in a primary care setting in Iceland, all cases of herpes zoster and postherpetic neuralgia occurring over 4.5 years in a population of 100,000 were identified, and all cases of postherpetic neuralgia were followed for up to 7.6 years. Few patients (4%) received antiviral medication.

In this study, postherpetic neuralgia followed herpes zoster in 2% of patients under age 40, 21% between the ages of 40 and 60, and in 40% of those over age 60.[1,2] Subjects self-described pain as none, mild, moderate, or severe. Patients aged >60 years had the worst prognosis: 18% still had mild pain at 3 months and 6% had moderate or severe pain. At 1 year, 8% had mild pain and 2% had moderate pain. No patients had severe pain after 12 months.[1,2]

TABLE

Risk of postherpetic neuralgia by age

Age (y)	Pain at 3 mo	Pain at 1 y
>50	3% mild	0%
50–59	4% mild	4% mild
60–69	9% mild	3% mild
	4% moderate to severe	1% moderate
≥70	18% mild	8% mild
	6% moderate to severe	2% moderate

Among the 14 patients with pain persisting >12 months, 7 had complete resolution of pain, 5 had persisting pain that either improved or remained mild, 1 had ongoing moderate pain at 7 years, and 1 was lost to follow-up.[2] (See **Table**.) Although postherpetic neuralgia can recur after resolution,[4] no recurrence of pain was found among 183 randomly selected patients who had had resolution by 1 year.[2]

These results are similar to those found in an analysis of a retrospective cohort drawn from a large general practice network database,[5] as well as other population-based studies.[6,7] The prognosis is better than that reported in the placebo arms of trials of acute herpes zoster treatment.[4] Patients in such trials are more likely to have severe disease than those seen in primary care settings.

RECOMMENDATIONS FROM OTHERS

A British guideline states that 5% of herpes zoster patients have postherpetic neuralgia 1 year after shingles.[8] A review in the *New England Journal of Medicine* states that 48% of herpes zoster patients aged >70 years have postherpetic neuralgia at 1 year.[9] This prevalence comes from a retrospective cohort study that combined patients presenting to a referral center with herpes zoster or postherpetic neuralgia into a single cohort, thus overestimating

the prevalence of postherpetic neuralgia and providing a less reliable prognosis.[10]

John D. Gazewood, MD, MSPH, *University of Virginia, Charlottesville, VA;* ***Susan Meadows, MLS,*** *Department of Family and Community Medicine, University of Missouri–Columbia*

CLINICAL COMMENTARY

Knowing the overall good prognosis for postherpetic neuralgia is helpful as I encounter patients with shingles. This answer is consistent with my experience. Fear of potential interminable pain and anecdotal experience with prolonged patient suffering has seduced me to start medications to "prevent" this problem. In some cases, my unnecessary (and unproven) "preventive" medications have produced new problems. Future research should focus on effective pain treatment options instead of prevention of a condition that usually resolves with time.

Larry Halverson, MD, *Cox Health Systems Family Practice Residency Program, Springfield, Missouri*

REFERENCES

1. Helgason S, Sigurdsson JA, Gudmundsson S. The clinical course of herpes zoster: a prospective study in primary care. *Eur J Gen Pract* 1996; 2:12–16.
2. Helgason S, Peturrson G, Gudmundsson S, Sigurdsson JA. Prevalence of postherpetic neuralgia after a single episode of herpes zoster: prospective study with long term follow up. *BMJ* 2000; 321:1–4.
3. MacDonald BK, Cockerell OC, Sander JW, Shorvon SD. The incidence and lifetime prevalence of neurological disorders in a prospective community-based study in the UK. *Brain* 2000; 123:665–676.
4. Alper BS, Lewis PR. Does treatment of acute herpes zoster prevent or shorten postherpetic neuralgia? *J Fam Pract* 2000; 49:255–264.
5. Opstelten W, Mauritz J, de Wit N, van Wijck A, Stalman W. Herpes zoster and postherpetic neuralgia: incidence and risk indicators using a general practice research database. *Fam Pract* 2002; 19:471–475.
6. Ragozzino MW, Melton LJ, Kurland LT, Chu CP, Perry HO. Population-based study of herpes zoster and its sequelae. *Medicine (Baltimore)* 1982; 61:310–316.
7. Choo PW, Galil K, Donahue JG, Walker AM, Spiegelman D, Platt R. Risk factors for postherpetic neuralgia. *Arch Intern Med* 1997; 157:1217–1224.
8. Guidelines for the management of shingles. Report of a working group of the British Society for the Study of Infection (BSSI). *J Infect* 1995; 30:193–200.
9. Wood AJJ. Postherpetic neuralgia—pathogenesis, treatment and prevention. *N Engl J Med* 1996; 335:32–41.
10. Morgas JM, Kierland RR. The outcome of patients with herpes zoster. *Arch Dermatol* 1957; 75:193–196.

THE JOURNAL OF FAMILY PRACTICE

POEMs

PATIENT ORIENTED EVIDENCE THAT MATTERS

Watch for these POEMs coming soon

Risks associated with taking ephedra and ephedrine for weight loss

Natural progesterone prevents preterm birth in high-risk pregnancies

Heliox vs air-oxygen mixtures in acute asthma

Tricyclics and opioids for the treatment of postherpetic neuralgia

Metoclopramide reduces nausea from emergency contraception

Diclofenac vs acetaminophen in osteoarthritis of the knee