



# Getting Started Kit: Prevent Pressure Ulcers

## Bibliography

### 5 Million Lives Campaign

We invite you to join the 5 Million Lives Campaign, a national initiative to dramatically improve the quality of American health care. The Institute for Healthcare Improvement (IHI) and its partners seek to engage thousands of U.S. hospitals in an effort to reduce harm for five million American patients between December 2006 and December 2008. This ambitious work builds upon the great energy and commitment shown by hospitals during the 100,000 Lives Campaign, a national, IHI-led initiative that focused on reducing unnecessary mortality and ran from December 2004 to June 2006. Complete details, including materials, contact information for experts, and web discussions, are on the web at <http://www.ihl.org/IHI/Programs/Campaign/>.

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Allman R. The impact of pressure ulcers on healthcare costs and mortality. *Adv Wound Care*. 1998;11(3 Suppl):2.

Allman RM, Goode PS, Patrick MM, Burst N, Bartolucci AA. Pressure ulcer risk factors among hospitalized patients with activity limitation. *JAMA*. 1995;273:865-870.

The objective of this study was to identify specific demographic, medical, functional status, and nutritional characteristics that predict the development of stage 2 or greater pressure ulcers among patients whose activity is limited to bed or chair. Results suggest that nonblanchable erythema, lymphopenia, immobility, dry skin, and decreased body weight are independent and significant risk factors for pressure ulcers in hospitalized patients whose activity is limited to bed or chair.

Ayello EA, Braden B. How and why to do a pressure ulcer risk assessment. *Adv Skin Wound Care*. 2002;15 (3):125-131.

A quiz with the objective of improving clinical practice and the quality of patient care by providing a learning opportunity that enhances the participant's understanding of pressure ulcer risk assessment. Specific objectives cited by the authors: 1. Identify the purpose and benefits of using a pressure ulcer risk assessment scale. 2. Evaluate pressure ulcer risk by using the Braden Scale and its subscales. 3. Identify the interventions that can be implemented based on the patient's Braden Scale score.

Ayello EA. Predicting pressure ulcer sore risk. *J Gerontol Nurs* 1999;25:7-9.

Bates-Jensen BM. Quality indicators for prevention and management of pressure ulcers in vulnerable elders. *Ann Intern Med*. 2001;135:744-751.

Despite an increase in pressure ulcer research since the publication of the AHCPR guidelines on pressure ulcers, few quality indicators are supported by substantial evidence. Through a literature search and synthesis coupled with a two-stage expert panel process, the authors identify 11 quality indicators for pressure ulcers. These indicators span pressure ulcer care from prevention and assessment to topical treatments. Although they are not comprehensive, they provide a baseline for measures that may discriminate between quality and substandard care.

Bates-Jensen BM, Alessi CA et al. The effects of an exercise and incontinence intervention on skin health outcomes in nursing home residents. *J Am Geriatr Soc*. 2003;51(3):348-355.

An examination of skin health outcomes of an exercise and incontinence intervention. A multifaceted intervention improved four risk factors related to skin health but did not translate into significant improvements in most measures of skin health.

Black J, Baharestani MM, Cuddigan J, et al. National Pressure Ulcer Advisory Panel's updated pressure ulcer staging system. *Dermatology Nursing*. 2007;19(4):270-274.

Braden BJ, Maklebust J. Preventing pressure ulcers with the Braden scale; an update on this easy-to-use tool that assesses a patient's risk. *Am Journal Nurs*. 2005;105:70-72.

Brandeis GH, Berlowitz DR, Katz P. Are pressure ulcers preventable? A survey of experts. *Adv Skin Wound Care*. 2001;14:244-248.

This study sought to determine expert opinion regarding the preventability of pressure ulcers, the resources available to nursing homes for prevention, and the role of negligence lawsuits in pressure ulcer care. The results of this survey demonstrated divergent expert opinion on whether pressure ulcers are preventable. The role of regulations and litigation in pressure ulcer prevention needs to be further defined.

Bergstrom NI. Strategies for preventing pressure ulcers. *Clin in Geriatr Prac*. 1997;13(3):437-54.

Summary of the recommendations and algorithm presented in the AHCPR Pressure Ulcer Guidelines; the evidence supporting recommendations; and the research reported since the guidelines were written.

Bergstrom N, Braden BJ, Boynton P, Brunch S. Using a research-based assessment scale in clinical practice. *Nursing Clin North Am*. 1995;3:539-551.

The Braden Scale has been translated into Chinese, Japanese, Dutch, French, German, Italian, and perhaps other languages. It has been implemented in many health care settings in the United States and abroad. Perhaps the most significant data come from individual settings, such as the two highlighted earlier, which show that through use of a research-based risk assessment tool and a program of prevention based on the findings of the assessment, pressure ulcer incidence can be reduced. Both sites saw a 50% to 60% decrease in incidence of pressure sores. If the cost projections of Miller and Delozier cited earlier are correct and this decrease could be replicated in hospitals across the country, the cost savings for the nation would exceed \$400 million.

Breslow RA, Hallfrisch J, Guy DC, Crauwly D, Goldberg AP. The importance of dietary protein in healing pressure ulcers. *J Am Geriatr Soc*. 1993;41(4):357-362.

A study designed to determine the effect of dietary protein on healing of pressure ulcers in malnourished patients. The authors conclude that high protein diets may improve the healing of pressure ulcers in malnourished nursing home patients.

Bryant RA, Rolstad BS. Utilizing a systems approach to implement pressure ulcer prediction and prevention. *Ostomy Wound Manage*. 2001;47(9):26-36.

This article reviews systems theory, presents the steps for process improvement using the PDSA cycle, and references a recent statewide QI study conducted by the authors in collaboration with the Minnesota QIO.

Courtney BA, Ruppman JB, Cooper HM. Save our skin: Initiative cuts pressure ulcer incidence in half. *Nursing Management*. 2006;37(4):35-46.

OSF Saint Francis Medical Center (SFMC) initiated the implementation of the Six Sigma methodology—a process that allows for increased focus on developing and delivering near-perfect products and services—in its daily operations.

By incorporating Six Sigma methodologies into SFMC's treatment process, investigators hoped they could improve treatment methods and reduce further incidences of pressure ulcers. This undertaking ultimately led to the development of the Save Our Skin (SOS) project, an effort that boasted an ambitious goal of reducing the number of hospital-acquired pressure ulcers in adult patients by 50% within one fiscal year.

Cuddigan J, Ayello EA, Sussman C (eds.). *Pressure Ulcers in America: Prevalence, Incidence, and Implications for the Future*. Reston, VA: National Pressure Ulcer Advisory Panel; 2001.

Dolynchuk K, Keast D, Campbell K, et al. Best practices for the prevention and treatment of pressure ulcers. *Ostomy Wound Manage*. 2000;46(11):38-52.

In this article, the Canadian Association of Wound Care puts forward 12 recommendations for best practices in the prevention and treatment of pressure ulcers that focus on an interdisciplinary patient-centered approach. These recommendations are a synthesis of the Agency for Health Care Policy and Research guidelines, European guidelines, and current literature as interpreted by the Canadian experience and achieved through a national consensus panel. The article concludes that best practice guidelines must be fluid documents that respond to new evidence and experience.

Ferrell BA, Osterweil D, Christenson P. A randomized trial of low-air-loss beds for treatment of pressure ulcers. *JAMA*. 1993;269(4):494-497.

A study designed to assess the effectiveness of low-air-loss beds for the treatment of pressure ulcers in nursing homes. The authors conclude that low-air-loss beds provide substantial improvement compared with foam mattresses, despite other factors in pressure ulcer healing.

Frantz RA, Tang JH, Titler MG. Evidence-based protocol: prevention of pressure ulcers. *J Gerontol Nurs.* 2004;30:4-11.

This article concludes that those who provide direct care to older individuals who are functionally impaired and immobilized must be constantly vigilant for the potential development of pressure ulcers. Use of the evidence-based guideline, "Prevention of Pressure Ulcers" (Folkeahl et al., 2002), can provide a template for identification of patients at risk and implementation of interventions to prevent their occurrence.

Gibbons W, Shanks HT, Kleinhelter P, Jones P. Eliminating facility-acquired pressure ulcers at Ascension Health. *Jt Comm J Quality Patient Saf.* 2006;32:488-496.

In 2004, as part of Ascension Health's "Healthcare That Is Safe" initiative, St. Vincent's Medical Center, as an alpha site, was charged with defining best practices to eliminate facility-acquired pressure ulcers. A comprehensive plan, including the "SKIN" (Surfaces, Keep the patients turning, Incontinence management, Nutrition) bundle, was developed. The incidence of pressure ulcers decreased from > 2% to < 1% from December 2004 through February 2006. No new Stage III or IV facility-acquired pressure ulcers occurred between August 2004 and February 2006. Weekly SKIN operations meetings and use of the SKIN process tool ensured that all at-risk patients were receiving appropriate interventions. The SKIN program was adopted and is being implemented throughout Ascension Health.

Lyder CH. Pressure ulcer prevention and management. *JAMA.* 2003;289:223-226.

It is estimated that 1.3 million to 3 million adults have a pressure ulcer, with an estimated cost of \$500 to \$40 000 to heal each ulcer. The incidence of pressure ulcers varies greatly by clinical setting. Incidence rates of 0.4% to 38.0% for hospitals, 2.2% to 23.9% for long-term care, and 0% to 17% for home care have been reported. Incidence rates of less than 2% are ideal. However, the optimal incidence rate may vary depending on patient case mix, severity of illness, and other contextual factors. Pressure ulcers in elderly persons have also been associated with increased mortality rates. Because pressure ulcers are now considered a good indicator of quality of care, the failure to prevent or heal them can lead to litigation.

Panel for the Prediction and Prevention of Pressure Ulcers in Adults. Pressure Ulcers in Adults: Prediction and Prevention. Clinical Practice Guideline, Number 3. AHCPR Publication No. 92-0047. Rockville, MD: Agency for Health Care Policy and Research, Public Health Service, U.S. Department of Health and Human Services. May 1992.

This guideline makes specific recommendations to identify at-risk adults and to define early interventions for prevention of pressure ulcers. The guideline may also be used to treat Stage I pressure ulcers (nonblanchable erythema of intact skin). These guideline recommendations are not intended as the basis for care of infants and children, nor do they apply to individuals with existing Stage II or greater pressure ulcers or to individuals who are fully mobile.

Ratliff CR, Rodeheaver GT. Pressure ulcer assessment and management. *Lippincotts Prim Care Pract.* 1999;3:242-258.

A pressure ulcer is an area of localized tissue destruction directly related to prolonged pressure. The loss of skin integrity produces significant consequences not only for the individual, but also for the community, with reported costs of \$8.5 billion for pressure-ulcer care. Because of these costs, health care providers should be seeking prevention programs that identify high-risk individuals and implement preventive measures before the ulcer begins. Once the individual develops an ulcer, assessment of healing is critical to determine the appropriate treatment. Successful treatment depends on the principles of debridement, cleansing, bacterial control, wound dressing, and occasionally, surgical intervention.

Reddy M, Gill SS, Rochon PA. Preventing pressure ulcers: a systematic review. *JAMA.* 2006;296:974-984.

The authors conclude that given current evidence, using support surfaces, repositioning the patient, optimizing nutritional status, and moisturizing sacral skin are appropriate strategies to prevent pressure ulcers. Although a number of RCTs have evaluated preventive strategies for pressure ulcers, many of them had important methodological limitations. There is a need for well-designed RCTs that follow standard criteria for reporting nonpharmacological interventions and that provide data on cost-effectiveness for these interventions.

Thomas DR, Goode PS, Tarquine PH, Allman RM. Hospital-acquired pressure ulcers and risk of death. *J Am Geriatr Soc.* 1996;44:1435-1440.

A study to evaluate the impact of in-hospital pressure ulcer development on mortality among older, high-risk, hospitalized patients up to one year post-hospital discharge, after adjusting for baseline patient characteristics, disease severity, hospital complications, and discharge activity level. The authors conclude that pressure ulcers that develop during acute hospitalization are not associated with reduced 1-year

survival among high risk older persons after adjusting for nutritional and functional status, global measures of disease severity and co-morbidity, and noninfectious hospital complications.

Whitfield MD, Kaltenthaler EC, Akehurst RL, Walters SJ, Paisley S. How effective are prevention strategies in reducing the prevalence of pressure ulcers? *J Wound Care*. 2000;9:261-266.

The prevalence of pressure ulcers has remained constant at about 7% over the past 20 years, even though considerable time and money has been invested in various prevention strategies. This literature review explores whether pressure-prevention programmes can reduce the prevalence rate still lower or whether they are working but are limited by an increasingly aged population and rising patient acuity.

Wound Ostomy and Continence Nurses (WOCN) Society: Clinical Practice Guideline Series: Guidelines for Prevention and Management of Pressure Ulcers. Glenview, IL: WOCN Society, 2003.

Guideline Objectives: (1) To present an evidence-based guideline for pressure ulcer prevention and management; (2) To improve cost-effective patient outcomes as well as increase wound research in the areas where there are gaps between research and practice.

[http://www.guideline.gov/summary/summary.aspx?ss=15&doc\\_id=3860&nbr=3071](http://www.guideline.gov/summary/summary.aspx?ss=15&doc_id=3860&nbr=3071)

Zeller JL. Patient pages: Pressure ulcers. *JAMA*. 2006;296(8):1020.

A patient education document regarding how pressure ulcers form and how they can be prevented and treated.

Zuldowski K, Kindsfater D. Examination of care planning needs for elderly newly admitted to an acute care setting. *Ostomy Wound Manage*. 2000;46:32-38.

This study examined characteristics of elderly people newly admitted to an acute-care setting who should be included in routine care planning. Use of the nutritional, functional, and cognitive profile developed from this study will enable nurses and medical personnel to better plan care to prevent functional decline and improve nutritional status during hospitalization of elderly patients.

The following is a comprehensive bibliography of articles on Best Practice and Quality Indicators in Pressure Ulcer Prevention, Incidence and Prevalence and Risk Assessment, compiled by the NPUAP.

## Best Practice & Quality Indicators in Pressure Ulcer Prevention

Baharestani, M.M Pressure ulcers in an age of managed care. *Ostomy/Wound Management* 1999; 45 (5), 18-40.

Baharestani MM, Ratliff C, the National Pressure Ulcer Advisory Panel. Pressure ulcers in neonates and children: An NPUAP white paper. *Advances in Skin & Wound Care*. 2006 (in press).

Bates-Jensen, B.M. 2001. *Annals of Internal Medicine*: 135. Quality indicators for prevention and management of pressure ulcers in vulnerable elders.

Berlowitz, D.R.; Brand, H.K.; Perkins, C. 1999. Geriatric syndromes as outcome measures of hospital care: Can administrative data be used? *J. Am. Geriatr. Soc.* 47(6):692-6.

Berlowitz, D.R.; Bezerra, H.Q.; Brandeis, G.H.; Kader, B; Anderson, J.J. 2000. Are we improving the quality of nursing home care?: the case of pressure ulcers. *J. Am. Geriatr. Soc.* 48(1):59-62.

Berlowitz, D.R.; Brandeis, G.H.; Morris, J.N.; Ash, A.S.; Anderson, J.J.; Kader, B.; Moskowitz, M.A. 2001. Deriving a risk-adjustment model for pressure ulcer development using the Minimum Data Set. *J. Am. Geriatr. Soc.* 49(7):866-871.

Berlowitz, D.R.; Brandeis, G.H.; Anderson, J.J.; Ash, A.S.; Kader, B.; Morris, J.N.; Moskowitz, M.A. 2001. Evaluation of a risk-adjustment model for pressure ulcer development using the Minimum Data Set. *J. Am. Geriatr. Soc.* 49(7):872-876.

Blegen, M.A.; Goode, C.J.; Reed, L. 1998. Nurse staffing and patient outcomes. *Nursing Research* 47(1):43-50.

Boettger, J.E. 1997. Effects of a pressure-reduction mattress and staff education on the incidence of nosocomial pressure ulcers. *J. Wound Ostomy Continence Nurs.* 24(1):19-25.

CalNOC. 2000. A statewide nursing outcomes database. Linking patient outcomes to hospital nursing care: California Nursing Outcomes Coalition.

Dolynchuk, K.; Keast, D.; Campbell, K.; Houghton, P.; Orsted, H.; Sibbald, G. et al. 2000. Best practices for the prevention and treatment of pressure ulcers. *Ostomy Wound Management* 46(11):38-52.

Hanson, D.; Langemo, D.K.; Olson, B.; Hunter, S.; Burd, C. 1994. Evaluation of pressure ulcer prevalence rates for hospice patients post-implementation of pressure ulcer protocols. *Am. J. Hosp. Palliat. Care* 11(6):14-9.

Inman, K.J.; Dymock, K.; Fysh, N.; Robbins, B.; Rutledge, F.S.; Sibbald, W.J. 1999. Pressure ulcer prevention: a randomized controlled trial of 2 risk-directed strategies for patient surface assignment. *Advances in Wound Care* 12(2):72-80.

Lyder, C.H.; Preston, J.A.; Ahearn, D.; Dimenstein, M.; Forsyth, K.; Grady, J.N. et al. November 1998. Medicare Quality Indicator System: Pressure Ulcer Predication and Prevention Module Final Report. Government Report. Bethesda, MD: Health Care Financing Administration.



Lyder, C.H.; Presto, J.; Grady, J.; Scinto, J.; Allman, R.; Bergstrom, N. et al. 2001. Quality of care for hospitalized Medicare patients at risk for pressure ulcers. *Arch. Intern Med.*:161.

Sacharok, C.; Drew, J. 1998. Use of a total quality management model to reduce pressure ulcer prevalence in the acute care setting. *J. Wound Ostomy Continence Nurs.* 25(2):88-92.

Xakellis, G.C.; Frantz, R.A.; Lewis, A.; Harvey P. 1998. Cost-effectiveness of an intensive pressure ulcer prevention protocol in long-term care. *Advances in Wound Care* 11(1):22-9.

Zanca JM, Brienza DM, Berlowitz D, Bennett RG, Lyder CH; National Pressure Ulcer Advisory Panel. Pressure ulcer research funding in America: creation and analysis of an on-line database. *Advances in Skin & Wound Care.* 2003 Jul-Aug; 16(4): 190-7.

### Incidence and Prevalence

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Barczak, C.A.; Barnett, R.I.; Childs, E.J.; Bosley, L.M. 1997. Fourth national pressure ulcer prevalence survey. *Advances in Wound Care* 10(4):18-26.

Baumgarten, M. 1998. Designing prevalence and incidence studies. *Advances in Wound Care* 11(6):287-93.

Bergstrom, N.; Braden, B.; Kemp, M.; Champagne, M.; Ruby, E. 1996. Multi-site study of incidence of pressure ulcers and the relationship between risk level, demographic characteristics, diagnoses, and prescription of preventive interventions. *J. Am. Geriatr. Soc.* 44:22-30.

Bergquist, S.; Frantz, R. 1999. Pressure ulcers in community-based older adults receiving home health care. Prevalence, incidence and associated risk factors. *Advances in Wound Care* 12(7):339-51.

Cuddigan J. Frantz RA. Pressure Ulcer Research: Pressure Ulcer Treatment. A monograph from the National Pressure Ulcer Advisory Panel. *Advances in Skin & Wound Care.* 1998 Oct 11(6): 294-300; quiz 30.

Data 2010: The Healthy People 2010 Database. In: Center for Disease Control and Prevention. National Center for Health Statistics. Website: <http://wonder.cdc.gov/data2010/obj.htm>.

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National Pressure Ulcer Advisory Panel Board of Directors. Cuddigan J.; Berlowitz, D.R.; Ayello, E.A. (Eds). 2001. Pressure ulcers in America: Prevalence, incidence, and implications for the future. An executive summary of the National Pressure Ulcer Advisory Panel Monograph. *Advances in Skin and Wound Care* 14(4):208-215.

National Pressure Ulcer Advisory Panel. Cuddigan, J.; Ayello, E.A., Sussman, C. (Eds.). 2001. Pressure ulcers in America: Prevalence, incidence, and implications for the future. Reston, VA: NPUAP.

Olson, B.; Langemo, D.; Burd, C.; Hanson, D.; Hunter, S.; Cathcart Silberberg, T. 1996. Pressure ulcer incidence in an acute care setting. *J. Wound Ostomy Continence Nurs.* 23(1):15-22.

O'Sullivan, K.L.; Engrav, L.H.; Maier, R.V.; Pilcher, S.L.; Isik, F.F.; Copass, M.K. 1997. Pressure sores in the acute trauma patient: incidence and causes. *J. Trauma* 42(2):276-8.

Pieper, B.; Templin, T.N.; Dobal, M.; Jacox, A. 1999. Wound prevalence, types, and treatments in home care. *Advances in Wound Care* 12(3):117-26.

Sacharok, C.; Drew, J. 1998. Use of a total quality management model to reduce pressure ulcer prevalence in the acute care setting. *J. Wound Ostomy Continence Nurs.* 25(2):88-92.

Salzberg, C.A.; Byrne, D.W.; Cayten, C.G.; Kabir, R.; van Niewerburgh, P.; Viehbeck, M. et al. 1998. Predicting and preventing pressure ulcers in adults with paralysis. *Advances in Wound Care* 11(5):237-46.

Schue, R.M.; Langemo, D.K. 1998. Pressure ulcer prevalence and incidence and a modification of the Braden Scale for a rehabilitation unit. *J. Wound Ostomy Continence Nurs.* 25(1):36-43.

Whittington, K.; Patrick, M.; Roberts, J.L. 2000. A national study of pressure ulcer prevalence and incidence in acute care hospitals. *J. Wound Ostomy Continence Nurs.* 27(4):209-15.

Williams, D.F.; Stotts, N.A.; Nelson, K. 2000. Patients with existing pressure ulcers admitted to acute care. *J. Wound Ostomy Continence Nurs.* 27(4):216-26.

### Risk Assessment

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Ayello, E.A.; Braden, B. 2001. Why is pressure ulcer risk assessment so important? *Nursing* 2001. 31 (11): 75-79.

Bennett, M.A. 1995. Report of the task force on the implications for darkly pigmented intact skin in the prediction and prevention of pressure ulcers. *Advances in Wound Care* 8(6):34-5.

Bergstrom, N.; Braden, B.; Kemp, M.; Champagne, N.M.; Ruby, E. 1998. Predicting pressure ulcer risk: a multisite study of the predictive validity of the Braden Scale. *Nursing Research* 47(5):261-9.

Carlson, E.V.; Kemp, M.G.; Shott, S. 1999. Predicting the risk of pressure ulcers in critically ill patients. *Am. J. Crit. Care* 8(4):262-9.

Lewicki, L.J.; Mion, L.; Splane, K.G.; Samstag, D.; Secic, M. 1997. Patient risk factors for pressure ulcers during cardiac surgery. *AORN J.* 65(5):933-2.

Lyder, C.H.; Yu C.; Emerling, J.; Mangat, R.; Stevenson, D.; Empleo-Frazier, O. et al. 1999. The Braden Scale for pressure ulcer risk: evaluating the predictive validity in Black and Latino/Hispanic elders. *Applied Nursing Research* 12(2):60-8.

Lyder, C.H.; Yu, C., Stevenson, D.; Mangat, R.; Empleo Frazier, O.; Emerling, J. et al. 1998. Validating the Braden Scale for the predication of pressure ulcer risk in blacks and Latino/Hispanic elders: a pilot study. *Ostomy Wound Management* 44(3A Suppl):42s-49s.

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Stotts, NA. 1999. Risk of pressure ulcer development in surgical patients: A review of the literature. *Advances in Wound Care* 12(3): 127-36.

Stotts, N.A. Deosaransingh, K.; Roll, F.J.; Newman, J. 1998. Under utilization of pressure ulcer risk assessment in hip fracture patients. *Advances in Wound Care* 11(1):32-8.

Tourtual, D.M.; Riesenber, L.A.;Korutz, C.J.; Semo, A.H.; Asef, A.; Talati, K. et al. 1997. Predictors of hospital acquired heel pressure. *Ostomy Wound Management* 43(8):24-8, 30, 32-4 passim.

Van Rijswijk, L.; Braden, B.J. 1999. Pressure ulcer patient and wound assessment: An AHCPR clinical practice guideline update. *Ostomy Wound Management* 45(1A suppl):56-68. Willock J, Baharestani, M, Anthony D. A risk assessment scale for pressure ulcers in children. *Nusing Times*. 2007;103(14):32-33.

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