

Support of Evidence-Based Guidelines for the Annual Physical Examination

A Survey of Primary Care Providers

Allan V. Prochazka, MD, MSc; Kristy Lundahl, MS; Wesley Pearson, MD; Sylvia K. Oboler, MD; Robert J. Anderson, MD

Background: Current evidence does not support an annual screening physical examination for asymptomatic adults, but little is known about primary care provider (PCP) attitudes and practices regarding an annual physical examination.

Methods: We conducted a postal survey (32 items) of attitudes and practices regarding the annual physical examination (in asymptomatic patients 18 years or older) of a random sample of PCPs (specializing in internal medicine, family practice, and obstetrics/gynecology) from 3 geographic areas (Boston, Mass; Denver, Colo; and San Diego, Calif).

Results: Respondents included 783 (47%) of 1679 PCPs. Overall, 430 (65%) of 664 agreed that an annual physical examination is necessary. Three hundred ninety-three (55%) of 712 disagreed with the statement that national organizations do not recommend an annual physical examination, and 641 (88%) of 726 perform such examinations. Most PCPs agreed that an annual physical

examination provides time to counsel patients about preventive health services (696/739 [94%]), improves patient-physician relationships (693/737 [94%]), and is desired by most patients (572/737 [78%]). Most also believe that an annual physical examination improves detection of subclinical illness (545/738 [74%]) and is of proven value (461/736 [63%]). Many believed that tests should be part of an annual physical examination, including mammography (44%), a lipid panel (48%), urinalysis (44%), testing of blood glucose level (46%), and complete blood cell count (39%).

Conclusions: Despite contrary evidence, most PCPs believe an annual physical examination detects subclinical illness, and many report performing unproven screening laboratory tests. Primary care providers do not appear to accept recommendations that annual physical examinations be abandoned in favor of a more selective approach to preventing health problems.

Arch Intern Med. 2005;165:1347-1352

THE ANNUAL PHYSICAL EXAMINATION became popular in the 1920s as a means of identifying disease before the usual time of clinical diagnosis.¹ In the last 20 years, evidence-based guidelines have been developed that do not recommend a routine annual physical examination and testing for asymptomatic adults.^{2,3} The guidelines suggest a change in approach from mass screening to more selective case finding based on the patient's personal and family history and overall risk assessment.

the general public desired an annual physical examination and extensive testing.⁴ Current attitudes of primary care physicians (PCPs) about the annual physical examination are not known. The objective of the present study, therefore, was to examine attitudes and self-reported practices of PCPs regarding the annual physical examination. To maintain relevance to our recent results, we studied PCPs residing in the same geographic regions as used in the previous public survey.⁴

Author Affiliations:
Ambulatory Care Section,
Denver Veterans Affairs Medical
Center (Drs Prochazka and
Oboler), and Division of
General Internal Medicine,
University of Colorado Health
Sciences Center
(Drs Prochazka, Pearson,
Oboler, and Anderson and
Ms Lundahl), Denver.
Financial Disclosure: None.

See also pages 1354
and 1333

Despite these guidelines, which have been widely disseminated in the medical literature, a recent report from our group found that a relatively high percentage of

METHODS

The study was approved by the Colorado Multiple Institutional Review Board, Aurora. The subjects were PCPs in the specialties of internal medicine, family practice, and obstetrics/gynecology and located in the metropolitan areas of Boston, Mass; Denver, Colo; and San Diego, Calif. We obtained the sampling list from KM Lists, Inc (Marlton, NJ) and it was de-

Table. Respondent Demographics by Region*

Characteristic	Overall (n = 741)	Geographic Area			P Value
		Boston, Mass (n = 210)	Denver, Colo (n = 304)	San Diego, Calif (n = 227)	
Age, mean, y	46.6	47.2	45.9	47.0	.27
Male	66	59	67	70	.03
Specialty					<.001
Family practice	38	16	48	45	
Internal medicine	43	63	33	38	
Obstetrics/gynecology	16	16	17	15	
Practice setting					<.001
Private	58	54	65	53	
HMO	10	6	12	12	
Other	32	40	23	35	
Year of graduation					.03
1970 or before	11	11	8	16	
1971-1989	57	60	57	53	
1990 or after	32	30	35	31	

Abbreviation: HMO, health maintenance organization.

*Unless otherwise indicated, data are expressed as percentage of respondents.

rived from the American Medical Association's list of licensed physicians. This list is not restricted to American Medical Association members, but includes virtually all physicians who are licensed to practice medicine in the United States. Potential subjects were randomly selected from this list. Two hundred physicians from each of the 3 primary care specialties from each metropolitan region were selected. The cities were selected for the previous patient survey⁴ because they represented a range of penetration by health maintenance organizations, with the highest level in San Diego, an intermediate level in Denver, and the lowest level in Boston at that time. Thus, the total sample included 1800 physicians. The sample size was selected so that, assuming a 50% response rate and an α of .05, we could detect a small to moderate overall effect size with comparison of the region and specialty using χ^2 testing with more than 80% power.⁵

The survey instrument was a postal, self-administered, 32-item questionnaire (available from the corresponding author by request). The survey included physician attitudes (8 items), laboratory testing (8 items), physical examination maneuvers (4 items), and diagnostic procedures (4 items). The construct validity of the attitude items was high (Cronbach α =0.709). The test items were selected because they paralleled those used in the survey of patients.⁴ These also represented a range of procedures, some of which are generally recommended for screening in adults by the US Preventive Services Task Force (lipid panel, Papanicolaou smear, mammography, blood pressure measurement, and height and weight measurement) and some of which are not or for which there are insufficient data to make a recommendation (glucose level measurement, complete blood cell count [CBC], human immunodeficiency virus testing, kidney, liver, and thyroid function testing, urinalysis, chest x-ray, electrocardiography, and treadmill test). The test items represent self-report and have not been independently validated against medical record review. Items were ranked on 4-point Likert scales or were yes/no in format. We defined an annual physical examination on the survey as a routine physical examination in an asymptomatic person 18 years or older. Our survey instrument was pilot tested on 25 PCPs and refined before final use.

We performed the statistical analysis with SAS software (SAS Institute, Cary, NC). Statistical methods included descriptive statistics, with unpaired, 2-tailed *t* tests and χ^2 tests for com-

parison of continuous and categorical variables, respectively. We used logistic regression to examine respondent characteristics associated with attitudes regarding the annual physical examination.⁶ The regression models include our key demographic variables (year of medical school graduation, sex, region, and specialty). We assessed model fit with the Hosmer-Lemeshow statistic.⁷ Denominators may vary due to item nonresponse. Data are presented as percentages or odds ratios (ORs) with 95% confidence intervals (CIs).

RESULTS

The response rate was 783 (47%) of 1679 after accounting for incorrect addresses and physicians no longer in practice. The demographic characteristics of the respondents are shown in the **Table**. The physicians' average age was 47 years, with a range from 27 to 85 years. Sixty-six percent were male. Of the specialties, 43% were internists, 38% were in family practice, and 16% were in obstetrics/gynecology. Most respondents (58%) were in private practice, whereas 12% were in hospital-based clinics, 10% in health maintenance organizations, and 8% in community-based clinics. The physicians in Boston included a higher proportion of internal medicine ($P<.001$) and more women physicians than the other regions ($P=.03$). A higher proportion of respondents graduated medical school since 1990 in the Denver region (35%) compared with the Boston (30%) or the San Diego region (31%) ($P=.03$).

Figure 1 addresses the question whether PCPs believe an annual physical examination is necessary in addition to seeing patients for acute medical conditions and chronic medical illnesses. Most PCPs (65%) agreed or strongly agreed with this statement. Primary care physician attitudes about the annual physical examination (**Figure 2**) indicate that most (94%) believed that an annual physical examination improved the physician-patient relationship and provided valuable time for counseling on preventive health behaviors. Nearly all physi-

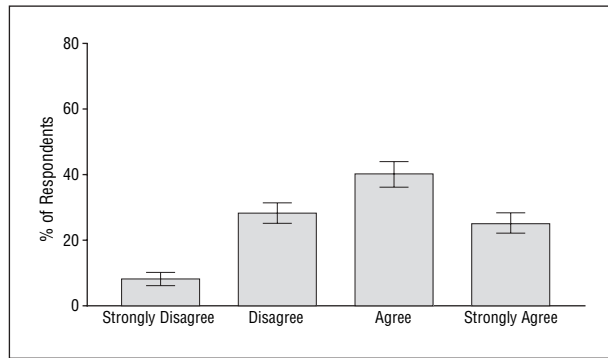


Figure 1. Likert scale responses to the question whether an annual physical examination is necessary for asymptomatic adults. Limit lines represent 95% confidence intervals.

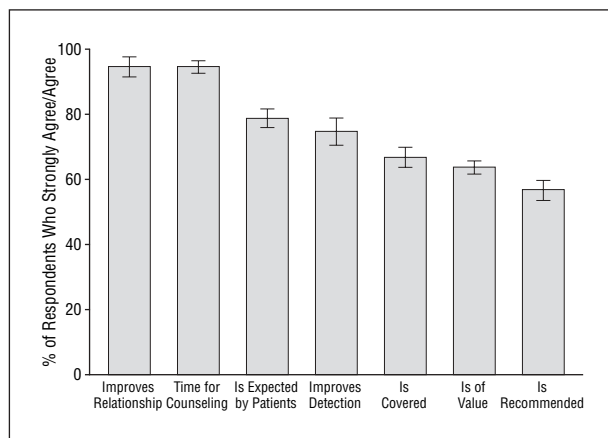


Figure 2. Percentage of primary care physicians who strongly agree or agree with the following views on the annual physical examination: improves physician-patient relationship; provides time for counseling; is expected by patients; improves detection of subclinical illnesses; is covered by most insurance plans; is of no proven value; and is not recommended by national organizations. For the last 2 items, the responses represent the percentage of respondents who strongly disagreed or disagreed with the statement. Limit lines represent 95% confidence intervals.

cians (88%) indicated that they performed annual physical examinations. Seventy-eight percent believed that such an examination was expected by most patients. Surprisingly, in view of the current evidence, 74% thought that an annual physical examination improved the detection of subclinical illness. Sixty-six percent believed that annual physical examinations are covered by insurance, 63% thought they were of proven value, and 55% disagreed with the statement that such examinations were not recommended by national organizations.

When queried about the content of the annual physical examination, virtually all physicians (>95%) believed that height, weight, and blood pressure measurement should be obtained on all patients during an annual physical examination. For women, 60% thought that a Papanicolaou smear should be obtained on all patients and 44% thought that a mammogram was similarly indicated. We next addressed the role of specific examinations and tests during an annual physical examination (**Figure 3**). A large proportion of PCPs reported that a number of tests should be performed as part of an annual physical examination, including a lipid panel (48%), CBC (39%), urinalysis (44%), measurement of

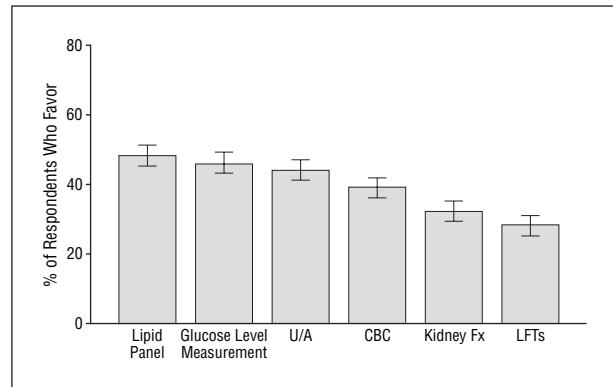


Figure 3. Percentage of primary care physicians who favor performing laboratory testing for all patients during an annual physical examination. CBC indicates complete blood cell count; kidney Fx, kidney function tests; LFTs, liver function tests; and U/A, urinalysis. Limit lines represent 95% confidence intervals.

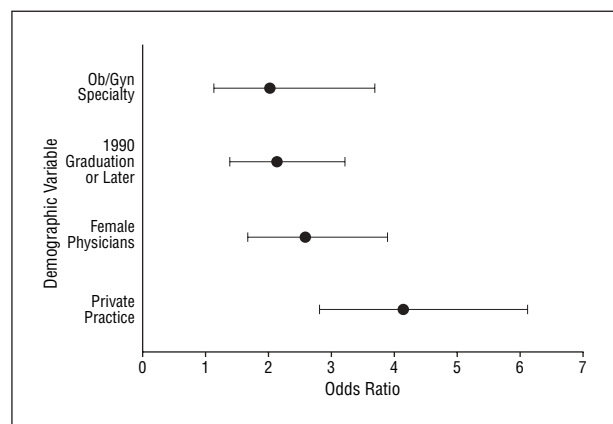


Figure 4. Predictors of viewing an annual physical examination as being necessary for asymptomatic adults. We performed logistic regression analysis on the dependent variable of agreeing/strongly agreeing with the statement that an annual physical examination is necessary. Female physicians were compared with male physicians; specialists in obstetrics/gynecology (Ob/Gyn), with those in family medicine; those who graduated medical school in 1990 or later, with those who graduated before 1990; and those in a private practice setting, with those in a health maintenance organization or a hospital/community-based clinic. Bars represent 95% confidence intervals.

blood glucose level (46%), and kidney (32%), liver (28%), and thyroid function tests (21%). The chest x-ray, electrocardiography, and exercise treadmill were rarely thought to be indicated (2%, 6%, and 0.4%, respectively).

We used logistic regression to examine PCP characteristics associated with the belief that an annual physical examination was necessary. **Figure 4** shows the results. Physicians in private practice, those in obstetrics/gynecology, younger physicians, and women physicians favored an annual physical examination more than other PCPs. There was no significant effect of region of the country ($P=.22$), and the model had good fit (Hosmer-Lemeshow statistic, $P=.59$). When we examined predictors of performance of annual physical examinations, however, there was a significant effect of region, with respondents in Denver (OR, 1.95; 95% CI, 1.08-3.53) and Boston (OR, 4.92; 95% CI, 2.23-10.86) reporting a higher rate of performance of annual physical examinations com-

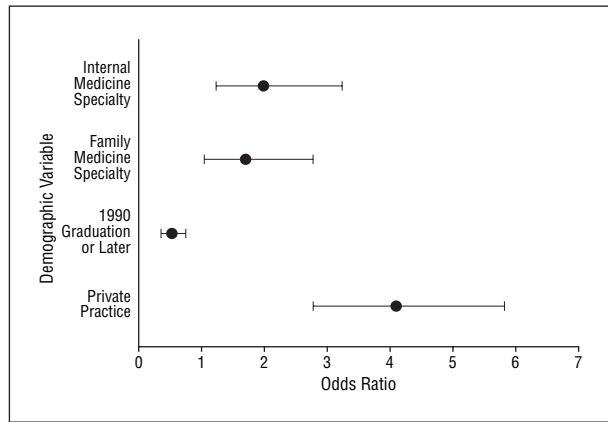


Figure 5. Predictors of recommending a complete blood cell count (CBC) for all patients during an annual physical examination. We performed logistic regression analysis on the dependent variable of recommending a CBC for all patients who are receiving an annual physical examination. Specialists in internal medicine were compared with those in obstetrics/gynecology; specialists in family medicine, with those in obstetrics/gynecology; those who graduated medical school in 1990 or later, with those who graduated before 1990; and those in a private practice setting, with those in a health maintenance organization or hospital/community-based clinic. Bars represent 95% confidence intervals.

pared with those in San Diego. Physicians in private practice (OR, 9.53; 95% CI, 4.96-18.26) and younger physicians graduating since 1990 (OR, 3.25; 95% CI, 1.73-6.09) were more likely to report performing annual physical examinations; however, the effect of sex was not significant (OR, 0.99; 95% CI, 0.97-1.03). The model fit was acceptable (Hosmer-Lemeshow statistic, $P = .75$).

We selected the CBC (**Figure 5**) as an indicator of whether a physician was in favor of testing that was of unproven value in the context of an annual physical examination. In a multivariate logistic regression model that included all our demographic variables, physicians in private practice were much more likely to be in favor of performing a CBC (OR, 4.10; 95% CI, 2.77-5.81). Specialists in family medicine (OR, 1.69; 95% CI, 1.04-2.77) and internal medicine (OR, 2.02; 95% CI, 1.23-3.23) were more in favor of performing a CBC than those in obstetrics/gynecology, whereas younger physicians were less likely to favor such testing than other physicians (OR, 0.52; 95% CI, 0.36-0.75). Region of the country and sex were not significant, and model fit was acceptable (Hosmer-Lemeshow statistic, $P = .49$). We contrasted the results for CBC testing with obtaining a lipid panel, because screening of lipid levels has a much stronger evidence base. In this analysis, those in private practice were more likely to recommend testing of lipid levels for all (OR, 1.58; 95% CI, 1.13-2.20) compared with those in nonprivate practice settings, and specialists in family medicine (OR, 6.09; 95% CI, 3.46-10.73) and internal medicine (OR, 7.71; 95% CI, 4.36-13.59) were more likely than those in obstetrics/gynecology to recommend lipid testing. Younger physicians were somewhat less likely to recommend testing of lipid levels for all patients as part of the annual physical examination than older physicians (OR, 0.71; 95% CI, 0.51-1.00). Region and sex were not significant, and the model fit was acceptable (Hosmer-Lemeshow statistic, $P = .86$).

The concept that an annual physical examination can serve as an important tool to screen for asymptomatic disease and predisposition to disease was first proposed in 1861.⁸ During the subsequent 144 years, numerous influences resulted in promotion of the concept of an annual physical examination, often accompanied by laboratory testing, as an important mass screening technique in asymptomatic adults.⁹ In more recent years, the principles of evidence have been applied to the comprehensive annual examination and multiphasic laboratory screening.^{2,3,10-13} When subjected to careful scrutiny, a comprehensive annual examination with laboratory testing in unselected healthy adults has not been proven as a means for disease detection and prevention. Subsequently, national organizations no longer advocate comprehensive annual examinations. Instead, they recommend that the few examinations and procedures of proven preventive value be undertaken within the concept of providing routine medical care.^{2,3} The goal of this study was to assess the views of physicians practicing primary care medicine on current recommended practices of providing preventive care and annual physical examinations.

The present studies find that a relatively high proportion of PCPs practicing in 3 geographically diverse areas believe that an annual physical examination is necessary in asymptomatic adults. These results are nearly identical to results obtained from surveying the general public residing in the same geographic areas, in which two thirds of the public were found to desire an annual physical examination.⁴ Primary care physicians believe that annual physical examinations are necessary, and they support routine laboratory testing, of unproven value, in asymptomatic adults. Studies of the use of such routine testing for case finding show that there is very little yield from tests such as CBCs and chemistry panels, yet those tests were often endorsed by physicians in our survey.¹⁴ Our data are consistent with the findings of a study of more than 700 000 periodic health examinations in Canada. More than one third of such examinations included laboratory tests that were not recognized by Canadian guidelines.¹⁵ Our group recently found that the public also has a high desire for extensive periodic laboratory testing,⁴ and these findings are similar to those of prior surveys performed nearly 20 years ago,¹⁶ suggesting that little has changed in public expectations. Our collective results regarding PCP and public desires for annual examinations and testing stand in contrast to current evidence-based guidelines and recommendations regarding such examinations and testing. It is clear that, despite national organizations no longer recommending annual examinations and lack of evidence supporting routine laboratory testing in asymptomatic individuals,¹⁷ the public desires such examinations, and PCPs continue to believe in the value of these examinations.

We found that PCPs and patients desire examinations and tests of unproven value and that there is relatively low support for some tests and procedures of proven preventive value, such as testing of cholesterol levels. Clearly, there is a significant disconnect among data-

driven recommendations, patient desires, and physician practices. Given the more than 140 years of promotion of annual/preventive examinations and testing and only recent organizational emphasis away from such examinations, the public's desires for such examinations are perhaps reasonable. Less understandable, however, are PCP attitudes toward such examinations and testing. Although our results indicate several reasons why PCPs support annual examinations (ie, improvement in patient/physician relationship, time for counseling, patient expectation), it was somewhat surprising that PCPs believe that annual examinations improve detection of subclinical illness and are currently recommended by national organizations. Clearly, better education of the public and PCPs regarding examinations and tests of proven and unproven value is needed.

Two other important factors that seem to be influencing our results are the type of practice setting and region. Those in private practice were more in favor of the annual physical examination and of many of the less evidence-based tests, such as CBCs. This may reflect the different financial incentives present in private practice than in health maintenance organizations or other capitated settings. In addition, there were regional differences in whether PCPs perform an annual physical examination. Primary care physicians in Denver and Boston were more likely to report performing physical examinations, although they had similar attitudes about the necessity of an annual physical examination as those in San Diego. Again, this finding parallels the degree of managed care market penetration and may depend on financial incentives for performing annual physical examinations.

Despite the fact that national organization suggestions no longer recommend annual examinations and suggest incorporation of prevention practices into ongoing care, there has been little impact on the delivery of preventive services. For example, in Canada, the Canadian Task Force on the Periodic Health Examination recommended abandonment of the periodic examination in favor of case finding undertaken in the context of visits made for other reasons in 1979.² When professional paid volunteers sought to establish care with a Canadian PCP, only 41% received preventive health services of proven benefit and 17% received services with evidence of no benefit.¹⁸ These results are unfortunately nearly comparable to those of a large analysis recently performed in the United States, in which 55% of adults had received recommended preventive care.¹⁹ Clearly, mass screening and more selected case finding approaches are not resulting in optimal delivery of preventive services for asymptomatic adults.

There are a number of limitations to our study. First, the data represent physician opinions and self-reported recommendations, so we cannot be sure that such views translate into actual behavior. Second, it appears that physicians have different views on what an annual physical examination should entail. This may represent influences of practice setting or differing views of what *asymptomatic* represents. Our data do not allow us to explore this possibility. Third, our response rate was 47%, which is within the typical range of physician postal surveys.²⁰ However, we do not have data to assess whether our re-

spondents' views are similar to those of the physicians who did not respond. Fourth, we had a differential response rate by specialty, with the lowest response from specialists in obstetrics and gynecology. This may reflect the fact that physicians in that specialty may have a different view of their role as PCPs. There also was a higher response rate from the Denver metropolitan area than the other regions; however, this did not appear to affect the results of the multivariate analyses. Finally, the attitudes and opinions expressed may not be representative of other specialties and other regions.

This study has several important implications. First, physicians who follow the currently recommended selective approach to the annual physical examination need to recognize and acknowledge patients' wishes for testing and at the same time appropriately educate them about those components of the annual physical examination that are of value. Second, physicians clearly believe that the annual physical examination builds the physician-patient relationship. To our knowledge, no studies have specifically addressed whether the annual physical examination actually improves relationships with patients. If the annual physical examination with appropriate testing can be shown to have this effect, then it would be a strong argument in favor of such examinations. Finally, national prevention guidelines do not recommend routine, annual physical examinations and testing for asymptomatic adults. However, the PCPs in this study are very much in favor of the annual physical examination. Thus, there is a lack of concordance between the guidelines and those who would implement the guidelines. This is a critical challenge for achieving national prevention goals, because many of those on the front lines of primary care do not appear to accept the targeted recommendations of the guidelines.

Accepted for Publication: December 12, 2004.

Correspondence: Allan V. Prochazka, MD, MSc, Ambulatory Care Section 11B, Denver Veterans Affairs Medical Center, 1055 Clermont, Denver, CO 80220 (Allan.Prochazka@med.va.gov).

Funding/Support: This study was supported by the Division of General Internal Medicine, University of Colorado Health Sciences Center, Denver.

Previous Presentation: The abstract was presented at the 26th Annual Meeting of the Society of General Internal Medicine; May 2, 2003; Vancouver, British Columbia.

REFERENCES

1. Emerson H. Periodic medical examinations of apparently healthy persons. *JAMA*. 1923;80:1376-1381.
2. Canadian Task Force on the Periodic Health Examination. The periodic health examination. *CMAJ*. 1979;121:1193-1254.
3. US Preventive Services Task Force. *Guide to Clinical Preventive Services: Report of the Preventive Services Task Force*. 2nd ed. Baltimore, Md: Williams & Wilkins; 1996.
4. Oboler SK, Prochazka AV, Gonzales R, Xu S, Anderson RJ. Public expectations and attitudes for annual physical examinations and testing. *Ann Intern Med*. 2002; 136:652-659.
5. Cohen J. *Statistical Power Analysis for the Behavioral Sciences*. 2nd ed. Hillsdale, NJ: Lawrence A Erlbaum Associates; 1988.
6. Holford TR. *Multivariate Methods in Epidemiology*. New York, NY: Oxford University Press Inc; 2002.

7. Hosmer DW, Lemeshow S. A goodness-of-fit test for the multiple logistic regression model. *Commun Stat.* 1980;A10:1043-1069.
8. Dobell H. *Lectures on the Germs and Vestiges of Disease, and on the Prevention of the Invasion and Fatality of Disease by Periodical Examinations.* London, England: Churchill Livingstone Inc; 1861:142-163.
9. Han PK. Historical changes in the objectives of the periodic health examination. *Ann Intern Med.* 1997;127:910-917.
10. Frame PS, Carlson SJ. A critical review of periodic health screening using specific screening criteria: part 4: selected miscellaneous diseases. *J Fam Pract.* 1975; 2:283-289.
11. Olsen DM, Kane RL, Proctor PH. A controlled trial of multiphasic screening. *N Engl J Med.* 1976;294:925-930.
12. South-East London Screening Study Group. A controlled trial of multi-phasic screening in middle-age: results of the South-East London screening study. *Int J Epidemiol.* 1977;6:357-363.
13. Friedman GD, Collen MF, Fireman BH. Multiphasic health check up evaluation: a 16-year follow-up. *J Chronic Dis.* 1986;39:453-463.
14. Boland BJ, Wollan PC, Silverstein MD. Yield of laboratory tests for case-finding in the ambulatory general medical examination. *Am J Med.* 1996;101:142-152.
15. van Walraven C, Goel V, Austin P. Why are investigations not recommended by practice guidelines ordered at the periodic health examination? *J Eval Clin Pract.* 2000;6:215-224.
16. Romm FJ. Periodic health examination: effect of costs on patient expectations. *South Med J.* 1985;78:1330-1332, 1340.
17. Gordon PR, Senf J, Campos-Outcalt D. Is the annual complete physical examination necessary? *Arch Intern Med.* 1999;159:909-910.
18. Hutchison B, Woodward CA, Norman GR, Abelson J, Brown JA. Provision of preventive care to unannounced standardized patients. *CMAJ.* 1998;158:185-193.
19. McGlynn EA, Asch SM, Adams J, et al. The quality of health care delivered to adults in the United States. *N Engl J Med.* 2003;348:2635-2645.
20. Kellerman SE, Herold J. Physician response to surveys: a review of the literature. *Am J Prev Med.* 2001;20:61-67.