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Preface

The Agency for Healthcare Research and Quality (AHRQ), through its Evidence-Based Practice Centers (EPCs), sponsors the development of evidence reports and technology assessments to assist public- and private-sector organizations in their efforts to improve the quality of health care in the United States. The reports and assessments provide organizations with comprehensive, science-based information on common, costly medical conditions and new health care technologies. The EPCs systematically review the relevant scientific literature on topics assigned to them by AHRQ and conduct additional analyses when appropriate prior to developing their reports and assessments.

To bring the broadest range of experts into the development of evidence reports and health technology assessments, AHRQ encourages the EPCs to form partnerships and enter into collaborations with other medical and research organizations. The EPCs work with these partner organizations to ensure that the evidence reports and technology assessments they produce will become building blocks for health care quality improvement projects throughout the Nation. The reports undergo peer review prior to their release.

AHRQ expects that the EPC evidence reports and technology assessments will inform individual health plans, providers, and purchasers as well as the health care system as a whole by providing important information to help improve health care quality.

We welcome comments on this evidence report. They may be sent by mail to the Task Order Officer named below at: Agency for Healthcare Research and Quality, 540 Gaither Road, Rockville, MD 20850, or by e-mail to **epc@ahrq.gov.**

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Structured Abstract

Objective: To systematically review evidence on definitions of the periodic health evaluation (PHE), its associated benefits and harms, and system-level interventions to improve its delivery.

Data Sources: Electronic searches in MEDLINE®, and other databases; hand searching of 24 journals and bibliographies through February 2006.

Review Methods: Paired investigators abstracted data and judged study quality using standard criteria. We reported effect sizes for mean differences and proportions in randomized controlled trials (RCTs). We adapted GRADE Working Group criteria to assess quantity, quality and consistency of the best evidence pertaining to each outcome, assigning grades of "high," "medium," "low," or "very low."

Results: Among 36 identified studies (11 RCTs), definitions of the PHE varied widely. In studies assessing benefits, the PHE consistently improved (over usual care) the delivery/receipt of the gynecological exam/Pap smear (2 RCTs, small effect (Cohen's d (95% confidence interval (CI)): 0.07 (0.07,0.07)) to large effect (Cohen's d (CI): 1.71 (1.69, 1.73)), strength and consistency graded "high"); cholesterol screening (1 RCT, small effect (Cohen's d (CI): 0.02 (0.00,0.04)) with large associations in 4 observational studies, graded "medium"); and fecal occult blood testing (2 RCTs, large effects (Cohen's d (CI): 1.19 (1.17, 1.21) and 1.07 (1.05, 1.08)), graded "high"). Effects of the PHE were mixed among studies assessing delivery/receipt of counseling (graded "low"), immunizations (graded "medium") and mammography (graded "low"). In one RCT, the PHE led to a smaller increase in patient "worry" (13%) compared to usual care (23%) (graded "medium"). The PHE had mixed effects on serum cholesterol (graded "low"), blood pressure, body mass index, disease detection, health habits and health status (graded "medium"). The PHE had mixed effects on hospitalization (graded "high") costs, disability, and mortality (graded "medium"). No studies assessed harms. Delivery of the PHE was improved by scheduling of appointments for PHE (1 RCT, medium effects (Cohen's d (CI): 0.69 (0.68, 0.70)) and offering a free PHE (1 non-RCT, 22% increase) (graded "medium").

Conclusions: The evidence suggests delivery of some recommended preventive services are improved by the PHE and may be more directly affected by the PHE than intermediate or long-term clinical outcomes and costs. Descriptions of the PHE and outcomes were heterogeneous, and some trials were performed before dissemination of guidelines by the U.S. Preventive Services Task Force, limiting interpretations of findings. Efforts are needed to clarify the long-term benefits of receiving multiple preventive services in the context of the PHE. Future studies assessing the PHE should incorporate diverse populations, carefully define comparisons to "usual care," and comprehensively assess intermediate outcomes, harms, and costs.

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Appendixes and Evidence Tables for this report are provided electronically at
http://www.ahrq.gov/downloads/pub/evidence/pdf/phe/phe.pdf**.**

Executive Summary

Introduction

The periodic health evaluation (PHE) consists of one or more visits with a health care provider to assess patients' overall health and risk factors for preventable disease, and it is distinguished from the annual physical exam by its incorporation of tailored clinical preventive services and laboratory testing as part of health risk assessment. By promoting prevention, management of chronic conditions, and enhancing the patient-provider relationship, the PHE may improve patient outcomes and the public's health. However, it could also induce unnecessary costs and patient harms by promoting the use of non-recommended services. Early studies of the PHE, performed before the adoption of current preventive services guidelines, were costly and demonstrated minimal improvement in clinical outcomes, leading to concern regarding the PHE's value and to the promotion of episodic, targeted delivery of preventive services in the context of ongoing clinical care. More recent clinical trials have reported scattered benefits of the PHE. Thus, despite its continued practice, the value of PHE in improving health and healthcare costs has been largely unclear.

Private and public health insurance coverage for preventive services in the U.S. has gradually increased over time. However, increases are typically for one recommended service at a time, rather than a comprehensive set of preventive services. Recent legislation will provide coverage for a "Welcome to Medicare Visit" for new enrollees, incorporating a range of diagnostic and screening tests. Lack of clear evidence to support or refute its use, and recent legislation to cover preventive services on a wide scale provide the basis for this systematic review of the evidence to elucidate the value of the PHE.

Methods

The American College of Physicians posed preliminary questions regarding the PHE. We convened a panel of three internal and eight external technical experts to provide input into the refinement of questions to be addressed. We also recruited peer reviewers representing stakeholder organizations to give feedback on the draft report.

We address the following Key Questions concerning the value of the PHE for adults:

1. What definitions are used for the adult PHE in studies of its value?

2. What is the evidence that a PHE, delivered at different patient ages or different frequencies, is associated with benefits (i.e., improved outcomes) compared to care without a PHE (e.g., usual care)?
   Outcomes include:
   a. Delivery of recommended clinical preventive services.
   b. Patient attitudes/perceptions (e.g., knowledge, satisfaction).
   c. Behavioral outcomes (e.g., tobacco cessation, adherence).
   d. Proximal/intermediate clinical outcomes (e.g., cholesterol lowering, disease management).

e. Distal clinical outcomes (e.g., death, or myocardial infarction).
f. Economic outcomes (e.g., cost savings, health care utilization).
g. Public health (e.g., improvements in family and community health).

3. What is the evidence that a PHE, delivered at different patient ages or different frequencies, is associated with harms (i.e., worse outcomes) compared to care without a PHE (e.g., usual care)?
   Outcomes include:
   a. Delivery of non-recommended clinical preventive services.
   b. Patient attitudes/perceptions (e.g., worry).
   c. Behavioral outcomes (e.g., continuation of risky behaviors).
   d. Proximal/intermediate clinical outcomes (e.g., complications from testing).
   e. Distal clinical outcomes (e.g., events such as death).
   f. Economic outcomes (e.g., induced costs, increased health care utilization).
   g. Public health (e.g., declines in family and community health).

4. What system-based interventions improve the receipt or delivery of the PHE (e.g., insurance premium reductions or provider reminders)?

We searched MEDLINE®, the Cochrane databases, and the Cumulative Index to Nursing and Allied Health Literature (CINAHL), and we hand-searched 24 journals and bibliographies from pertinent articles through February, 2006. We used pre-specified, standard criteria to select studies. Pairs of reviewers screened the literature for relevant article titles. For articles promoted to abstract review, two investigators independently reviewed abstracts and excluded them if they: 1) had no useful information applying to the Key Questions; 2) were not written in English; 3) included subjects only 18 years or younger ; 4) contained no original data; or 5) had no comparison group. Titles and abstracts were promoted to further review if either of two reviewers did not exclude them. For articles promoted to final review, two reviewers sequentially performed full data abstraction for each article, including information on study design, location and setting, dates of performance, follow up length, enrollment, eligibility criteria, participant characteristics, components of the PHE, interventions, and outcomes.

Two reviewers independently judged individual studies' quality on several aspects of external and internal validity, including descriptions of: inclusion/exclusion criteria; subjects' baseline characteristics; handling of withdrawals; the intervention; adequacy of length of study follow up; outcomes; randomization and blinding (for RCTs); and the statistical analysis. At the completion of the article review, we summarized the magnitude of effects in RCTs by reporting Cohen's d (95% confidence interval (CI)) for mean differences and proportions. We considered effect sizes ranging from 0 to 0.25 to represent "small" effects, from 0.26 to 0.8 to represent "medium" sized effects, and greater than 0.8 to represent "large" effects. We also graded the quantity, quality and consistency of the "best available evidence" (comprised of studies least likely to present biased findings) addressing Key Questions 2 through 4 by adapting an evidence-grading scheme recommended by the GRADE Working Group (classifying bodies of evidence pertaining to each outcome as "high", "medium," "low," or "very low" grade). Evidence grading incorporated assessments of studies' quality, consistency in the direction of reported results for an outcome, sparseness of data, probability of bias, and reported strength of association between the PHE and outcomes.

Results

We screened 6523 articles for eligibility at the title review level and reviewed 2021 at the abstract level, and 819 at the article inclusion/exclusion level. Of these, 54 articles were promoted for full review, representing 36 studies reporting multiple outcomes or follow up dates. All studies addressed Key Question 1, 36 studies addressed Key Question 2, no studies addressed Key Question 3, and five studies addressed Key Question 4.

Identified Studies

We identified a total of 36 studies containing information applicable to the Key Questions. A description of study characteristics is listed in Table 1. The most common study design was cross-sectional (14 studies), followed by randomized controlled trials (RCTs) (11) and cohort studies (7). Overall, the literature was characterized by complexity and heterogeneity in several dimensions. Studies were conducted over a period of several decades (19 from 1990 and later, 9 between 1970-1989, and 4 before 1970) (Table 1). Practice settings for the studies were also diverse, with 16 studies taking place in private offices, four in hospital outpatient clinics, and seven in academic practices. Studies reflected a range of health plans as well, with four studies in Medicare or Medicaid populations, 10 in non-U.S. national health plans, four in employer health plans, and two in staff-model HMOs. While 25 studies were performed in the U.S., we also identified relevant studies from the United Kingdom, Canada, Taiwan, Japan, Denmark and Sweden.

Key Question 1. What Definitions are Used for the Adult PHE in Studies of its Value?

Definitions of the PHE were heterogeneous. While central elements used to define the PHE included the clinical history and risk assessment of patients and a physical examination, the specific composition of these central elements varied among studies. The most frequently cited types of history and risk assessment performed were assessment of dietary, alcohol/substance abuse, and tobacco smoking risks; the least frequently cited types of risk assessment included assessment of calcium and folic acid intake. In many cases, the physical examination was referred to with no specific clarification of what components were included. When specified, the most frequently cited components of the examination were assessment of blood pressure, weight and height, breast examination, gynecological examination, and rectal examination; the least frequently cited components included neurological and foot examinations.

Key Question 2. What is the Evidence that a PHE, Delivered at Different Patient Ages or Different Frequencies, is Associated with Benefits Compared to Care Without a PHE?

Studies addressing Key Question 2 reported on the association of receipt of the PHE with: a) delivery/receipt of seven preventive services; b) seven proximal clinical outcomes; c) three distal clinical outcomes; and d) economic outcomes.

Delivery/receipt of clinical preventive services. The PHE consistently improved delivery/receipt of the gynecological examination/Pap smear, cholesterol screening, and fecal occult blood testing. The magnitude of the PHE's effects on receipt of the gynecological examination/Pap smear based on 2 RCTs ranged from small (Cohen's d (95% CI): 0.07 (0.07, 0.07)) to large (Cohen's d (95% CI):1.71 (1.69,1.73)). The strength and consistency of evidence pertaining to gynecological examination/Pap smear was graded "high." The magnitude of the PHE's effects on receipt of cholesterol screening based on one RCT and four observational studies ranged from small effects in the RCT (Cohen's d (95% (CI): 0.02 (0.00,0.04)) to large associations in observational studies. The strength and consistency of evidence pertaining to cholesterol screening was graded "medium." The magnitude of the PHE's effects on receipt of fecal occult blood testing based on 2 RCTs was large (Cohen's d (95% CI): 1.19 (1.17, 1.21) and 1.07 (1.05, 1.08). The strength and consistency of evidence pertaining to fecal occult blood testing was graded "high." Effects of the PHE were mixed among studies assessing delivery/receipt of preventive counseling, immunizations, and mammography. The strength and consistency of the evidence regarding these outcomes ranged from "low" (mammography and counseling) to "medium" (immunizations).

Proximal clinical outcomes. One study reported the PHE had a positive effect on patient "worry,' with smaller increases in health worry (13% increase in baseline worry score) among persons receiving the PHE compared to persons receiving usual care (23% increase in baseline worry score) at 24 months follow up. The strength and consistency of the evidence from this study was graded "medium." Among the best available evidence, the PHE had mixed effects on disease detection, health habits, health status, blood pressure, serum cholesterol, and body mass index. The strength and consistency of the evidence assessing these outcomes ranged from "low" (serum cholesterol) to "medium" (disease detection, health habits, blood pressure, and body mass index).

Distal clinical and economic outcomes. The PHE had mixed effects on costs, disability, hospitalization, and mortality. The strength and consistency of the evidence ranged from "medium" (costs, disability, mortality) to "high" (hospitalization).

Key Question 3. What is the Evidence that a PHE, Delivered at Different Patient Ages or Different Frequencies, is Associated with Harms Compared to Care Without a PHE?

We identified no studies focused on the delivery of non-recommended preventive services or the inducement of poor health outcomes as a result of the PHE.

Key Question 4. What System-based Interventions Improve the Receipt or Delivery of the PHE?

Among the best available evidence, two interventions (scheduling of appointments for the PHE and offering a free PHE) improved delivery of the PHE with medium to large positive effects. One study demonstrated a 29% improvement in attendance at the PHE for persons provided with a scheduled appointment versus an open invitation to the PHE, and one study demonstrated a 22% increase in attendance at the PHE with offering a free PHE versus a small fee. The strength and consistency of this evidence was graded "medium."

Limitations

The PHE was described with great heterogeneity, limiting inferences regarding which aspects of the PHE are most influential on outcomes. Few large-scale RCTs assessed the effect of the PHE, with some of the largest trials performed among select populations prior to guidelines of the U.S. Preventive Services Task Force (USPSTF) in 1989, limiting their generalizability. Outcomes in some categories (e.g., counseling) were heterogeneous, limiting inferences regarding these outcomes. Little evidence addressed the PHE's effect on intermediate outcomes (e.g. blood glucose control, diabetes management). Evidence regarding the cost-effectiveness of the PHE was similarly sparse. Many outcomes were reported among a few RCTs, leaving open the possibility that individual study designs heavily influenced the direction of multiple outcomes. The feasibility of isolating the effect of the PHE on long-term outcomes is unclear given the periodic (or one-time) delivery of the PHE in studies and given multiple other episodes of patient care that typically occur outside of the PHE.

Our review is also subject to potential publication bias, in that investigators may have been more likely to publish articles reporting the PHE improved outcomes. In addition, observational studies in this review are subject to unaddressed residual confounding of results.

Recommendations for Future Research

Studies are needed to assess whether the PHE could encourage delivery of inappropriate preventive services or inflict harms on patients and to clarify the effect of the PHE on health habits, patient attitudes, health status, other intermediate outcomes such as clinical morbidity or worker productivity, and broad public health outcomes such as communicable disease containment or improvements in family health. Work to elucidate the magnitude and duration of effects of the PHE on outcomes is also needed. Studies elucidating the PHE's effect on both direct and indirect costs, long-term changes in quality of life, and clinical morbidity can be used in cost-effectiveness models, which are needed to more fully integrate findings regarding potential harms and benefits of the PHE.

Studies are needed of the frequency and intensity of the PHE required to achieve clinical improvements (or to induce harms) studies also are needed to assess differences in the PHE's effect when delivered in different health care systems or by different providers. Such studies would enhance knowledge regarding mechanisms through which the PHE can be delivered most efficiently.

Additional, well-designed studies are needed to strengthen the evidence for or against system-level interventions to enhance receipt of the PHE.

Conclusions

The best available evidence suggests delivery of some recommended preventive services are improved by the PHE and may be more directly affected by the PHE than proximal or long-term clinical outcomes and costs. It may be difficult to entirely isolate the effect of receipt of the PHE on intermediate clinical outcomes which require ongoing management such as blood pressure or long-term outcomes such as mortality. Thus, studies linking the PHE with improved delivery of preventive services may provide the best evidence of its value. Since appropriate implementation of preventive services has been demonstrated to improve health in evidence which provides the basis for USPSTF recommendations, findings of increased delivery of preventive services in the setting of the PHE may provide adequate justification for implementation of the PHE. While achieving consistency in the definition and delivery of the PHE stands as an important remaining challenge, efforts to clarify the presumed long-term benefits of receiving multiple preventive services in the context of the PHE versus other types of ambulatory visits are needed to fully elucidate the value of the PHE.

Mechanisms through which improvements in care attributed to the PHE occur are unclear. The PHE may have a stronger effect on the delivery of preventive services which are performed by clinicians at the time of the office visit (e.g., fecal occult blood testing) versus preventive services requiring patients to schedule appointments outside of the office (e.g., mammography).

Future studies assessing the value of the PHE should incorporate diverse study populations and should seek to carefully define systems of “usual care” with which the PHE is to be compared, capture outcomes in a standardized fashion, and more clearly assess the PHE’s cost-effectiveness. The development of computerized models may be most helpful in assessing the long-term value of the PHE.

Chapter 1. Introduction

The Periodic Health Evaluation

The periodic health evaluation (PHE) consists of one or more visits with a health care provider for the purpose of assessing patients' overall health and risk factors for preventable diseases. The PHE is distinguished from the complete physical examination by its incorporation of tailored clinical preventive services and laboratory testing as a part of health risk assessment. During the PHE, health care providers perform a history and risk assessment in addition to a physical exam. Based on the information gathered by providers, patients may receive counseling, immunizations, lab testing, or arrangements for other preventive health services as part of the evaluation. By promoting appropriate clinical management of chronic conditions, providing patient education, and the patient-provider relationship, the PHE has been hypothesized to improve intermediate and long-term patient outcomes as well as the public's health. Because of its focus on prevention and recommendations for chronic disease management, the PHE has potential to affect patient health and health care cost for the individual, the health care industry, and society as a whole.

Historical Changes in Conceptualization of the Content and Value of the PHE

Since the late nineteenth century, ideas regarding the content and the value of the PHE have continually evolved, reflecting changing views of the medical community and the public toward the role of prevention in health care. In 1861, Dr. Horace Dobell, considered the father of mass screening in the United Kingdom (U.K.) and a physician at the Royal Chest Hospital in England, outlined his basic belief that discovery of a pre-existent disease state could offer a chance for treatment and cure through the detailed examination of the individual. Others supported this notion such as Dr. George Gould, a prominent Philadelphia physician, who offered the "periodic examinations of patients" as an important mechanism through which future illness could be prevented and quality of life could be enhanced.[1]

In the early 1900s, motivations for assessing and enhancing individuals' health through the PHE were often financial in nature. The life insurance industry advocated the use of medical histories and periodic physical exams to risk stratify patients for coverage decisions. Studies at the turn of the century, such as those performed by Dr. A.S. Knight of the Metropolitan Life Insurance Company and Eugene Lyman Fisk of the Life Extension Institute, both reported that policyholders undergoing an annual physical exam had lower mortality than would be expected based on actuarial data.[1] Similarly, private industry advocated for comprehensive laboratory and physical exams to insure the health of workers and contribute to productivity, morale, and operating efficiency of the work place.[2] The physical exam was also often required to attend school, enlist in the military forces, gain employment, and note the early signs of potentially serious diseases.[3] However, the central role of physicians in performing the physical exam prompted organized medical agencies to endorse the PHE as an opportunity to establish the physician-patient relationship. Giving his address to Harvard medical students in 1925, Dr.

Francis W. Peabody emphasized this relationship by noting, "One of the essential qualities of the clinician is interest in humanity, for the secret of care of the patient is in caring for the patient."[4]

Despite the potential virtues of the PHE from both a financial standpoint and from the standpoint of the patient-physician relationship, the PHE was not considered standard medical care and lost momentum as a public interest during the 1930s and the Great Depression. Renewed interest in the PHE arose in the mid-1940s with the development of "multiphasic screening" whereby the PHE assumed the objective of mass screening. This approach only minimally involved physicians, and used technology for the detection of unrecognized diseases or defects.[1] While the medical literature at that time continued to emphasize the important role of the periodic health examination, there were few examples of studies objectively supporting the ability of the PHE to promote health and longevity.[2]

Even with growing popularity of the PHE as standard clinical practice, the emergence of evidence-based medicine in the 1960s raised serious questions concerning the value of the PHE within the medical establishment.[5] During this period, several studies were conducted to assess the value of the PHE. In the U.S., Collen undertook a study at Kaiser, which followed 10,000 adults through 7 and 16 year follow ups, collecting data on morbidity and mortality. In this study, the authors concluded that periodic health examinations were associated with lower death rates from potentially postponable causes.[6] In the U.K., two group general practices in South London and the Department of Community Medicine at St. Thomas's Hospitals embarked on an ambitious study to assess the value of introducing a general-practice-based screening service for persons 40 to 64 year old as an extension of the National Health Service.[7] This study collected data on morbidity, hospital admission rates, certified sickness absence from work, and mortality – ultimately concluding little difference between the screened and unscreened groups. Costs of the screening were also calculated, and the results of this large study ultimately influenced British policy makers against investing in publicly supported multiphasic screening at that time.[8,9]

In the 1970s, health care providers moved toward individualizing the PHE. Rather than a single annual exam during which a universal battery of screening and assessment maneuvers were undertaken, the PHE began to be conceptualized as an amalgam of preventive services tailored to individuals' risk profiles. In this manner, the annual physical exam became defined as the comprehensive physical examination which included an extensive history, physical, counseling, and diagnostic testing which was used to determine the patient's baseline health status. In contrast, the periodic health evaluation evolved into one or more visits with the primary emphasis of evaluating and offering preventive health services based the patient's age, gender and risk profile for recognizable and treatable conditions. Redefinition of the PHE in this way prompted another wave of important studies assessing the value of preventive services. Frame and Carlson in 1975 assessed the accuracy of screening measures and their impact on altering disease progression and mortality with regard to 36 major medical conditions.[10] In 1979 the Canadian Task Force on the Periodic Health Examination (now known as the Canadian Task Force on Preventive Health Care (CTF) looked at 78 medical conditions and also assessed the strength of evidence behind screening measures to reduce morbidity and mortality.[11] In 1984, the newly established U.S. Preventive Services Task Force (USPSTF) began to evaluate specific preventive interventions and their impact on morbidity and mortality in 60 medical conditions.[12]

These efforts prompted conceptualization of the PHE as an assessment targeted only to the preventive service elements demonstrating an impact on morbidity and mortality. This minimalist approach was endorsed by the American College of Physicians (ACP) and the

American Medical Association (AMA) with the caveat that the absence of evidence should not be equated with the ineffectiveness of an omitted screening intervention. These groups also advocated for increased breadth within the PHE supporting the inclusion of counseling and immunization.[13]

National Task Forces to Evaluate Preventive Care and the PHE

Canadian Task Force on Preventive Care

The Canadian Task Force on Preventive Health Care (CTF), formerly known as the Canadian Task Force on the Periodic Health Examination, was established in 1976 to determine how the periodic health examination might enhance or protect the health of Canadians and to recommend a plan for a lifetime program of periodic health assessments.[11] During the inception of the CTF, Canadian health care costs were rising significantly as medical technology and services became increasingly available, prompting the Conference of Deputy Ministers of Health to seek a critical assessment of health care services. In 1974, the Lelonde Report released by the Canadian Ministry of National Health and Welfare called for the expansion of the federal government's role in public health, particularly in the examination of evidence for the impact of environmental factors and individual behaviors and on health status. The CTF developed a formal methodology for evaluating scientific evidence in clinical medicine and published its first report on the periodic health examination in 1979. In addition to publishing conclusions regarding 78 different clinical conditions and services, the CTF determined that the undefined "annual checkup" should be abandoned and replaced with a series of age-specific "health protection packages" implemented during the course of medical visits for other purposes.[14]

Although the CTF recommended the elimination of the oftentimes-nebulous "annual checkup," the practice persists in Canada. A survey of 285 Canadian primary care physicians in 1991 reported most doctors engage in preventive care during an annual general physical rather than routine patient care.[15] Similarly, a retrospective chart audit published in 2000 reported rates of recommended health screening tests for Canadian elderly were improved during a visit devoted to the periodic health examination when compared to visits for specific reasons where screening tests were done.[16]

United States Preventive Services Task Force

In 1984, the USPSTF was created under the auspices of the U.S. Public Health Service and the Department of Health and Human Services. Comprised of independent primary care experts in the field of preventive care, the USPSTF was charged with the task of impartially assessing the strength of evidence behind individual clinical preventive services. This focus on tailored individual preventive services adopted by the CTF in 1979 was a departure from previous efforts, which had concentrated on an annual exam, comprised of a universal group of services without regard to individual risks. Subsequent USPSTF *Guides* "evaluated the benefits of individual services based on age, gender, and risk factors for disease, made recommendations

about which preventive services should be incorporated routinely into primary medical care and for which populations, and identified a research agenda for clinical preventive care."[12]

Preventive Health Guidelines in Other Geographic Regions (Australia, Europe, Asia)

Australia's leading expert body on health promotion is the National Health and Medical Research Council (NHMRC) under the auspices of the Australian Government. While the NHMRC and other organizations produce clinical guidelines, Australia has no established single source for guidelines. Existing guidelines address individual health interventions and there is little mention of bundled preventive services or periodic health examinations for the general population. Australia does, however, provide expanded preventive health services for seniors age 75 and older through their Enhanced Primary Care program and for indigenous people aged 15 to 54 years through their Health Checks program both of which are based on the CTF recommendations.

The population-based evaluation of health status of the European community by history and physical exam primarily takes place in the form of the Health Interview Surveys and Health Examination Surveys.[17] There does not seem to be a consistent nationally supported doctrine of clinical preventive medicine among the European countries. The most consistent use of the PHE in Europe seems to be in regard to employee physicals and their utility in maintaining a healthy, productive workforce.

Examples of organized efforts to evaluate the health screening practices in Asia include Singapore's Ministry of Health Clinical Practice Guidelines. Similar to the USPTF, levels of evidence are assessed and recommendation grades are provided for various clinical conditions. These guidelines were first introduced to the public in the late 1990's and cover a wide range of topics.[18]

Continued Use of the PHE Despite Recommendations

Continued implementation of the PHE, despite the CTF's guidelines eliminating the "routine checkup," may reflect the significant influence of patient and provider expectations regarding the PHE in clinical practice. According to a study assessing patients' expectations of the PHE, over 90% desired such examinations, most often on an annual basis. Accordingly, patients desired extensive examinations which included laboratory and other procedures which were in excess of CTF guideline recommendations.[19]

In a qualitative assessments of healthcare providers' perspectives on the integration of preventive practices during clinical visits, several barriers to delivering care were identified. Barriers within the physician-patient relationship include lack of patient compliance with preventive recommendations, lack of continuity of care, and discordant expectations of patients and providers within the clinical encounter. Studies seem to suggest patients place greater reliance on diagnostic labs and tests than do providers who often use the clinical history and physical to guide their recommendations during periodic health visit.[20,21] Health systems barriers which providers believed affected the integration of preventive measures into the clinical visit

included lack of time, remuneration, and lack of provider reminders or tools to aid in the receipt of care.

Private Insurance Coverage for the PHE

Numerous studies have demonstrated a positive association between health insurance coverage and the receipt of preventive services. Coverage for preventive services in the U.S. by both private and public payers has gradually increased over time. However, this increase in coverage is usually for one recommended service at a time, rather than a comprehensive set of preventive services.[22] In one recent study of employer-sponsored insurance plans by Partnership for Prevention, roughly 80% of plans reimbursed for a general physical examination with health maintenance organizations being slightly more likely to cover this service when compared to preferred provider organizations or point of service health plans.[23] According to the National Health Policy Forum at George Washington University, states rarely mandate insurance coverage for preventive services based on USPSTF guidelines. However, of those preventive services which are mandated, large employer-based health plans remain exempt from such requirements through the Employee Retirement Income Security Act. Thus, there is no consistent policy regarding coverage for preventive health services, including the periodic health examination.

Centers for Medicare and Medicaid Service (CMS) Legislation and the PHE

Under the Medicare Prescription Drug Improvement and Modernization Act (MMA) of 2003, the PHE will be covered for some individuals for the first time in Medicare's history. The Act provides Medicare reimbursement for an initial preventive visit at enrollment into Medicare, as long as the enrollee completes the examination within six months of enrollment.[24] The examination will cover a wide range of services, including: medical history; physical examination; counseling; laboratory tests; radiological interventions; and electrocardiograms. The Secretary of Health and Human Services has been granted permission to make some coverage decisions, but many interventions such as bone mass measurement, cancer screening and immunizations are specifically provided for in the MMA. This new legislation reflects intentions and efforts of the U.S. Department of Health and Human Services to combat rising health care costs and improve patient outcomes through the promotion of preventive measures.[25]

Need for Review of the Evidence on the Value of the PHE

Historical changes in the conceptualization and implementation of the PHE reflect not only the complex and multidimensional nature of the PHE but also the lack of clear evidence to support or refute its continued use. While the PHE could be seen as an explicit opportunity outside of compressed symptom-based ambulatory visits for clinicians to implement recommended clinical preventive services (particularly for preventive interventions which require more time to perform or advance planning), it is unclear whether any improvements that

could be gained from the implementation of the PHE would be justified by increased costs or harms which may be associated with its implementation. At the same time, it is unclear if symptom-based visits allow adequate time for clinicians to address all age-specific recommendations for prevention or behavioral issues such as smoking and diet (which are substantial contributors to the development of many of the most costly chronic illnesses burdening patients today).[26,27] We therefore performed this comprehensive review of the extensive literature to elucidate the value of the PHE and ways in which the PHE could be improved. The review was intended to provide an evidence basis which patients, health care providers and health policy makers can use to guide future clinical practice.

Chapter 2: Methods

The ACP requested an evidence report to synthesize the available evidence on the effectiveness and/or harms of implementing the PHE. Our Evidence-based Practice Center was awarded this contract in December 2004. We established a research team and work plan to develop the evidence report. The project consisted of recruiting technical experts, formulating and refining specific research questions, performing a comprehensive literature search, summarizing the state of the literature, constructing evidence tables, synthesizing the evidence and submitting the report for peer review.

Recruitment of Technical Experts and Peer Reviewers

At the beginning of the project, we recruited a panel of internal and external technical experts to give us input on key steps including the selection and refinement of the questions to be examined. The panel included three internal technical experts from the Johns Hopkins University who had expertise in various aspects of the periodic health exam and eight external experts who had interests in the periodic health exam (see Appendix A[a]). In addition to this panel of technical experts, we recruited a group of peer reviewers to examine a draft of the evidence report, as described further in the section on Peer Review. This group included representatives of organizations or agencies having different perspectives on the topic. We also sought input throughout the project from representatives of the ACP.

Key Questions

We worked with the ACP and technical experts from the CMS, the Agency for Healthcare Research and Quality (AHRQ), and academic and clinical centers (including practicing internists and family physicians) to develop the Key Questions contained in this report. The ACP posed an initial set of questions designed to help its internal medicine physician members gain more insight into the value of the PHE for their adult patients. After consulting with representatives of the ACP and technical experts, we expanded initial questions to incorporate an assessment of the definition of the periodic health evaluation and to identify interventions which might improve the delivery of the PHE. During this process, we developed a conceptual framework, which we used to help with refinement of the initial Key Questions, to help standardize the research team's conceptualization of the PHE, and to help guide the literature search and review.

We asked the following Key Questions concerning the value of the PHE for adults:

1. What definitions are used for the adult PHE in studies of its value?

2. What is the evidence that a PHE, delivered at different patient ages or different frequencies, is associated with benefits (i.e., improved outcomes) compared to care without a PHE (e.g., usual care or opportunistic delivery of clinical preventive services)? Outcomes include:
   a. Delivery of recommended clinical preventive services.

[a] Appendixes cited in this report are provided electronically at http://www.ahrq.gov/clinic/tp/phetp.htm

b. Patient attitudes/perceptions (e.g., knowledge, satisfaction, trust, respect).
c. Behavioral outcomes (e.g., tobacco cessation, adherence).
d. Proximal/intermediate clinical outcomes (e.g., cholesterol lowering, disease management).
e. Distal clinical outcomes (e.g., measurable clinical events such as death, or myocardial infarction).
f. Economic outcomes (e.g., cost savings, improved health care utilization).
g. Public health (e.g., improvements in family and community health, communicable disease containment).

3. What is the evidence that a PHE, delivered at different patient ages or different frequencies, is associated with harms (i.e., worse outcomes) compared to care without a PHE (e.g., usual care or opportunistic delivery of clinical preventive services)? Outcomes include:
   a. Delivery of non-recommended clinical preventive services .
   b. Patient attitudes/perceptions (e.g., worry/anxiety).
   c. Behavioral outcomes (e.g., continuation of risky behaviors).
   d. Proximal/intermediate clinical outcomes (e.g., complications from testing).
   e. Distal clinical outcomes (e.g., measurable clinical events such as death).
   f. Economic outcomes (e.g., induced costs, less efficient health care utilization).
   g. Public health (e.g., declines in family and community health).

4. What system-based interventions improve the receipt or delivery of the PHE (e.g., insurance premium reductions or provider reminders)?

We selected these questions as the final questions for study after assessing the feasibility of addressing these questions in the literature (including brief preliminary reviews of electronic databases for the presence of evidence to address the questions) as well as on the perceived applicability and importance of the questions to current clinical practice.

Conceptual Framework

We developed a conceptual framework to a) help clarify how the PHE might be identified in the published literature, b) identify the potential goals of the PHE, c) place the PHE into a larger context of its perceived value in the health care system and society, and d) help refine the Key Questions studied. The conceptual framework was developed by group consensus after reviewing sentinel published opinion pieces, clinical reviews, and studies with primary data.[1,16,19,28-34] We worked iteratively to produce an initial conceptual framework which we reviewed with our Technical Expert Panel. We incorporated comments from our technical experts to develop a final framework (Figure 1), which guided our selection of studies for this review.

In our model, we defined the goals and expectations of patients, providers and society, which provide the impetus for institution of the PHE. Performance of the PHE, which consists (at minimum) of a risk assessment, including personal and family history taking and a core physical examination, would be followed by delivery of tailored (to patients' age, gender and clinical risk factors) clinical preventive services. Same day clinical preventive services could be delivered

either in the context of a more detailed physical examination (e.g., the gynecological examination/Pap smear for an appropriately aged female) or in the context of the provision of preventive counseling, immunizations or laboratory testing. We defined follow up clinical preventive services as services occurring outside of the initial visit for the PHE. However, both same-day and follow up clinical preventive services could be considered potential outcomes of receiving the PHE. The PHE could occur once or over repeated intervals of time. In addition to the receipt of clinical preventive services, we defined other potential benefits and harms of the PHE, including changes in patient attitudes (e.g., trust or worry), changes in patient behaviors (e.g., adherence or continuity with care), proximal (e.g., blood pressure control) or distal (e.g., death) clinical outcomes), resource use and costs (e.g., costs associated with hospitalizations), and outcomes related to public health in general (e.g., communicable disease containment).

To standardize the investigative team's conceptualization of the PHE, we summarized our conceptual framework using the following statement, which all investigators were encouraged to refer to when reviewing the literature at all stages of the study:

> "The PHE consists of one or more visits with a health care provider for the primary purpose of assessing a patient's overall health and risk factors for disease which may be prevented by early intervention. During the PHE, health care providers typically perform a history and risk assessment, followed by a tailored physical exam. Based on the information gathered, patients may receive counseling, immunizations, lab testing or arrangements for other tailored preventive health services during the evaluation. The goal of the PHE is to improve intermediate and long-term patient outcomes and ultimately the public's health by appropriate clinical management of chronic conditions, patient education, and fostering the patient-provider relationship. The PHE has the potential to affect patient health and health care cost for the individual, the health care industry, and society as a whole."

Literature Search Methods

Sources

Our comprehensive search plan included electronic and hand searching. In May 2005, we performed an initial search of the following electronic databases: MEDLINE®, the Cochrane database including Cochrane Reviews, Database of Abstracts of Reviews of Effects (DARE) , The Cochrane Central Register of Controlled Trials (CENTRAL), The Cochrane Database of Methodology Reviews (Methodology Reviews), The Cochrane Methodology Register (Methodology Register), Health Technology Assessment Database (HTA), the National Health System Economic Evaluation Database (NHS EED), and the Cumulative Index of Nursing and Allied Health Literature (CINAHL®). None of the electronic search strategies were limited by year of publication. The search of electronic databases was updated to include any relevant citations published before February 2006.

Hand searching for possibly relevant citations took several forms. Our experts identified 24 journals that were thought to be most likely to contain relevant studies (see Appendix B[a]). We

[a] Appendixes cited in this report are provided electronically at http://www.ahrq.gov/clinic/tp/phetp.htm

scanned the table of contents of each issue of these journals for relevant citations from January 2005 through February 2006.

Reviewers also reviewed bibliographies of flagged articles of interest and included studies for the team to compare to the existing database. We used SRS® 3.0 (TrialStat! Corporation, Ottawa, Ontario, Canada), a web-based software package developed for systematic review data management, to track the article flagging.

Search Terms and Strategies

Search strategies, specific to each database, were designed to maximize sensitivity. Initially, we developed a core strategy for MEDLINE, accessed via PubMed®, based on an analysis of the Medical Subject Headings (MeSH) and text words of key articles identified *a priori*.[1,7,29,32,33,35-47] The PubMed strategy formed the basis for the strategies developed for the other electronic databases (see Appendix C[a]).

Organization and Tracking of Literature Search

The results of the searches were downloaded and imported into ProCite® version 5 (ISI ResearchSoft, Carlsbad, CA). From ProCite, the articles were uploaded to SRS 3.0. We used the duplication check feature in SRS 3.0. This feature allowed us to scan for exact article duplicates, author/title duplicates, and title duplicates. Additionally, this database was used to store citations in PDF (portable document format) and to track the search results at title review, abstract review, article inclusion/exclusion, and data abstraction levels (Figure 2).

Title Review

After the electronic databases were searched, citations were downloaded into ProCite, and uploaded to the SRS 3.0 tracking system. The study team scanned all titles. Title scans were conducted in a parallel fashion by two independent reviewers. For a title to be eliminated at this level, both reviewers had to indicate that it was ineligible. If the two reviewers did not agree on the eligibility of an article, it was automatically promoted to the next level (see Appendix D[a], Title Review Form). The title review phase was designed to capture as many studies as possible reporting on the PHE. All titles related to the delivery of clinical preventive services or the PHE itself were included in the initial search and promoted to the abstract review level.

Abstract Review

Inclusion and Exclusion Criteria

The abstract review phase was designed to capture as many studies as possible reporting on the PHE. Investigators determined whether clinical preventive services were potentially delivered in the context of the PHE in either the intervention or control groups (for controlled

[a]Appendixes cited in this report are provided electronically at http://www.ahrq.gov/clinic/tp/phetp.htm

studies) or in the entire study group (for non-comparative observational study designs). All articles with abstracts meeting these criteria were kept for further review. Abstracts were reviewed independently by two investigators, and were excluded if both investigators deemed the abstract to have: 1) no useful information applying to the Key Questions, 2) were not written in the English language, 3) included only subjects younger than 18 years in age, or 4) contained no original data (including reviews or opinion pieces) (see Appendix D, Abstract Review Form). Differences in opinions regarding abstract inclusion were resolved through consensus adjudication.

Article Inclusion/Exclusion

Because of the broad array of potentially eligible articles obtained at the abstract review phase, full articles initially selected for final review underwent another independent parallel review by investigators to determine if they should be included for full data abstraction. At this phase of review, investigators determined which of the Key Questions (2-4) each article addressed (see Appendix D, Article Inclusion/Exclusion Form). For Key Questions 2 and 3, randomized controlled trials were deemed to have applicable information if they contained a group receiving the PHE compared to a group receiving usual care. Observational studies were deemed to have information applicable to assessing Key Questions 2 and 3 if they compared one group who had received the PHE to a group of persons not receiving the PHE (e.g., if persons reported receipt of a PHE in a cross-sectional survey) or if the compared persons before and after receipt of a PHE (in pre-post study designs). Studies were considered eligible if they focused on adults, and not children. All definitions of the PHE were included without regard to the targeting of adults of specific age groups. Although our uniform conceptualization of the PHE prior to the search stated health care providers "typically perform a history and risk assessment followed by a physical exam" in the PHE, we included articles even if they did not explicitly state which components of the PHE were included. Randomized controlled trials were deemed to be not applicable if they contained two groups both receiving the PHE or if they compared groups receiving different forms of the PHE (e.g., a PHE delivered by a nurse versus a physician). For Key Question 4, studies were deemed to have applicable information if they featured interventions designed to enhance patient attendance at the PHE. This could include randomized controlled trials randomizing certain practices or communities to interventions to enhance delivery of the PHE. Articles still deemed to have applicable information at this stage were included in the final article review. All articles deemed to apply to Key Questions 2-4 were used to answer Key Question one (assessing definitions of the PHE in studies). Differences in opinions regarding article inclusion or exclusion were resolved through consensus adjudication.

Article Review

The purpose of the article review was to confirm the relevance of each article to the Key Questions, to determine methodological characteristics pertaining to study quality, and to collect evidence that addressed the Key Questions. Articles eligible for full review could address one or more of the Key Questions. If reviewers felt an article addressed more than one question, multiple data abstraction forms were used.

Two investigators reviewed each study for assessment of study quality and full data abstraction. Each reviewer independently judged study quality and rated items on standard quality assessment forms. For all data abstracted from studies, we used a sequential review process. In this process, all data abstraction forms were completed by the primary reviewer. The second reviewer confirmed the first reviewer's data abstraction forms for completeness and accuracy. Reviewer pairs were formed to include personnel with both clinical and methodological expertise. A third reviewer re-reviewed all articles that were marked as "ineligible" by the first two reviewers to ensure consistency in the classification of the articles. Reviewers were not masked to the articles' authors, institution, or journal. In most instances, data were directly abstracted from the article. If possible, relevant data were also abstracted from figures. Differences in opinion were resolved through consensus adjudication.

For each article, data abstracted included: 1) study design; 2) study location (including country of study); 3) dates the study was performed and length of follow up; 4) study setting (geographic setting as well as health care delivery structure); 5) numbers of study subjects enrolled; 6) study eligibility criteria for patients and providers; 7) descriptive characteristics of study patients (including race, gender, education, and income) and providers (including clinical specialty and practice setting); 8) components of the PHE in each study; 9) descriptive information about study interventions; and 10) study outcomes (including baseline and follow up rates of delivery of recommended preventive services, proximal clinical outcomes, distal clinical and economic outcomes as well as improvements in the delivery of the PHE) (see Appendix D, Data Abstraction Review Forms).

Data Abstraction

All information from the article review process was entered in a relational database (Recruitment Evidence Database). The database was used to maintain and clean the data, as well as to create detailed evidence tables and summary tables (see Appendix G and Tables 1 through 9).

Data abstracted to assess the definition of the PHE (Key Question 1). Data were abstracted on the components of the PHE in each study. Components of the PHE could include: 1) the history and risk assessment of patients (including collection of a history on patients' diet, alcohol/substance abuse, injuries, sexual practices, tobacco use, calcium and folic acid intake, sun exposure, or poly-pharmacy); 2) physical examination of patients (including assessment of blood pressure, height, weight, pulse, and examination of breasts, cardiovascular system, pulmonary system, abdominal region, neurological system, gynecological or urological systems, and extremities); 3) counseling provided to patients (including counseling regarding diet, physical activity, alcohol/substance abuse, injury prevention, safe sexual practices, tobacco use, use of folic acid, sun exposure, oral health, poly-pharmacy); 4) delivery of immunizations during the PHE; and 5) delivery of clinical preventive services during the PHE (including Pap smears, gonorrhea/chlamydia screening, audiometry, vision screening, electrocardiograms, chest x-rays, mammography, sigmoidoscopy, colonoscopy, fecal occult blood tests, bone mineral density tests, serum glucose, lipids, hemoglobin A1c, blood counts, chemistries, prostate specific antigen, urinalysis, and purified protein derivative skin test (PPD) screening for tuberculosis exposure). When the PHE included other components (not listed), they were abstracted for later categorization.

Data abstracted to assess outcomes of the PHE (Key Questions 2 through 4). For studies assessing the benefits and harms associated with the PHE, data were abstracted to capture changes in the delivery (by health care providers) or receipt (by patients) of recommended clinical preventive services which were delivered as a result of the PHE, including the delivery of recommended aspects of the physical examination (e.g., blood pressure measurement, gynecological examination), counseling (e.g., substance abuse counseling), immunizations (e.g., influenza vaccination), and clinical screening tests (e.g., cholesterol testing). Data were also abstracted regarding changes in patient attitudes/perceptions as a result of the PHE (e.g., knowledge, satisfaction), changes in patient behavioral outcomes as a result of the PHE (e.g., rates of tobacco cessation), proximal/intermediate clinical outcomes (e.g., cholesterol lowering, disease detection), distal clinical outcomes (e.g., death), economic outcomes (e.g., cost, health care utilization), and public health outcomes (e.g., communicable disease containment). In studies of system-level interventions, data were abstracted on interventions associated with receipt of the PHE. For randomized controlled trials, non-randomized controlled trials, and comparative observational studies, baseline and follow up data from both intervention and control groups were abstracted for comparison. For observational studies with a pre-post design, outcomes were abstracted at baseline and follow up for the single group under observation.

Article Quality Assessment

Two reviewers independently judged articles on several aspects of study external and internal validity, including: 1) description of inclusion and exclusion criteria for study subjects (best scores assigned for explicit reporting of criteria); 2) description of study subjects' baseline characteristics (best scores assigned for reporting of all important characteristics including age, gender, race, socioeconomic status, and comorbidities); 3) description of study non-enrollees (best scores assigned for description of differences in sociodemographic or clinical characteristics between study groups); 4) description of handling of study withdrawals (best scores assigned for use of intention to treat analyses with sensitivity analyses to examine differences between as-treated and intention-to-treat analyses); 5) description of the study intervention (best scores assigned for studies in which reviewers judged the intervention could be replicated with the completeness and detail included in the description); 6) adequacy of length of study follow up (best scores assigned when the length of follow up was appropriate for fully capturing outcomes); 7) study subject attrition (best scores assigned when the percentage of subjects remaining study was ≥85%); 8) description of study outcomes (best scores assigned for studies clearly describing outcomes so they could be understood easily); 9) relevancy and appropriateness of outcomes (best scores assigned for studies in which outcomes were deemed to be relevant and appropriate for the study as well as feasibly measured); 10) quality of outcomes assessment (best scores assigned with assessment of outcomes was both standardized and valid); 11) quality of randomization for RCTs, (best scores assigned for reporting of centralized randomization scheme and the presence of sufficient documentation regarding randomization); 12) quality of blinding for RCTs (best scores assigned for studies documenting adequate blinding of patients, providers, and outcomes assessors when appropriate); 13) comparable treatment of treatment groups for RCTs (best scores assigned for studies reporting comparable treatment of study groups with the exception of the intervention); 14) comparable characteristics of enrolled subjects for control and treatment groups for RCTs (best scores assigned when studies reported no significant difference in any characteristic likely to affect the success of the intervention or

any outcome); and 15) statistical analysis. Assessments of quality of statistical analyses included assessment of : 1) study power to assess study outcomes (best scores assigned when a priori estimates of the statistical analysis were reported); 2) study investigator choice for statistical tests (best scores assigned when appropriate choice of statistical tests were made); 3) the presentation of statistical significance (best scores assigned when studies reported statistical significance in the form of confidence intervals or p-values); 4) the assessment and adjustment for potential confounding, when present (best scores assigned when multivariable analyses adequately accounted for potential confounding); and 5) potential problems with unit of analyses (best scores assigned for studies with no potential problems or for studies in which potential problems existed but were appropriately addressed). For both experimental and observational studies, we applied a total quality score, based on Chalmers et al, in which items assessing the external validity of studies received 35% of the score, items assessing the internal validity of studies received 35% of the total score, and items assessing the quality of the statistical analysis received 30% of the total score (see Appendix D, Quality Review Form).[48] In developing overall quality scores for individual studies, scores for each item were averaged between two reviewers. Total quality scores for each study could range from 0 (worst quality) to 100 (best quality). In the absence of universal standards for recognizing studies of high or low quality, we classified studies according to their score relative to the distribution of all other study scores, defined by tertiles of the distribution of all scores. Studies with quality scores falling within the top 33% of all study quality scores were deemed to have "high" scores, studies with quality scores falling within the middle 33% of all study quality scores were deemed to have "medium" scores, and studies with quality scores falling within the lowest 33% of all scores were deemed to have "low" scores. Because trials were judged on slightly different criteria than observational studies, trials were rated in relation to the scores of all other trials, and observational studies were rated in relation to the scores of all other observational studies.

Data Entry and Quality Control

Initial data were abstracted by investigators and entered directly into Web-based data collection forms; SRS® 3.0 (TrialStat! Corporation, Ottawa, Ontario, Canada) (Appendix D). After data were reviewed by a second author, adjudicated data were re-entered into Web-based data collection forms by trained research assistants. A standard process for data quality checks was instituted in which research assistants individually inspected all data entries. In addition, research assistants used a redundant system of random data checks to assure data quality.

Grading of the Evidence

At the completion of our review, we graded the quantity, quality and consistency of the best available evidence addressing Key Questions 2-4 by adapting an evidence-grading scheme approach recommended by the Grading of Recommendations Assessment, Development and Evaluation (GRADE) Working Group.[49] GRADE is a systematic approach to grading the strength of the total body of evidence that is available to support recommendations on a specific clinical management issue. In applying the GRADE system to the evidence, we incorporated assessments of studies' design, studies' quality, consistency of findings, and magnitude of findings.

Process for Assigning Evidence Grades

First, we assessed study designs of the best available evidence to assess an individual outcome. We used the term "best available evidence" to indicate studies assessing the effect of the PHE on outcomes of interest in the least biased manner. We considered randomized controlled trials to represent the best study design to address Key Questions 2-4. Thus, when RCTs assessed outcomes, we considered the best available evidence assessing the outcome to be comprised of two or more RCTs. If an outcome was evaluated by at least two RCTs as well as observational studies, our evidence grade was based only on the RCTs and observational studies were ignored. If an outcome was evaluated by one or no RCTs, our evidence grade was based on the single randomized controlled trial in addition to the best available non-randomized controlled trial or the best available observational studies (cohort studies (considered best), followed by cross-sectional studies and studies with pre-post observational design (considered worst)). We reported the number of studies within the category of best available evidence to assess the quantity of evidence.

Based on the design of at least two studies comprising the best available evidence assessing specific outcomes, we designated a starting numeric value between one and four for the evidence applying to each outcome. Accordingly, we assigned a value of 4 (highest value) if the body of evidence for the outcome included two or more RCTs; a value of 3 if there was one RCT with or wihtout at least one non-randomized controlled trial, one RCT with or without at least one cohort study (prospective or retrospective), or one RCT and one pre-post study; a value of 2 if there were cohort studies only (prospective or retrospective) or if there was one controlled trial and two cross-sectional studies. All other study designs started with a value of one (lowest value). Next, we assessed the quality of the individual studies providing the evidence on specific outcomes. We used the standard assessment of individual study quality (described above and completed prior to the evidence grading process) to guide our evaluation of the overall quality of evidence assessing the outcome, including variations in studies' external validity, internal validity, and approach to statistical analysis. We evaluated the consistency of the direction of results reported in the evidence by evaluating the number and type of studies reporting the PHE had positive, negative or no effects on specific outcomes. Bodies of evidence in which results from individual studies were consistent in direction for a specific outcome received no point deduction for inconsistency. Bodies of evidence in which some studies reported results in one direction (either positive or negative) but some studies reported neutral effects of the PHE received a 0.5 point deduction for inconsistency. Bodies of evidence in which studies reported both positive and negative results received a full one point deduction for inconsistency. Finally, we evaluated the directness of evidence by considering how individual studies handled plausible confounders, and we evaluated the strength of the associations between the PHE and outcomes based on the magnitude of effect sizes indicating clinically significant differences in outcomes between groups receiving the PHE and groups not receiving the PHE.

We based the overall grade of evidence on these four key elements for each outcome, categorized as "high" grade (score of 3.0 to 4.0), 2) "medium" grade (score of 2.0 to 2.9), 3) "low" grade (score of 1.0 to 1.9), and 4) "very low" grade (score less than 1.0). A grade of "high" signifies that further research would be unlikely to alter observed effects, a grade of "medium" signifies that further research could alter the observed effects, a grade of "low" signifies that further research would be very likely to alter the observed effects in the abstracted literature, and a grade of "very low" signifies that any estimate of effect is very uncertain. In

Figure 3, utilizing colon cancer as an example outcome, we have provided an example of our approach to grading the evidence for each outcome.

Estimating the Magnitude of Effect of the PHE on Outcomes in RCTs

In an effort to provide standard estimates of the effect of the PHE across outcomes, we calculated effect sizes (using Cohen's d Effect Size Estimate for mean differences and differences in proportions) for comparative studies evaluating the effect of the PHE on outcomes where possible.[50,51] We considered effect sizes ranging from 0 to 0.25 to represent "small" effects, ranging from 0.26 to 0.8 to represent "medium" sized effects, and effect sizes greater than 0.8 to represent "large" effects.[50] Effect sizes can be thought of as the average percentile standing of the average participant receiving the PHE relative to the average participant not receiving the PHE. An effect size of 0.0 indicates that the mean of the group receiving the PHE is at the 50th percentile of group not receiving the PHE. An effect size of 0.25 indicates that the mean of the group receiving the PHE is at the 58th percentile of the group not receiving the PHE. An effect size of 0.8 indicates that the mean of the group receiving the PHE is at the 79th percentile of the group not receiving the PHE. Thus, larger effect sizes represent greater separation of findings between treatment and control groups.[52] We also noted the direction of effects. We considered evidence neutral when the 95% CI of the estimate of effect included zero. When enough data were not presented in articles to present effect sizes (e.g., no information reported regarding the variance of reported means), we presented other standard estimates of effect (e.g., rate ratio) or estimated the direction and clinical significance of reported results.

Peer Review

Throughout the project, we sought feedback from the technical experts through ad hoc and formal requests for guidance. A draft of the completed report was sent to the technical experts and peer reviewers, as well as to the representatives of the ACP and AHRQ. The range of reviewers included a representative of the sponsor of the Key Questions (ACP), academic experts in the assessment of clinical preventive services and primary care, patient stakeholder organizations (American Association of Retired Persons, American Cancer Society), private and public health insurance stakeholders (American Health Insurance Plans and CMS), and experts from the AHRQ. Substantive comments were entered into a database, and revisions to the draft report addressed reviewer comments. The disposition of all comments was submitted to the AHRQ with the final report.

Chapter 3: Results

Results of Literature Search and Abstract Review Process

A summary of the results of the search and review process is provided in Figure 2.

In addition to the 7003 citations retrieved by the search methods, we retrieved 64 citations through hand searching. Using the duplicate removal feature of SRS 3.0, and reviewer observation, we identified 544 duplicates, leaving 6523 for title review. Of these, we reviewed 2021 at the abstract level. We included 819 articles in the full article inclusion/exclusion portion of the review. Of these, 54 articles were promoted for full data abstraction and quality assessment. These 54 articles represented 36 studies that reported multiple outcomes and/or multiple follow ups. Full data abstraction was completed only on the 36 studies integrating data from all 54 articles.

Because many articles had more than one reason to be excluded the abstract reviewers did not need to agree on the main reason for exclusion applied at the abstract level. The two most frequent reasons for exclusion were that the article did not include any useful information for this review (762 abstracts), and no original data was presented (either a review or an opinion piece) (523 abstracts). The remaining reasons for exclusion were: study included only subjects less than 18 years old (75 abstracts), and not an English language study (4 abstracts). Articles could be excluded for more than one reason at this level.

Results of Article Inclusion/Exclusion Process

From the abstract review process, 819 citations were identified for the article inclusion/exclusion phase. At this level 762 articles (93%) were excluded, and 3 were not retrievable. The most frequent reasons for exclusion were that the article did not include any original data (390 articles), the article did not apply to any of the Key Questions (372 articles), the exposure in the study was not a PHE (310 articles), and the article focused on specific preventive service delivery (215 articles). Of the 54 articles (36 studies) included in this report, Key Question 1 was addressed by all studies, Key Questions 2 was addressed by 36 studies, and Key Question 4 was addressed by 5 studies. Articles could be excluded for more than one reason at this level. A listing of the included articles and the excluded articles with the reasons for exclusion is included in this report (Appendix E[a]).

General Study Characteristics

We identified a total of 36 studies containing information applicable to the Key Questions. A description of study characteristics is listed in Table 1. The most common study design was cross-sectional (14 studies), followed by RCTs (11) and cohort studies (7). Overall, the literature was characterized by complexity and heterogeneity in several dimensions. Studies were conducted over a period of several decades (19 from 1990 and later, 9 between 1970 and 1989, 4 before 1970, 4 articles did not indicate when the study was conducted) (Table 1). Practice

[a]Appendixes cited in this report are provided electronically at http://www.ahrq.gov/clinic/tp/phetp.htm

settings for the studies were also diverse, with 16 studies taking place in ambulatory practice offices, seven in academic practice settings and four in hospital outpatient clinics. Studies described family medicine physicians, internal medicine physicians and general practice physicians as delivering the PHE. Studies reflected a range of health plans as well, with 10 studies in non-U.S. national health plans, four in Medicare settings, four in employer health plans and two in staff-model HMOs. While 25 studies were performed in the U.S., we also identified relevant studies from the U.K., Canada, Taiwan, Japan, Denmark and Sweden

In addition to study setting and population, heterogeneity was evident in how the PHE was delivered. Some studies reported on the effects of receiving PHEs over a period of time, but most studies reported on receiving the PHE at one point in time. While all studies included some sort of comparison to the PHE, some studies compared the PHE to usual care (which was defined heterogeneously or no system for the organized delivery of preventive services), and some observational studies compared exposure to a PHE to lack of exposure to a PHE (Table 2). The definition of the PHE also varied substantially across studies (see Key Question 1). Receipt of the PHE in intervention groups offered the PHE ranged from 54% to 100% across studies.

Studies described a wide range of outcomes including clinical preventive service delivery, health behaviors, hospitalization, and mortality. Most studies reported on multiple outcomes: 13 studies reported on one outcome; 5 studies reported on two; and 18 studies reported on three or more. (Table 3) Eleven articles reported on delivery of at least three delivery of clinical preventive services outcomes, three reported on at least three proximal clinical outcomes, and three reported on at least three distal clinical or economic outcomes.

Randomized Controlled Trials

The 11 RCTs studying the value of the PHE spanned a variety of populations and settings including: Medicare demonstration projects, Veterans Administration Medical Centers, Kaiser Health Plan, South London, Denmark and Sweden. Four trials were performed in 1990 or later, three were performed in the 1980s and four were performed before 1980 (1964, 1967, 1969 and 1974.) Every outcome measured in the report had results from at least one randomized controlled trial. (Table 2)

Medicare Demonstration Projects. Four RCTs examined the effect of the PHE in Medicare populations through demonstration projects sponsored by the Health Care Financing Administration. The goal of these projects was to determine whether Medicare payment for preventive services delivered to seniors results in better health and decreased health care utilization. In one Medicare demonstration study in 2558 patients, performed in 1993 at Group Health Cooperative of Puget Sound HMO in Seattle, the PHE was delivered in the context of a "preventive service package" in which patients received clinical preventive services including a health risk assessment, a health promotion visit (including health risk appraisals, positive behavior reinforcement, referrals for interventions where appropriate), disease prevention visit (visit with nurses and physicians who conducted history and physical examinations and reviewed patients' health risks), and follow up educational classes (group exercise classes, "planning" ahead classes with advanced directives and long-term care insurance.)[53] Counseling on exercise, high fiber/low fat diet and advance directives was also offered to all intervention group participants. The health promotion and disease prevention visits and the exercise classes were conducted annually for two years. The comparison group received clinical preventive services as customarily offered in their physicians practices. Immunization, health habits, patient attitudes,

body mass index (BMI), costs and mortality were measured outcomes; some outcomes were measured at completion of the two-year intervention while others were also assessed two years after intervention completion (4 years from baseline). Fifty-one percent of eligible enrollees participated in study. Of the treatment group, approximately 90% had health-promotion and disease-prevention visits in the first intervention year, and approximately 83% had visits in year two. Seventy-eight percent had all four visits in years one and two, and 9% had no visits. However, only 24% of the treatment group attended any offered classes. The main limitation to this study is generalizability to non-elderly non-Medicare populations. Other limitations include suboptimal reporting on blinding, potentially inadequate adjustment for residual confounding, and poor description of study outcomes.

In a second Medicare demonstration project beginning in 1993, 1203 subjects who were Medicare beneficiaries enrolled in a health maintenance organization in San Diego were randomly assigned to receive either a PHE comprised of selected clinical tests and immunizations, a health risk appraisal with individual counseling, and a series of health promotion sessions or usual care. The health risk appraisal and health promotion workshops were offered for one year. In the second year of the intervention, individual counseling was continued. Outcomes assessed included health habits, BMI and blood pressure. Behaviors were assessed from patients' self reports; blood pressure was measured.[54] Ninety-six percent of the intervention group completed the health risk appraisal and individual counseling, 87% attended at least one group session, and 59% attended at least six group sessions. Limitations in this study include suboptimal reporting on differences between study enrollees and non-enrollees, blinding and participant withdrawals. In addition, the results may not be generalizable outside the Medicare population.

A third study reporting on a Medicare demonstration project described results for 1914 participants in 10 primary care practices in central North Carolina, with chart abstraction on 455 patients.[55] Physicians of patients randomized to the intervention group received annual capitated payments for preventive care and health promotion packages, prompting to routinely schedule preventive care visits, office system changes for nurse delivery of preventive care and a form for charting preventive care. Patients were randomized within physician practices, and intervention group patients received the "preventive service package" at no cost. The "preventive service package" included annual history and physical, Pap smear, breast exam, eye exam, hearing test, depression test, influenza and pneumovax immunizations, cholesterol tests, fecal occult blood testing, urinalysis and a urinary incontinence test. Each clinical screening service had recommended intervals for delivery, and nurses were responsible for delivery of most of the preventive care services. The "preventive service package" (history and physical and recommended tests) was offered once a year for two years. One hour health promotion sessions were offered twice a year for two years and included physical activity, nutrition and stress management classes with others offered based on risk. Practices received monthly prompting to schedule prevention appointments, and nurses received training to conduct the prevention/health promotion services offered. Special chart forms were used for services delivered as part of the intervention. The comparison group received clinical preventive services as customarily offered in their physicians practices. Study outcomes assessed included Pap smear, immunization, cholesterol screening, fecal occult blood screening, mammogram, costs and hospitalizations. Outcomes were assessed through chart review on a sample of practices, participant interview and Medicare claims records. Outcomes assessments based on interviews and chart review occurred between 12 and 26 months after the beginning of the intervention; cost outcomes were assessed 1

year after completing the intervention (3 years after beginning of intervention.) The authors report 45% of eligible patients were recruited to participate. Of the 954 participants randomized to the intervention group, 88% received at least one clinical screening and 87% received at least one health promotion service. The primary limitation of this study is that the results may not be generalizable beyond the Medicare population.

The fourth Medicare demonstration project was conducted in Baltimore in 1989 and randomized 4195 participants to receive a physical examination, history and evaluation, laboratory procedures and immunizations, and counseling for health risks or else usual care.[56] Intervention participants received a voucher for a preventive exam from their physician once a year for two years. The history and physical exam included vision, hearing, dentition, breast exam, pelvic exam with Pap smear and digital rectal exam. Fecal occult blood tests and total serum cholesterol tests were performed. Vouchers for counseling visits were issued if physicians requested them; counseling could include smoking, exercise, diet, alcohol use/abuse, emotional distress, injury prevention/ falls, medication use/adverse reactions, sleep problems, functional status and urinary incontinence. Outcomes measured included Pap smear, health habits (smoking, problem drinking), health status, costs, hospitalizations and mortality. Some outcomes were measured at the end of the two-year intervention, and some were measured two years later. Outcomes were assessed by a combination of self-report and Medicare claims data. Sixty-three percent of the intervention group had a preventive clinical visit; 52% had a counseling visit. In year two, 32% made a preventive visit and 33% made a counseling visit. The study's limitations included suboptimal reporting of blinding and that the results may not be generalizable beyond the Medicare population.

Veteran Affairs Medical Center. One randomized controlled trial, beginning in 1981, took place in the Seattle Veterans Affairs Medical Center.[44] In this study, 1224 male patients were randomized to receive the PHE in the context of a "health promotion clinic" versus other supplementary services versus usual care. We include the 647 patients offered the "health promotion clinic" or usual care in this review (the other patients (n=577) received other supplementary services to encourage preventive service compliance not pertinent to this report). In the "health promotion clinic," nurse practitioners, with backup consultation by general internists, delivered screening, counseling and referral protocols tailored to participants' age, gender and other risk factors. These were similar to the 1989 USPSTF recommended activities and included history and physical examination items (alcoholism screen, smoking assessment, blood pressure check, breast examination); laboratory testing (fecal occult blood, cholesterol, tuberculin skin test, VDRL, Pap smear and mammography); tetanus/diphtheria and influenza vaccination, and counseling on breast self-examination and alcoholism and smoking cessation. Results of screening were given to the patient and to their usual medical care provider. The "health promotion clinic" was offered for five years. Outcomes were assessed by chart review five years after trial completion, compared to baseline, and included alcohol or smoking screening, influenza immunization and fecal occult blood testing. Seventy-one percent of those in the intervention group participated in the health promotion clinic during year one, and 78% of participants came to the health promotion clinic in either year one or year two. In year two, 90% of those attending in year one returned for the second annual screening. Limitations of this study included lack of detail provided on the study population or the content of the PHE and limited generalizability. Although this study was designed to assess this outcome directly, its limitations included suboptimal description of the study population, no reporting on any blinding, and its potentially limited generalizability to men receiving care in the VA setting.

South London, U.K. One study, performed in 1967, was a large randomized controlled trial of nearly 7,000 community dwelling persons in South London who attended one of two group general practices. This study was designed to assess the value of introducing a general practice based screening service (compared to usual care) for persons age 40-64 and followed patients for nine years for the incidence of co-morbid illnesses, hospitalization or mortality.[57] The general practice based multiphasic screening service was described as a visit in which patients completed a "symptoms questionnaire" and occupational history followed by a physical examination performed by nurses (primarily, supervised by a physician) and several screening tests. The goal was to screen for ischemic heart disease, elevated blood pressure, chronic bronchitis, diabetes, thyroid imbalance, arthritis, obesity, varicose veins and hearing and visual defects. Specific physical exam components included height, weight, blood pressure, skinfold, skin, mouth, joints, abdomen, legs, breast and pelvic exams; screening tests included pulmonary function tests, vision, audiometry, chest X-ray, ECG, blood count, blood urea, blood glucose, serum cholesterol, protein-bound iodine, uric acid and fecal occult blood testing. Two years after the first multiphasic screening, participants with initially abnormal screening results were invited to have a second screening. Outcomes included disease detection, health habits, disability, hospitalization and mortality up to nine years. Health habits and disability were self-reported. Seventy-three percent of eligible individuals participated in the first health screening of which 99% had both clinic tests and a physical examination. Limitations of this study include suboptimal reporting on blinding, suboptimal adjustment of confounders and incomplete presentation of statistical significance. In addition, this study was performed before the USPSTF or similar contemporary preventive services guidelines were in effect which may limit inferences that can be drawn.

Small Canadian RCT. The goal of this trial, performed in Canada in 1974, was to determine if a multiphasic screening program helps physicians identify new medical problems. One hundred twelve physicians in an academic teaching setting were randomized to a) have their patients undergo a multiphasic screening program, b) have their patients receive usual care followed by formal medical records abstraction, or c) have their patients receive usual care followed by an informal chart review by the physicians themselves. Patients ages 40 to 65 years being seen at least twice in the past year were eligible for the study, and one patient per physician was studied. The patients in the multiphasic screening program arm received their multiphasic exam after the regular physician visit. One to two weeks after the visit, physicians were given additional information about their patients according to the randomized study groups: multiphasic screening results, results from chart abstraction or being able to review their patients chart for 15 minutes. Disease detection of all new problems and all "important" problems were outcomes measured before and after the intervention. In the multiphasic screening program, patients were administered a "standard health questionnaire" followed by a physical examination and several screening tests.[45] The exam and screening tests included blood pressure, height, weight, visual acuity, tonometry, audiometry, blood leukocyte count, hematocrit, syphilis serology, 16-channel automated biochemistry profiles, urinalysis, ECG, chest X-ray, vital capacity, breast exam and Pap smear. Limitations of this study include suboptimal reporting on blinding and on the study population characteristics as well as potentially incomplete adjustment for residual confounding. In addition, this study was performed before the USPSTF or similar contemporary preventive services guidelines were in effect which may limit inferences that can be drawn.

Kaiser Multiphasic Health Checkup Study. A large trial randomized 10,713 Kaiser Health Plan members ages 35-54 years in 1964 to either being encouraged to undergo an annual multiphasic health checkup or receiving usual care.[41] The study group resided in San Francisco, Oakland or Berkley and had to have at least two years continuous membership in the health plan. The intervention group received an initial letter and then regular phone calls over the eleven year study period urging them schedule a multiphasic health checkup appointment annually. The multiphasic health checkup consisted of a series of laboratory and radiologic tests, self-administered history, and follow up physical exam by an internist. Testing included ECG, sphygmomanometery, anthropometry, chest and breast X-rays, visual acuity, tonometry, audiometry, spirometry, urine test and serum chemistry panel. After the evaluation, the patient's regular internist received a report of the results. Outcomes assessed included costs, self-reported disability and mortality. Mortality outcomes were followed up to 16 years. Fifty-four percent of the intervention group received four or more multiphasic check-ups over the first seven years compared to 13% of the control group. Eighty-three percent of the intervention group at had least one examination over seven years compared to53% of the control group. The limitations of this study include suboptimal reporting on any blinding as potential inadequate adjustment for confounders. As in other studies conducted before contemporary clinical preventive services guidelines were developed, this study may not have the same potential for improving health outcomes as later trials.

Stockholm, Sweden. This large RCT was conducted in Stockholm in 1969 to investigate the long-term effects of one "general health screening" on mortality.[58] In this study of over 32,000 residents ages 18 to 65 years, 2,578 underwent the general health screening. The "general health screening" included social, psychiatric and medical interviews, blood tests, physical examinations, ECGs, exercise tests, psychological tests and eye and dental examinations. Each participant was screened over the course of one day by social workers, psychiatrists and physicians. Mortality over 20 years was assessed by the national death registry. Eighty-four percent of individuals offered the health screening were examined. Limitations of this study include suboptimal reporting on blinding, differences between participants and non-participants, description of study population characteristics and detailed description of the PHE. In addition, there was potentially inadequate consideration of confounders. Finally, the PHE was performed in before USPSTF guidelines were available.

OXCHECK. This RCT was conducted in five urban and suburban general practices in Bedfordshire, England in 1989, and studied the effectiveness of health checks delivered by nurses in primary care in reducing risk factors for cardiovascular disease and cancer.[59] Over 11,000 individuals aged 35 to 64 years who returned a health questionnaire were randomly allocated to health checks during one of four years. This report focuses on participants who received a health check in year one of the study (n=2205) and year four (n=1660) compared to participants who received their first health check in year four (n=1916). The health check consisted of a 45 to 60 minute visit with medical history, lifestyle questionnaire, structured dietary assessment, height, weight, blood pressure, and serum cholesterol. Post visit counseling was also given. Nurses were formally trained to conduct health checks per a standard protocol. Outcomes included health habits, blood pressure, cholesterol level, BMI, and cost effectiveness. Of the 2205 participants in the intervention group (receiving PHE in year 1 and year 4), 75% received the health check at year 4. Limitations in this study include reporting on blinding and potentially inadequate adjustment for confounders.

U.K. System-level Intervention. This RCT examined an intervention on the uptake of the PHE. This study, published in 1992, randomized patients of a general practice in the Norfolk, England to receive either an invitation for a scheduled health check or an open invitation for a health check.[60] The health check consisted of a history and physical examination performed by a nurse, followed by the generation of a personalized letter summarizing results and providing personalized advice regarding health changes. Eight hundred eighteen patients ages 30 to 41 years were randomized. The outcome was attendance at the PHE. Limitations of this study include lack of reporting of detailed study population characteristics and potentially inadequate adjustment for confounding.

Benefits and Limitations of RCTs Assessing the PHE

RCTs provide the only study design capable of minimizing bias due to unmeasured confounding. However, it is difficult to follow long-term outcomes in RCTs, especially with the delay expected between the effects of health interventions mediated through the PHE (at times only one PHE was received in these studies) and durable effects many years later. During this time period, participants in RCTs may have many other interactions with the health care system which could limit the ability to detect meaningful differences in health outcomes. Randomized trials of the PHE also are expensive, and although the study design maximizes internal validity, results from one study population may not be broadly generalizable to others. Moreover, only one third of RCTs evaluating the PHE were performed in 1990 or later when the USPSTF guidelines were in effect. Earlier studies would not be expected to have the same effects on health outcomes as later trials if they did not incorporate contemporary preventive service guidelines.

Benefits and Limitations of Observational Studies Assessing the PHE

Observational studies on the PHE have inherent limitations that lessen inferences that can be drawn from their results. First, persons undergoing a PHE or volunteering for a PHE are likely healthier than those who do not. This selection bias can confound measurements of health outcomes, and possibly also preventive service delivery if physicians are less likely to recommend services to ill patients. Observational studies collecting information from self-report are subject to recall bias, and studies collecting information on preventive services from chart review are subject to the bias that clinicians may be more likely to record counseling services during a PHE. While some studies attempt to adjust for these issues, residual confounding usually remains a concern.

Despite their limitations, evidence from observational studies on the value of the PHE is included in this report (Table 2). Over 80% of studies conducted since 1990 have an observational design, likely due to the fact that randomized trials of the PHE are by nature large and very expensive. Thus, in order to consider the body of recent evidence on the PHE and to incorporate diverse populations (e.g., women, ethnic minorities), observational studies are included, while fully acknowledging their limitations.

Seven cohort studies, fourteen cross-sectional studies and three studies with pre/post comparison design assessed the value of the PHE. Nineteen of the studies took place in 1990 or later, two between 1980 and 1989 and three before 1980. The study populations were quite diverse ranging from middle management employees, to elderly residents in Taiwan, to primary

care clinic patients in settings across the U.S. Just as in the RCTs, the observational studies reported on a wide range of outcomes of the PHE.

Article Quality

The quality of reporting on studies varied, with only one study receiving quality scores in the highest tertile for external validity, internal validity, and quality of statistical analysis.[55] (Table 4) The majority of studies received varied ratings for external validity and internal validity, while five studies received scores in the lowest tertile for external validity, internal validity, and quality of statistical analysis (Table 4).[28,61-64] Total quality scores for experimental trials were generally high (median score of 68 (range 56 to 87) out of 100 total possible points). Total quality scores for observational studies were also generally high, but with more variability in range (median score of 63 (range 37 to 77) out of 100 total possible points). Total quality scores are included in the evidence tables Appendix G).

Key Question 1: What Definitions are Used for the Adult PHE in Studies of its Value?

Summary of findings. Definitions of the PHE were heterogeneous. While central elements used to define the PHE included the clinical history and risk assessment of patients and a physical examination, the specific composition of these central elements varied among studies. The most frequently cited types of history and risk assessment performed were assessment of dietary, alcohol/substance abuse, and tobacco smoking risks; the least frequently cited types of risk assessment included assessment of calcium and folic acid intake. In many cases, the physical examination was referred to with no specific clarification of what components were included. When specified, the most frequently cited components of the examination were assessment of blood pressure, weight and height, breast examination, gynecological examination, and rectal examination; the least frequently cited components included neurological and foot examinations.

Findings. A description of components studies reported as being part of the PHE is listed in Table 5. The most frequently reported components involving history and risk assessment were: assessment of tobacco smoking (14 studies); alcohol and substance use (13 studies); dietary risk factors (12 studies); and physical activity (10 studies). Fewer studies included assessments of injury risk/injury prevention (6 studies), calcium intake (2 studies) or folic acid intake (2 studies). The most frequently reported components involving the physical examination were: blood pressure (18 studies), breast examination (12 studies), weight (12 studies), height (10 studies), and gynecological examination (10 studies). Fourteen studies described the delivery of the PHE in general terms (e.g., as a “well visit” or a “health maintenance visit”) without further reporting what specific components were included in the PHE itself. Fewer studies reported on assessments of pulse (4 studies) rectal, prostate, abdominal or neurological examinations (4 studies for each), neurological examination (3 studies) or foot examination (2 studies). Complete definitions of the PHE varied tremendously (Table 2).

Key Question 2: What is the Evidence that a PHE, Delivered at Different Patient Ages or Different Frequencies, is Associated with Benefits Compared to Care Without a PHE?

Studies addressing Key Question 2 included studies reporting on the association of receipt of the PHE with: a) the delivery/receipt of seven clinical preventive services (gynecological examination/Pap smear, counseling, immunizations, cholesterol screening, colon cancer screening, and mammography); b) seven proximal clinical outcomes (disease detection, patient health habits, patient attitudes, health status, blood pressure, serum cholesterol, and BMI); c) three distal clinical outcomes (disability, hospitalization, and mortality); and d) economic outcomes (costs and cost-effectiveness).

Delivery of Clinical Preventive Services

Gynecological Examination/Pap Smear

Summary of findings. Thirteen studies (including two RCTs and eleven observational studies) evaluated the association of receiving the PHE with delivery/receipt of the gynecological examination/Pap smear. The best available evidence to assess this outcome was comprised of two large RCTs, performed in the late 1980's, and it was deemed to be of "high" grade based on standard criteria. In these studies, the PHE had small to large positive effects on the receipt of the gynecological examination/Pap smear (see below for details). While these RCTs were specifically designed to assess the effect of the PHE on this outcome, they focused on Medicare recipients, and thus may be limited in their generalizability to other populations. Observational studies of the association of receipt of the PHE with receipt of the gynecological examination/Pap smear revealed both positive and mixed results. Observational studies had a variety of limitations, including potential confounding of results not accounted for and use of data subject to recall bias.

Findings

Strength and limitations of the evidence. The best available evidence assessing this outcome, emanating from two large RCTs, received an overall grade of "high." In grading the evidence, these studies were found to have few serious limitations in quality, no important inconsistency with regard to the direction of effects, adequate data, and a low probability of reporting bias (Table 6). These two studies evaluated the effect of the PHE on the delivery/receipt of the gynecological examination/Pap smear among community dwelling Medicare recipients who received reimbursement for the PHE compared to Medicare recipients receiving usual care. While these studies were limited in their generalizability to other ambulatory populations, they were specifically designed to evaluate the effect of the PHE on delivery/receipt of clinical preventive services and therefore directly addressed Key Question 2 (Tables 2, 6 and 7).

Randomized controlled trials. Two randomized controlled trials performed in 1988 and 1989 studied Medicare recipients (over 5000 patient combined total).[55,56] Follow up of patients ranged from twelve to 26 months. In one study, funded as a Medicare demonstration project, the PHE was delivered in the context of a "preventive care package" in which patients received clinical

preventive services including annual history and physical on at least an annual basis, delivered by both a nurse and a physician. The comparison group received clinical preventive services as customarily offered in their physicians' practices.[55] In the other study, also funded as a Medicare demonstration project in which participants in the intervention group received vouchers for free preventive visits to be delivered by participants' primary care physicians, the PHE was described as consisting of a history and physical examination followed by the provision of USPSTF recommended clinical preventive services. The comparison group received no coverage for annual preventive visits or tests.[56] The PHE had a small positive effect (Cohen's d (95% confidence interval (CI)): 0.07 (0.07,0.07)) to a large positive effect (Cohen's d (95% CI):1.71 (1.69,1.73)) on delivery/receipt of the gynecological examination/Pap smear (Table 7, Evidence Table 1a). Limitations of these studies include their potential limited generalizability to non-Medicare populations (Table 2).

Observational studies. Observational studies evaluating the association of receipt of the PHE with delivery/receipt of the gynecological examination/Pap smear included one retrospective cohort study, eight cross-sectional studies, and two observational studies with pre-post design performed from 1976 to 2004. Study populations for these studies included patients seen in community practices who interacted (or did not interact) with a touch-sensitive computer system placed in primary care practices to promote the delivery of preventive services,[65] a cross-sectional audit of outpatient billing claims for adults seen at least once by a primary care provider classified by visit type (visits for preventive care vs. acute care),[66] female residents in Ontario, Canada who completed the National Population Health Survey reporting their use of annual examinations with answers linked to their use of services in a national health insurance plan,[67] respondents to a California telephone survey who were contacted to assess their access to preventive services and satisfaction with preventive services,[68] data from the National Ambulatory Medical Care and National Hospital Ambulatory Medical Care Surveys in which physicians completed forms describing reasons for ambulatory visits (including general medical visits or gynecological) and the receipt of preventive services,[64] Mexican-American participants in a telephone and door-to-door survey designed to assess access to and use of ambulatory health care,[69] patients randomly selected from 44 ambulatory outpatient clinics who completed a survey to ascertain their receipt of preventive services in the context of "checkup physical examinations" versus other types of visits,[31] patients from randomly selected community practices agreeing to complete a questionnaire and medical record review to assess their receipt of a "periodic health examination" and their receipt of recommended clinical preventive services,[70] employed health insurance enrollees responding to a questionnaire regarding the receipt of clinical preventive services in the past year,[63] patients in an ambulatory family practice residency clinic in which physicians participated in a quality improvement program to enhance the delivery of the "health maintenance examination" and clinical preventive services,[71] and family practice residents and faculty physicians using a practice-based teaching model to increase resident compliance with USPSTF guidelines.[72] Eight of these observational studies reported a positive association between receipt of the PHE and delivery/receipt of the gynecological examination/Pap smear, while three of these studies reported mixed results (Table 8, Evidence Tables 1b-d). Several limitations were noted among these observational studies including inability to completely control for potential confounding in several of the studies, lack of detail in studies' descriptions of the PHE, and the potential for recall bias in studies based on participant interviews/questionnaire responses (Table 2).

Preventive Counseling

Summary of findings. Thirteen studies (including one RCT and eight observational studies) evaluated the association of receiving the PHE with delivery/receipt of preventive counseling. A variety of types of counseling were examined within studies, including counseling regarding diet (6 studies), regarding physical activity (9 studies), smoking cessation (9 studies), alcohol/substance abuse (8 studies), injury prevention (3 studies), safe sexual practices (3 studies), calcium intake (one study), oral health (one study), sun exposure (one study), and general counseling (not otherwise specified) (one study). Four studies reported on other types of counseling. The delivery of all types of preventive counseling among studies was treated as a single outcome. The best available evidence to assess this outcome emanated from one RCT and six cross-sectional observational studies performed from1981 to 2004, and it was deemed to be of "low" grade based on standard criteria. Most studies reported a positive association of receiving a PHE with the delivery/receipt of preventive counseling with a strongly positive effect rendered by the PHE on delivery/receipt of smoking cessation counseling and alcohol abuse counseling in the RCT. Five observational studies reporting moderate to large positive associations of receipt of the PHE with receipt of counseling, while one observational study reported a negative association. The RCT was noted to have poor description of the study population and the PHE itself as well as its potentially limited generalizability to persons receiving care in the Veterans Affairs setting. However, this study did directly address Key Question 2. The seven cross-sectional studies were noted to have several limitations, including not directly addressing Key question 2, inability to completely control for potential confounding in several of the studies, lack of detail in studies' descriptions of the PHE, and the potential for recall bias in studies based on participant interviews/questionnaire responses.

Findings

Strength and limitations of the evidence. The best available evidence assessing this outcome, emanating from one RCT and six cross-sectional observational studies received an overall grade of "low." In grading the evidence, these studies were found to have serious limitations in quality, moderate inconsistency in the direction of results (one observational study reporting a negative association with remaining studies reporting positive associations) but adequate data and low probability of reporting bias (Table 6). Although the RCT was designed to assess this outcome directly, its limitations included poor description of the study population and the PHE itself as well as its potentially limited generalizability to persons receiving care in the VA setting.[44] The seven cross-sectional studies were noted to have several limitations, including not being designed to specifically assess this outcome, inability to completely control for potential confounding in several of the studies, lack of detail in studies' descriptions of the PHE, and the potential for recall bias in studies based on participant interviews/questionnaire responses (Tables 2, 6 and 7).

Randomized controlled trial. In this study, patients attending a VA medical center were randomized to receive the PHE in the context of a "health promotion clinic" versus usual care.[44]The study measured the delivery of both alcohol abuse counseling and smoking cessation counseling.[44] The study began in 1981 with follow up for five years. Limitations of this study included lack of detail provided on the study population or the content of the PHE and limited generalizability. Delivery/receipt of alcohol abuse and smoking counseling were improved by randomization to the health promotion clinic in this study (Cohen's d (95% (CI)): 1.18 (1.17,1.21) and 1.09 (1.08,1.11), respectively) (Tables 2 and 7, Evidence Table 2a).

Observational studies. Observational studies evaluating the delivery/receipt of preventive counseling included six cross-sectional studies and two observational studies with pre-post design performed from 1993 to 2004. Study populations included reports from ambulatory patients across the U.S.,[73] data from the National Ambulatory Medical Care and National Hospital Ambulatory Medical Care Surveys in which physicians completed forms describing reasons for ambulatory visits (including general medical visits or gynecological) and the receipt of preventive services,[64] outpatients seen in family practices in Ohio,[42,74] patients randomly selected from 44 ambulatory outpatient clinics who completed a survey to ascertain their receipt of preventive services in the context of "checkup physical examinations" versus other types of visits,[31] patients from randomly selected community practices agreeing to complete a questionnaire and medical record review to assess their receipt of a "periodic health examination" and their receipt of recommended clinical preventive services,[70] patients in an ambulatory family practice residency clinic in which physicians participated in a quality improvement program to enhance the delivery of the "health maintenance examination" and clinical preventive services,[71] and family practice residents and faculty physicians using a practice-based teaching model to increase resident compliance with USPSTF guidelines.[72] Six of these observational studies reported positive associations of receipt of the PHE with receipt of counseling, while one study reported a negative association and one reported mixed results (Table 8, Evidence Tables 2b-c). Several limitations were noted among these observational studies including inability to completely control for potential confounding in several of the studies, lack of detail in studies' descriptions of the PHE, studies not specifically designed to examine Key Question 2, and the potential for recall bias in studies based on participant interviews/questionnaire responses (Table 2).

Preventive Immunizations

Summary of findings. Nine studies (including three randomized controlled trials and six observational studies) evaluated the association of receiving the PHE with delivery/receipt of preventive immunizations. The association of receiving the PHE with delivery of a variety of immunizations was examined within studies, including the delivery of influenza (7 studies), tetanus (6 studies) and pneumonia (4 studies) vaccinations. Two studies reported on the delivery of other immunizations. The delivery of all types of preventive immunization among studies was treated as a single outcome. The best available evidence assessing this outcome, emanating from three RCTs performed from 1981 to 1999, and it was deemed to be of "medium" grade based on standard criteria. Results in these three RCTs were mixed with two studies reporting small to medium sized positive effects (two studies) and one study reporting a small negative effect of the PHE on delivery/receipt of preventive immunization. While these RCTs were specifically designed to assess the effect of the PHE on this outcome, they focused on Medicare recipients and patients of a Veterans Affairs medical center and thus may be limited in their generalizability to other populations. Six observational studies reported the PHE improved the delivery/receipt of preventive immunizations. Several limitations were noted among these observational studies including inability to completely control for potential confounding in several of the studies, lack of detail in studies' descriptions of the PHE or study populations, and studies not specifically designed to assess this outcome.

Findings

Strength and limitations of the evidence. The best available evidence assessing this outcome, emanating from three RCTs, received an overall grade of "medium." In grading the evidence,

these studies were felt to have some serious limitations in quality, and important inconsistency in the direction of results (Table 6). These three studies evaluated the effect of the PHE on the delivery/receipt of preventive immunizations among Medicare enrollees and patients of a Veterans Affairs medical center compared to similar patients receiving usual care. While these studies were limited in their generalizability to other ambulatory populations, they were specifically designed to evaluate the effect of the PHE on delivery/receipt of clinical preventive services and therefore directly addressed Key Question 2 (Tables 2, 6 and 7).

Randomized controlled trials. Three randomized controlled trials performed from 1981 to 1999 studied Medicare recipients and patients attending a VA medical center (over 5000 patients combined total).[44,53,55] Follow up of patients ranged from twelve months to five years. In one study, a Medicare demonstration project performed in 1993, the PHE was delivered in the context of a "preventive care package" in which patients received clinical preventive services including a health risk assessment, a health promotion visit (including health risk appraisals, positive behavior reinforcement and referrals for interventions where appropriate), disease prevention visit (visit with nurses and physicians who conducted history and physical examinations and reviewed patients' health risks), and follow up educational classes. The comparison group received clinical preventive services as customarily offered in their physicians practices.[53] In the second study, also a Medicare demonstration project, the PHE was delivered in the context of a "preventive care package" in which patients received clinical preventive services including annual history and physical on at least an annual basis, delivered by both a nurse and a physician. The comparison group received clinical preventive services as customarily offered in their physicians practices.[55] In the third study, patients attending a VA medical center were randomized to receive the PHE in the context of a "health promotion clinic" versus usual care.[44] The PHE improved delivery of preventive immunizations improved statistically significantly in two studies with effect sizes ranging from small to medium positive effects (Cohen's d (95% CI): 0.10 (0.10,0.10) and 0.35 (0.33,0.36), respectively).[53 55] The PHE worsened delivery of preventive immunizations worsened in the group of VA patients attending a health promotion clinic, with a small magnitude of negative effect (Cohen's d (95% CI): -0.22(-0.20,-0.24))[44] (Table 7, Evidence Table 3a). These studies have potentially limited generalizability to non-Medicare or VA populations (Table 2).

Observational studies. Observational studies evaluating the association of receipt of the PHE with delivery/receipt of preventive immunizations included one retrospective cohort study, three cross-sectional studies, and two observational studies with pre-post design performed from 1993 to 2003. Study populations included community-dwelling patients aged 70 and older,[16] a cross-sectional audit of outpatient billing claims for adults seen at least once by a primary care provider classified by visit type (visits for preventive care vs. acute care),[66] outpatients seen in family practices in Ohio,[42] patients randomly selected from 44 ambulatory outpatient clinics who completed a survey to ascertain their receipt of preventive services in the context of "checkup physical examinations" versus other types of visits,[31] patients in an ambulatory family practice residency clinic in which physicians participated in a quality improvement program to enhance the delivery of the "health maintenance examination" and clinical preventive services,[71] and family practice residents and faculty physicians using a practice-based teaching model to increase resident compliance with USPSTF guidelines.[72] All six of these observational studies reported a positive association between receipt of the PHE and the delivery of immunizations (Table 8, Evidence Tables 3b-c). Several limitations were noted among these observational studies including inability to completely control for potential confounding in several of the

studies, lack of detail in studies' descriptions of the PHE or study populations, and studies not specifically designed to examine Key Question 2 (Table 2).

Cholesterol Screening

Summary of findings. Seven studies (including one RCT and six observational studies) evaluated the association of receiving the PHE with delivery/receipt of cholesterol screening. The best available evidence to assess this outcome was comprised of one RCT and four cross-sectional observational studies, performed from 1995 to 2003, and it was deemed to be of "medium" grade based on standard criteria. These studies demonstrated receiving the PHE was positively associated with receipt of cholesterol screening (small to large positive effect sizes). While the RCT was specifically designed to assess this outcome, it was limited to Medicare recipients and thus may be limited in its generalizability to other populations. The four cross-sectional observational studies had a variety of limitations, including the potential for recall bias in studies based on participant interviews/questionnaire responses, inability to completely control for potential confounding in several of the studies, and lack of detail in studies' descriptions of the PHE or study populations.

Findings

Strength and limitations of the evidence. The best available evidence assessing this outcome, emanating from one RCT and four cross-sectional observational studies, received an overall grade of "medium." In grading the evidence, these studies were felt to have some serious limitations in quality, but they were consistent in the direction of findings, had adequate data to assess the outcome, and they had low probability of reporting bias (Table 6). The RCT evaluated the effect of the PHE on the delivery/receipt of the cholesterol screening among community dwelling Medicare recipients who received reimbursement for the PHE compared to Medicare recipients receiving usual care. While this study was limited in its generalizability to other ambulatory populations, it was specifically designed to evaluate the effect of the PHE on delivery/receipt of clinical preventive services and therefore directly addressed Key Question 2. The four cross-sectional studies were noted to have several limitations, including inability to completely control for potential confounding in several of the studies, lack of detail in studies' descriptions of the PHE and study populations, and the potential for recall bias in studies based on participant interviews/questionnaire responses (Tables 2, 6 and 7).

Randomized controlled trials. The RCT studied 455 Medicare recipients for 24 months beginning in 1995.[55] This study was a Medicare demonstration project in which the PHE was delivered in the context of a "preventive care package" in which patients received clinical preventive services including annual history and physical on at least an annual basis, delivered by both a nurse and a physician. The comparison group received clinical preventive services as customarily offered in their physicians practices.[55] Delivery/receipt of cholesterol screening was improved by randomization to the preventive care package in this study (Cohen's d (95% (CI)): 0.02 (0.00,0.04). This study was potentially limited in its lack of generalizability to non-Medicare populations (Tables 2 and 7, Evidence Table 4a).

Observational studies. Observational studies evaluating the delivery/receipt of cholesterol screening included four cross-sectional studies and two observational studies with pre-post designs performed from 1993-2003. Study populations included evaluated a variety of study subjects including female residents in Ontario, Canada who completed the National Population Health Survey reporting their use of annual examinations with answers linked to their use of services in a national health insurance plan,[67] a cross-sectional audit of outpatient billing claims

for adults seen at least once by a primary care provider classified by visit type (visits for preventive care vs. acute care),[66] Mexican-American participants in a telephone and door-to-door survey designed to assess access to and use of ambulatory health care,[69] patients randomly selected from 44 ambulatory outpatient clinics who completed a survey to ascertain their receipt of preventive services in the context of "checkup physical examinations" versus other types of visits,[31] patients in an ambulatory family practice residency clinic in which physicians participated in a quality improvement program to enhance the delivery of the "health maintenance examination" and clinical preventive services,[71] and family practice residents and faculty physicians using a practice-based teaching model to increase resident compliance with USPSTF guidelines.[72] In four cross-sectional studies, receipt of the PHE was positively associated with the delivery/receipt of cholesterol screening while both pre-post studies reported neutral results (Table 8, Evidence Tables 4b-c). Several limitations were noted among these observational studies including inability to completely control for potential confounding in several of the studies, lack of detail in studies' descriptions of the PHE or study populations, and the potential for recall bias in studies based on participant interviews/questionnaire responses (Table 2).

Colon Cancer Screening

Summary of findings. Six studies (including two randomized controlled trials and four observational studies) assessed the association of receipt of the PHE with delivery/receipt of colon cancer screening. Both the delivery of fecal occult blood testing (6 studies) and sigmoidoscopy (4 studies) were studied. The delivery of all types of colon cancer screening among studies was treated as a single outcome. The best available evidence to assess this outcome was comprised of two randomized controlled trials, performed from 1988 to 1995**,** and it was deemed to be of "high" quality based on standard criteria. These studies reported large positive effects of the PHE on the delivery/receipt of fecal occult blood testing. While these studies were specifically designed to assess this outcome, one was noted to have poor description of the study population and the PHE itself. Both studies were limited by their focus on Medicare populations and patients receiving care in the Veterans Affairs setting.

Findings

Strength and limitations of the evidence. Six studies assessed the effect of the PHE on delivery/receipt of colon cancer screening. The best available evidence assessing this outcome, emanating from two RCTs, received an overall grade of "high." In grading the evidence, one study was felt to have serious limitations in quality. However, these studies did not have important inconsistency in terms of the direction of the results, had sufficient data to ascertain results, and both studies demonstrated a strong association between the intervention and the outcome (Table 6). These two studies evaluated the effect of the PHE on the receipt of colon cancer screening among Medicare enrollees and patients of a Veterans Affairs medical center compared to similar patients receiving usual care. While these studies were limited in their generalizability to other ambulatory populations, they were specifically designed to evaluate the effect of the PHE on receipt of clinical preventive services and therefore directly addressed Key Question 2. These studies only evaluated the delivery of fecal occult blood testing in the setting of the PHE (Tables 2, 6 and 7).

Randomized controlled trials. Two randomized controlled trials performed from 1988 to 1995 studied Medicare recipients and patients attending a VA medical center (over 1000 patient combined total).[44,55] Follow up of patients ranged from 24 months to five years. In one study, a

Medicare demonstration project, the PHE was delivered in the context of a "preventive care package" in which patients received clinical preventive services including annual history and physical on at least an annual basis, delivered by both a nurse and a physician. The comparison group received clinical preventive services as customarily offered in their physicians practices.[55] In the second study, patients attending a VA medical center were randomized to receive the PHE in the context of a "health promotion clinic" versus usual care.[44] In both studies, receipt of the PHE improved delivery/receipt of fecal occult blood testing with large positive effect sizes (Cohen's d (95% CI): 1.19(1.17,1.21) and 1.07 (1.05,1.08), respectively).[44,55] (Table 7, Evidence Table 5a). Limitations of these studies included their potential limited generalizability to non-Medicare or VA populations (Table 2).

Observational studies. Observational studies evaluating the delivery/receipt of colon cancer screening included one retrospective cohort study, two cross-sectional studies, and one observational study with pre-post design performed from 1997-2003. Study populations included patients seen in community practices who interacted (or did not interact) with a touch-sensitive computer system placed in primary care practices to promote the delivery of preventive services,[65] a cross-sectional audit of outpatient billing claims for adults seen at least once by a primary care provider classified by visit type (visits for preventive care vs. acute care),[66] patients from randomly selected community practices agreeing to complete a questionnaire and medical record review to assess their receipt of a "periodic health examination" and their receipt of recommended clinical preventive services,[70] and patients in an ambulatory family practice residency clinic in which physicians participated in a quality improvement program to enhance the delivery of the "health maintenance examination" and clinical preventive services.[71] Both cross sectional studies reported receipt of the PHE was positively associated with delivery/receipt of both sigmoidoscopy and fecal occult blood testing, as did the pre-post study. The retrospective cohort study reported mixed results (Table 8, Evidence Tables 5b-d). Several limitations were noted among these observational studies including poor description of the study populations, inability to completely control for potential confounding in several of the studies, studies not specifically designed to answer Key Question 2 (Table 2).

Mammography

Summary of findings. Twelve studies (including one RCT and eleven observational studies) assessed the association of receipt of the PHE with delivery/receipt of mammography. The best available evidence to assess this outcome was comprised of one RCT and one retrospective cohort study. These studies were performed in 1988 and 1998, were deemed to be of "low" grade based on standard criteria. The PHE had a small positive effect on the receipt of mammography in the RCT study, while it had mixed effects in the observational study. While the RCT was limited in its generalizability to non-Medicare populations, it was specifically designed to assess the effect of the PHE on this outcome. In contrast, the retrospective cohort study was not specifically designed to assess this outcome, did not employ a detailed description of the PHE, and was potentially limited by inadequate adjustment for residual confounding.

Findings

Strength and limitations of the evidence. The best available evidence assessing this outcome, emanating from one RCT and one RCT analyzed as a retrospective cohort study, received an overall grade of "low." In grading the evidence, these studies were felt to have some serious limitations in quality and important inconsistency in the direction of results. However the data were not deemed to be sparse, and the studies did not appear to have high probability of

reporting bias (Table 6). The RCT evaluated the effect of the PHE on the receipt of mammography among community dwelling Medicare recipients who received reimbursement for the PHE compared to Medicare recipients receiving usual care. While this study was limited in its generalizability to other ambulatory populations, it was specifically designed to evaluate the effect of the PHE on receipt of clinical preventive services and therefore directly addressed Key Question 2. The other RCT studied the effectiveness of a computerized touch screen system employed in primary care practices to improve rates of preventive screening. While the study compared patients seen in primary care practices randomized to employ the touch screen system versus patients seen in practices not employing the touch screen system, they performed a retrospective chart review to assess whether patients in the intervention and control groups had received a "health maintenance examination" during the past year. Thus, for the purposes of our analyses, this study was analyzed as a retrospective cohort study (of persons exposed versus not exposed to the health maintenance examination) without regard to the study's randomized intervention. While this was a study of adult patients of all ages being seen in representative primary care practices, it was not designed to directly address Key Question 2 (Tables 2, 6 and 7).

Randomized controlled trials. The RCT studied 455 Medicare recipients for 24 months beginning in 1988.[55] This study was a Medicare demonstration project in which the PHE was delivered in the context of a "preventive care package" in which patients received clinical preventive services including annual history and physical on at least an annual basis, delivered by both a nurse and a physician. The comparison group received clinical preventive services as customarily offered in their physicians practices.[55] In this study, receipt of the PHE improved delivery/receipt of mammography with a small positive effect size (Cohen's d (95% CI): 0.14(0.12,0.16) (Tables 2 and 7, Evidence Table 6 a).[55] Inferences from this study are potentially limited to non-Medicare populations.

Observational studies. Observational studies evaluating the delivery/receipt of mammography included one RCT analyzed as a retrospective cohort study, eight cross-sectional studies, and two observational study with pre-post design performed from 1988-1998. Study populations included patients seen in community practices who interacted (or did not interact) with a touch-sensitive computer system placed in primary care practices to promote the delivery of preventive services,[65] respondents to a California telephone survey who were contacted to assess their access to preventive services and satisfaction with preventive services,[68] data from the National Ambulatory Medical Care and National Hospital Ambulatory Medical Care Surveys in which physicians completed forms describing reasons for ambulatory visits (including general medical visits or gynecological) and the receipt of preventive services,[64] female residents in Ontario, Canada who completed the National Population Health Survey reporting their use of annual examinations with answers linked to their use of services in a national health insurance plan,[67] a cross-sectional audit of outpatient billing claims for adults seen at least once by a primary care provider classified by visit type (visits for preventive care vs. acute care),[66] Mexican-American participants in a telephone and door-to-door survey designed to assess access to and use of ambulatory health care,[69] patients randomly selected from 44 ambulatory outpatient clinics who completed a survey to ascertain their receipt of preventive services in the context of "checkup physical examinations" versus other types of visits,[31] 93 physicians in an ambulatory practice network surveyed to recall the content of non-acute care visits with women age 40-75 years seen in their practices,[75] patients from randomly selected community practices agreeing to complete a questionnaire and medical record review to assess their receipt of a "periodic health

examination" and their receipt of recommended clinical preventive services,[70] patients in an ambulatory family practice residency clinic in which physicians participated in a quality improvement program to enhance the delivery of the "health maintenance examination" and clinical preventive services,[71] and family practice residents and faculty physicians using a practice-based teaching model to increase resident compliance with USPSTF guidelines.[72] The RCT analyzed as a retrospective cohort study, performed in 1998, reported mixed associations of the PHE with receipt of mammography. Seven cross-sectional studies reported a positive association of receipt the PHE with receipt of mammography, while one reported a negative association. Both pre-post studies reported no statistically significant effect of the PHE on improving mammography rate (Table 8, Evidence Tables 6b-d). Several limitations were noted among these observational studies including poor description of the study populations, inability to completely control for potential confounding in several of the studies, studies not specifically designed to answer Key Question 2, and the potential for recall bias in studies based on participant interviews/questionnaire responses (Table 2).

Proximal Clinical Outcomes

Disease Detection

Summary of findings. Three studies (including two RCTs and one observational study) assessed the association of receipt of the PHE with disease detection. The best available evidence to assess this outcome was comprised of two large RCTs, performed in 1967 and 1974, and it was deemed to be of "medium" quality based on standard criteria. The detection of all illnesses was treated as a single outcome. These studies reported the PHE had mixed effects on disease detection (increased disease detection in some cases, decreased detection in some cases, and no effect in some cases). While these studies were specifically designed to assess this outcome, they were both performed before the availability of USPSTF or similar contemporary clinical guidelines were in effect, thus inferences from these studies may be limited by dated approaches to the PHE.

Findings

Strength and limitations of the evidence. The best available evidence assessing this outcome, emanating from two large RCTs, received an overall grade of "medium." In grading the evidence, these studies were felt to have at least one serious limitation in quality and inconsistency in the direction of their results. However, they were not found to have sparse data or a high probability of reporting bias (Table 6). One study was performed community dwelling persons in South London, and one study was performed in Canadian patients age 40 to 65 years being seen in an academic teaching setting. Both of these studies were performed before USPSTF or similar contemporary preventive services guidelines were in effect. Thus, while they were specifically designed to evaluate the effect of the PHE on the detection of disease (and therefore directly addressed Key Question 2), inferences drawn from these studies could be limited by dated approaches to the PHE (Tables 2, 6 and 7).

Randomized controlled trials. One study, performed in 1967, was a large randomized controlled trial of nearly 7,000 community dwelling persons in South London who attended one of two group general practices. This study was designed to assess the value of introducing a general practice based screening service (compared to usual care) for persons age 40-64 and followed patients for nine years for the incidence of co-morbid illnesses, hospitalization or

mortality.[57,76] The general practice based screening service was described as a visit in which patients completed a "symptoms questionnaire" and occupational history followed by a physical examination performed by nurses (primarily, supervised by a physician) and several screening tests. In this study, the PHE was associated with increased detection of ischemia on an electrocardiogram (small positive effect-- (Cohen's d (95% CI): 0.03(0.02,0.03)), with decreased detection of angina and bronchitis symptoms (small negative effects--(Cohen's d (95% CI): -0.01(-0.01,-0.01) and -0.03 (-0.03,-0.03), respectively), and with no effect on the detection of increased diastolic blood pressure (Table 7, Evidence Table 7a). The second study, performed in 1974, identified Canadian patients age 40 to 65 years being seen by 112 physicians in an academic teaching setting and randomized patients (via physician) to a multiphasic screening program versus usual care. In the multiphasic screening program, patients were administered a "standard health questionnaire" followed by a physical examination and several screening tests. Patients were followed for twelve months for the development of co-morbid illnesses (referred to as "medical problems").[45] In this study, the PHE was associated with increased detection of "all medical problems" and "important medical problems" (defined as medical problems in which the physician caring for the patients would be likely to investigate further and provide advice regarding the condition and any necessary treatment) with medium to large effect sizes (Cohen's d (95% CI): 0.96(0.84,1.08) and 0.53 (0.41,0.64), respectively) (Table 7, Evidence Table 7a). Inferences from these studies are limited by their performance before USPSTF or similar contemporary guidelines were in place as well as potentially incomplete accounting for potential confounding of outcomes (Table 2).

Observational studies. The one observational study on the association of receipt of the PHE with disease detection was a retrospective cohort study of 240 employees of the Japan Maritime Self-Defense Force working on the Iwo Jima military defense base in December 1999. The study reported lower rates of hyperlipidemia and severe obesity among personnel receiving a pre-assignment medical examination (described as a medical examination followed by screening testing) one year prior to the study when compared to those not receiving a pre-assignment medical examination (Table 8, Evidence Table 7b). Limitations of this study included potential inability to completely control for potential confounding and the study's potentially limited generalizability beyond Japanese military populations (Table 2).[77]

Health Habits

Summary of findings. Five RCTs evaluated the effect of the PHE on patient health habits. The best available evidence to assess this outcome was comprised of five RCTs, performed from 1967 to 1989, and it was deemed to be of "medium" grade based on standard criteria. Changes in all health habits were treated as a single outcome. These studies demonstrated the PHE had mixed effects on patient health habits (improved health habits in some cases, worsened health habits in some cases, and no effect in some cases). While these studies were specifically designed to assess this outcome, one was performed before the availability of USPSTF or similar contemporary clinical guidelines were in effect, thus inferences from these studies may be limited by dated approaches to the PHE. Other studies were limited by their focus on Medicare enrollees or focus on participant living in the U.K. only. Health habits were assessed via self-report in all studies, thus results are potentially subject to recall bias.

Findings

Strength and limitations of the evidence. Five RCTs comprised the best evidence to assess this outcome, which received an overall grade of "medium." When grading the evidence, these

studies were felt to have at least one serious limitation in quality as well as important inconsistency in the direction of their results. However, they were not felt to have sparse data or high probability of reporting biased results (Table 6). Three studies funded as Medicare demonstration projects evaluated the effect of the PHE on patient behaviors among community dwelling Medicare recipients and members of a health maintenance organization who received reimbursement for the PHE, one study was a large randomized controlled trial of nearly 7,000 persons dwelling in South London who attended one of two group general practices, and one study was a study of patients seen in urban and suburban general practices in Bedfordshire, U.K. While the most notable limitations of these studies included their potentially limited generalizability to non-Medicare populations and persons living outside the U.K., as well as one study performed before USPSTF or similar contemporary guidelines, they were specifically designed to evaluate the effect of the PHE on health behaviors and therefore directly addressed Key Question 2. All behaviors were assessed via self-report in these studies, and could therefore have been subject to recall bias (Tables 2, 6 and 7).

Randomized controlled trials. In one study, performed in 1989 and funded as a Medicare demonstration project, participants in the intervention group received vouchers for free preventive visits to be delivered by participants' primary care physicians, in which the PHE was described as consisting of a history and physical examination followed by the provision of USPSTF recommended clinical preventive services. The comparison group received no coverage for annual preventive visits or tests. In this study, the PHE had mixed effects on patient behaviors. Behaviors were assessed via patient self-report at baseline and follow up. Patients receiving the PHE were statistically significantly more likely to decrease smoking when compared to those receiving usual care (small positive effect— (Cohen's d (95% CI): 0.13(0.11, 0.14)) but were less likely to improve problem drinking when compared to those receiving usual care (small negative effect— (Cohen's d (95% CI): -0.02(-0.03, -0.02)).[56,78] In a second study, a Medicare demonstration project published in 1993, subjects who were Medicare beneficiaries enrolled in a health maintenance organization were randomly assigned to receive a PHE in the setting of receiving selected clinical tests and immunizations, a health risk appraisal with individual counseling, and a series of health promotion sessions compared to usual care. Behaviors were assessed from patients' self reports. In this study, patients receiving the PHE demonstrated improvement in the number of fiber servings per day (small to medium positive effect— (Cohen's d (95% CI): 0.28(0.14, 0.42)), but there was no observed effect of the PHE on patients' fat servings per week, salt use, caffeine drinks per day, stretching minutes per weeks, or consumption of cruciferous foods.[54] In the third study, a Medicare demonstration project performed in 1993, the PHE was delivered in the context of a "preventive care package" in which patients received clinical preventive services including a health risk assessment, a health promotion visit (including health risk appraisals, positive behavior reinforcement and referrals for interventions where appropriate), disease prevention visit (visit with nurses and physicians who conducted history and physical examinations and reviewed patients' health risks), and follow up educational classes. The comparison group received clinical preventive services as customarily offered in their physicians practices. Behaviors were assessed via patients' self reports. In this study, receipt of the PHE was associated with improvement in physical activity (small positive effect--(Cohen's d (95% CI): 0.12(0.12, 0.12)), improvement in fat and fiber dietary intake (small positive effect—(Cohen's d (95% CI): 0.04 (0.04, 0.04)), use of advanced directives (medium positive effect—(Cohen's d (95% CI): 0.34 (0.34, 0.34)), breast self-examination (small positive effect—(Cohen's d (95% CI): 0.08 (0.08, 0.08)), smoking (small

positive effect—(Cohen's d (95% CI): 0.02 (0.02, 0.02)), and alcohol use (small positive effect—(Cohen's d (95% CI): 0.02 (0.02, 0.02)). This same study demonstrated the PHE was associated with a worsening in rates of seatbelt use (small negative effect—(Cohen's d (95% CI): -0.04 (-0.04, -0.04)).[53]The fourth study, performed in 1967, was a large randomized controlled trial of nearly 7,000 community dwelling persons in South London who attended one of two group general practices. This study was designed to assess the value of introducing a general practice based screening service (compared to usual care) for persons age 40-64 and followed patients for nine years for the incidence of co-morbid illnesses, hospitalization or mortality. The general practice based screening service was described as a visit in which patients completed a "symptoms questionnaire" and occupational history followed by a physical examination performed by nurses (primarily, supervised by a physician) and several screening tests. Behaviors were assessed via patients' self reports. In this study, receipt of the PHE was associated with worsening rates of smoking (small negative effect—(Cohen's d (95% CI): -0.014 (-0.012, -0.016)).[76] In the fifth study, performed in 1989 in five urban and suburban general practices in the UK, participants were randomly assigned to receive a "health check" (consisting of a comprehensive history and physical examination followed by several screening studies and post-visit health counseling) versus usual care. Behaviors were assessed via patient self-report. Patients were followed for two years after their initial intervention. In this study, the PHE was associated with improvements in smoking (small positive effect—(Cohen's d (95% CI): 0.10 (0.10, 0.10)), alcohol use (small positive effect—(Cohen's d (95% CI): 0.03 (0.03, 0.03)), exercise (small positive effect—(Cohen's d (95% CI): 0.09 (0.09, 0.09)), use of full cream (small positive effect—(Cohen's d (95% CI): 0.24 (0.24, 0.24)), and use of butter or hard margarine (small positive effect—(Cohen's d (95% CI): 0.25 (0.25, 0.25)) (Table 7, Evidence Table 8).[59] Limitations of these studies included inability to completely control for potential confounding and the study's potentially limited generalizability beyond Medicare populations and persons living in the UK. One study was performed before USPSTF or similar contemporary guidelines were in place as well as incomplete accounting for potential confounding of outcomes(Table 2).[76]

Patient Attitudes

Summary of findings. One RCT assessed the effect of the PHE on patient attitudes. This single study, performed in 1993, was deemed to comprise "medium" grade evidence, based on standard criteria. This study reported an improvement in patient worry with receipt of the PHE. While this study was specifically designed to assess the effect of the PHE on this outcome, inferences may be limited beyond non-Medicare populations.

Findings

Strength and limitations of the evidence. This one RCT comprised the best available evidence to assess this outcome, which received an overall grade of "medium." In assessing the evidence, the study was felt to have at least one serious limitation. Data on this outcome was also considered sparse (Table 6). The RCT was funded as Medicare demonstration projects evaluating the effect of the PHE on patient attitudes among Medicare recipients enrolled in a health maintenance organization who received reimbursement for the PHE (versus usual care). The most notable limitation of the RCT included potentially limited generalizability to non-Medicare populations. However, this study was specifically designed to evaluate the effect of the PHE on health behaviors and therefore directly addressed Key Question 2 (Tables 2, 6 and 7).

Randomized Controlled Trial. In this study, a Medicare demonstration project performed in 1993, the PHE was delivered in the context of a "preventive care package" in which patients received clinical preventive services including a health risk assessment, a health promotion visit (including health risk appraisals, positive behavior reinforcement and referrals for interventions where appropriate), disease prevention visit (visit with nurses and physicians who conducted history and physical examinations and reviewed patients' health risks), and follow up educational classes. The comparison group received clinical preventive services as customarily offered in their physicians practices.[53] Health worry was measured as part of the administration of the Quality of Well Being Scale. This study reported smaller increases in health worry at 24 months follow up (13% increase in baseline worry score) among persons receiving the PHE compared to persons receiving usual care (23% increase in baseline worry score at follow up) (Tables 2 and 7, Evidence Table 9). Inferences from this study are potentially limited to non-Medicare populations.

Health Status

Summary of findings. Two RCTs assessed the effect of receipt of the PHE on health status. The best available evidence to assess this outcome was comprised of these two studies, funded as Medicare demonstration projects and performed in 1989 and 1993, and it was deemed to be of "high" quality based on standard criteria. These studies reported the PHE had mixed effects on health status (both measured using the Quality of Well Being Scale, one study demonstrating health status declined less among persons receiving the PHE versus persons not receiving the PHE, one study demonstrating no effect). In the study demonstrating changes positive effect of the PHE at 2 years follow up, follow up of study participants to 4 years revealed the effect of the PHE two years after the study ended was not persistent (no differences between those receiving the PHE and those who did not receive the PHE). While these studies were designed to specifically assess this outcome, they were performed among Medicare recipients, and thus may be limited in generalizability beyond this select population. In addition one study was felt not to have accounted for potential confounding.

Findings

Strength and limitations of the evidence. The best available evidence was comprised of two RCTs, performed in 1989 and 1993. This evidence received a grade of "medium," as one study[53] was felt to have major limitations in quality. In addition, there was some inconsistency in the direction of results, however, there was not felt to be a high probability of reporting bias and data was felt to be adequate (Table 6). While these studies were designed to specifically assess this outcome, they were performed among Medicare recipients, and thus may be limited in generalizability beyond this select population. In addition one study was felt not to have accounted for potential confounding (Tables 2, 6 and 7).[53]

Randomized controlled trials. One RCT of a Medicare demonstration project provided a "preventive services package" for four years to the intervention group.[53] The "preventive services package" consisted of an annual health-risk assessment, health-promotion visit, disease-prevention visit and follow up classes. Health status was measured using the Quality of Well Being Scale. The study reported no differences in health status similar between intervention and control at 2 years follow up (-0.01 point change for persons receiving the PHE versus a 0.00 change for persons receiving usual care; effect sizes could not be calculated).The second study, funded as a Medicare demonstration project in which participants in the intervention group received vouchers for free preventive visits to be delivered by participants' primary care

physicians, the PHE was described as consisting of a history and physical examination followed by the provision of USPSTF recommended clinical preventive services. The comparison group received no coverage for annual preventive visits or tests. The study reported a small difference in the decline in health status as measured by the Quality of Well Being Scale between persons receiving the PHE (-0.0631 points over 2 years follow up) versus persons not receiving the PHE (-0.0832 points decline over 2 years follow up) (Table 7, Evidence Table 10).[79] However, investigators followed participants for 2 years after the study ended, to assess the persistence of the effect of the PHE. Investigators reported no differences in declines in health status between those receiving the PHE and those not receiving the PHE between 2 and 4 years after the study began.[80] These studies were limited by their focus on Medicare enrollees. In addition, one study did not account for potential residual confounding (Table 2).[53]

Blood Pressure

Summary of findings. Three studies (two RCTs and one observational study) assessed the association of receipt of the PHE with changes in blood pressure. The best available evidence, comprised of two RCTs performed from 1989 to 1992, were deemed to be of "high" grade based on standard criteria. These studies reported the PHE had mixed effects on blood pressure (consistent small improvements in blood pressure outcomes demonstrated in one study and mixed results in one study). While these studies were specifically designed to assess this outcome, their results may be limited in generalizability beyond Medicare beneficiaries and patients seen in general practices in the U.K. Results from one study may also be affected by inadequate adjustment for potential confounders.

Findings

Strength and limitations of the evidence. Two RCTs comprised the best evidence to assess this outcome, which received an overall grade of "high." When grading the evidence, the studies were found to have minor limitations in quality and some inconsistency. However, they were not felt to have sparse data or high probability of reporting bias (Table 6). One study was a study of patients seen in urban and suburban general practices in Bedfordshire, U.K. and one study was funded as a Medicare demonstration project to study community-dwelling Medicare recipients who were health maintenance organization enrollees. While these studies were designed to assess this outcome, they were potentially limited by their focus on patients receiving care in the UK and Medicare enrollees (Tables 2, 6 and 7).

Randomized Controlled Trials. In one study, a Medicare demonstration project performed in 1992, subjects who were Medicare beneficiaries enrolled in a health maintenance organization were randomly assigned to receive a PHE in the setting of receiving selected clinical tests and immunizations, a health risk appraisal with individual counseling, and a series of health promotion sessions compared to usual care. In this study, patients receiving the PHE demonstrated improvement in mean systolic blood pressure at 12 months follow up (small positive effect--Cohen's d (95% CI): 0.12(0.02, 0.21)), but there was no observed effect of the PHE on mean diastolic blood pressure at 12 months follow up (Cohen's d (95% CI): 0.03(-0.06, 0.13)).[54] In the second study, performed in 1989 in five urban and suburban general practices in the UK, participants were randomly assigned to receive a "health check" (consisting of a comprehensive history and physical examination followed by several screening studies and post-visit health counseling) versus usual care. Patients were followed for two years after their initial intervention. In this study, the PHE was associated with improvements in systolic blood pressure at follow up (small positive effect—(Cohen's d (95% CI): 0.11 (0.04, 0.18)), improvements in

diastolic blood pressure at follow up (small positive effect—(Cohen's d (95% CI): 0.13 (0.06, 0.19)), and improvement in the proportion of persons with diastolic blood pressure ≥100mmHg (small positive effect—(Cohen's d (95% CI): 0.022 (0.019, 0.24)) (Tables 2 and 7, Evidence Table 11a).[59]

Observational Studies. The one observational study on the association of receipt of the PHE with blood pressure was a retrospective cohort study of 240 employees of the Japan Maritime Self-Defense Force working on the Iwo Jima military defense base in December 1999. The study reported lower rates of hypertension among personnel receiving a pre-assignment medical examination (described as a medical examination followed by screening testing) one year prior to the study when compared to those not receiving a pre-assignment medical examination, but no statistically significant difference in absolute levels of blood pressure among all participants (Table 8, Evidence Table 11b). Limitations of this study included potential inability to completely control for confounding and the study's potentially limited generalizability beyond Japanese military populations (Table 2).[77]

Serum Cholesterol

Summary of findings. Two studies (one RCT and one observational study) evaluated the association of receipt of the PHE with changes in serum cholesterol. The best available evidence comprised of one RCT performed in 1989 and one retrospective cohort study performed in 1999 was deemed to be of "low" grade based on standard criteria. The RCT reported the PHE improved serum cholesterol, while the observational study reported mixed results. While these studies were specifically designed to assess this outcome, their results may be limited in generalizability beyond patients seen in general practices in the U.K and Japanese military recruits. Results from one study may also be affected by inadequate adjustment for potential confounders.

Findings

Strength and limitations of the evidence. One RCT and one observational study comprised the best available evidence to assess this outcome, which received and overall grade of "low." When grading the evidence, at least one of the studies was felt to have some serious limitations in quality. In addition, there was felt to be some inconsistency in the direction of results reported among the studies (Table 6). The studies were not felt to have sparse data or high probability of reporting bias, however. The RCT evaluated the effect of the PHE on cholesterol among patients seen in general practices in the U.K., while the retrospective cohort study identified differences in cholesterol among Iwo Jima military defense employees. The most notable limitations of these studies included their potential lack of generalizability beyond the populations studied (patients in the UK and Japanese military) as well as the potential inability to completely control for confounding in the observational study (Tables 2, 6 and 7).

Randomized controlled trial. In this study, performed in 1989 in five urban and suburban general practices in the UK, participants were randomly assigned to receive a "health check" (consisting of a comprehensive history and physical examination followed by several screening studies and post-visit health counseling) versus usual care. The PHE was associated with improvements in mean total cholesterol (small positive effect—(Cohen's d (95% CI): 0.22 (0.16, 0.19)) and the proportion of person with serum cholesterol ≥8mmol/L (small positive effect—(Cohen's d (95% CI): 0.09 (0.09, 0.10)) (Table 2 and 7, Evidence Table 12a).[59]

Observational study. The one observational study on the association of receipt of the PHE with serum cholesterol was a retrospective cohort study of 240 employees of the Japan Maritime

Self-Defense Force working on the Iwo Jima military defense base in December 1999. The study reported statistically significantly lower rates of hyperlipidemia among personnel receiving a pre-assignment medical examination (described as a medical examination followed by screening testing) one year prior to the study when compared to those not receiving a pre-assignment medical examination, statistically significantly greater absolute levels of total cholesterol among persons receiving the pre-assignment medical examination, and no difference in LDL cholesterol, triglycerides, or HDL among all participants (Table 8, Evidence Table 12b). Limitations of this study included potential inability to completely control for confounding and the study's potentially limited generalizability beyond Japanese military populations (Table 2).[77]

Body Mass Index

Summary of findings. Four studies (including three randomized controlled trials and one observational study) assessed the association of receipt of the PHE with BMI. The best available evidence to assess this outcome was comprised of three RCTs, performed from 1989 to 1993, and it was deemed to be of "medium" quality based on standard criteria. These studies reported the PHE had mixed effects on BMI (small improvements in BMI for persons receiving the PHE compared to usual care in one study, less improvement in BMI for persons receiving the PHE compared to usual care in one study, and no effect in one study). While these studies were specifically designed to assess this outcome, two were performed among community-dwelling Medicare recipients, and one was performed among persons seen in a general practice in the U.K. Thus inferences may be limited to these select populations.

Findings

Strength and limitations of the evidence. The best available evidence assessing this outcome, emanating from three large RCTs, received an overall grade of "medium." In grading the evidence, these studies were felt to have at least one serious limitation in quality and inconsistency in the direction of results. However, they were not felt to have sparse data or to have high probability of reporting bias (Table 6). Two studies, funded as Medicare demonstration projects, studied community dwelling Medicare recipients (in one study, participants were also health maintenance organization enrollees). The other study was performed among patients seen in general practices in the U.K. Thus, while they were specifically designed to assess this outcome, inferences could be limited to these populations. Two of the studies were felt to have potentially inadequate adjustment for residual confounding as well (Tables 2, 6 and 7).

Randomized controlled trials. Three randomized controlled trials performed from 1989 to 1993 studied Medicare recipients and patients attending one of 5 general practices in the UK (over 5000 patients combined total).[53,54,59] Follow up of patients ranged from two to three years. In one study, a Medicare demonstration project performed in 1993, the PHE was delivered in the context of a "preventive care package" in which patients received clinical preventive services including a health risk assessment, a health promotion visit (including health risk appraisals, positive behavior reinforcement and referrals for interventions where appropriate), disease prevention visit (visit with nurses and physicians who conducted history and physical examinations and reviewed patients' health risks), and follow up educational classes. The comparison group received clinical preventive services as customarily offered in their physicians practices.[53] Limitations of this study include potential lack of generalizability of results beyond Medicare populations as well as potentially inadequate adjustment for residual confounding. This study reported persons receiving usual care had greater improvements in BMI when compared to

their counterparts receiving the PHE (small negative effect--(Cohen's d (95% CI): -0.020 (-0.023, -0.017)) (Table 7, Evidence Table 13a). In the second study, a Medicare demonstration project published in 1993, subjects who were Medicare beneficiaries enrolled in a health maintenance organization were randomly assigned to receive a PHE in the setting of receiving selected clinical tests and immunizations, a health risk appraisal with individual counseling, and a series of health promotion sessions compared to usual care. In this study, the PHE had no effect on BMI at either 24 or 48 months of follow up.[54] Limitations of this study include potential lack of generalizability of results beyond Medicare health maintenance organization enrollees. In the third study, performed in 1989 in five urban and suburban general practices in the UK, participants were randomly assigned to receive a "health check" (consisting of a comprehensive history and physical examination followed by several screening studies and post-visit health counseling) versus usual care. Patients were followed for two years after their initial intervention. In this study, the PHE was associated with improvements in mean BMI at follow up (small positive effect—(Cohen's d (95% CI): 0.087 (0.022, 0.153)) as well as the proportion of persons with BMI≥30 at follow up (small positive effect—(Cohen's d (95% CI): 0.032 (0.030, 0.034)).[59] Limitations of this study include potential lack of generalizability of results beyond U.K. populations as well as potentially inadequate adjustment for residual confounding (Table 2).

Observational study. The one observational study on the association of receipt of the PHE with disease detection was a retrospective cohort study of 240 employees of the Japan Maritime Self-Defense Force working on the Iwo Jima military defense base in December 1999. The study reported no differences in mean BMI between groups but a significantly lower proportion of persons with BMI≥28.6 among personnel receiving a pre-assignment medical examination (described as a medical examination followed by screening testing) one year prior to the study when compared to those not receiving a pre-assignment medical examination (Table 8, Evidence Table 13b). Limitations of this study included potential inability to completely control for potential confounding and the study's potentially limited generalizability beyond Japanese military populations (Table 2).[77]

Distal Clinical and Economic Outcomes

Seven studies reported on mortality as a clinical outcome of delivery of the PHE, and nine studies reported on health care costs as an economic outcome of delivery of the PHE. Hospitalizations and disability may be considered both clinical and economic outcomes. Four studies reported on hospitalizations and three studies reported on disability as outcomes of delivery of the PHE (Table 8).

Costs

Summary of findings. Nine studies (including 5 RCTs and 4 observational studies) evaluated the association of receiving the PHE with health care costs. Cost outcomes assessed were varied and included annual physician visit costs, annual multiphasic health clinic costs, total health care charges, total Medicare charges, Medicare reimbursement, Medicare Part A charges, health care claims per capita, medical expenses per claim, inpatient cost per capita, outpatient cost per capita, and cost-effectiveness. All cost outcomes were considered as a single outcome. The best available evidence to assess this outcome was comprised of four large RCTs, one performed in the 1970's and three performed in the 1990s, and it was deemed to be

"medium" grade, based on standard criteria. In these studies, the PHE had mixed effects on health care costs (decreased costs in one study, increased costs in one study, no change in costs in two studies). While the RCTs were specifically designed to assess the effect of the PHE on this outcome, three of the RCTs were focused on Medicare recipients, and thus may be limited in their generalizability to other populations. The fourth RCT was performed before USPSTF or similar contemporary preventive service guidelines were in effect. A fifth RCT (assessing cost-effectiveness) was not incorporated when grading the evidence due to inability to assess direction of results.[6883] Observational studies of the association of receipt of the PHE with health care costs revealed both positive and negative results. Observational studies had a variety of limitations, including not reporting on differences between participants and non-participants, use of claims data not created for research purposes, results not generalizable beyond particular populations studied and potential for confounding.

Findings

Strength and limitations of the evidence. The best available evidence assessing this outcome, emanating from four large RCTs, received an overall grade of "medium." In grading the evidence, these studies were found to have serious limitations in quality, important inconsistency with regard to direction of effects, adequate data and a low probability of reporting bias (Table 6). Three studies evaluated the effect of the PHE on health care costs among community dwelling Medicare recipients who received reimbursement for the PHE compared to Medicare recipients receiving usual care. The fourth RCT was conducted in the Kaiser health care system in adults ages 35-54 years in the 1970s before contemporary clinical preventive guidelines were in effect. While the Medicare studies were limited in their generalizability to non-Medicare populations, and three of the studies did not report on blinding, they were specifically designed to evaluate the effect of the PHE on costs and therefore directly addressed Key Question 2 (Tables 2, 6 and 7).

Randomized controlled trials. Three randomized trials performed in 1988, 1989 and 1993 studied Medicare recipients (over 8000 patients combined total) as part of Medicare demonstration projects to determine if Medicare payment for preventive services resulted in better health and less acute care utilization.[53,55,56] Two Medicare studies had two-year interventions with either twelve or 24 month follow up of patients. In one study, the PHE was delivered in the context of a "preventive care package" in which patients received clinical preventive services including a history and physical at least annually. The comparison group received clinical preventive services as customarily offered in their physicians' practices.[55] In this study the PHE showed no effect on cumulative Medicare charges or Medicare reimbursements for the 2-year intervention and one year following (Cohen's d (95% CI)):0.06 (-0.03, 0.15) and 0.05(-0.04, 0.14)). A second Medicare demonstration study provided vouchers for participants in the intervention group for free preventive visits to be delivered by participants' primary care physicians.[56] In this study both total health care charges and monthly Medicare part A charges were lower for the intervention group (effect sizes could not be calculated) (Table 7, Evidence Table 14a). A third RCT of a Medicare demonstration project provided a "preventive services package" for four years to the intervention group.[53] The "preventive services package" consisted of an annual health-risk assessment, health-promotion visit, disease-prevention visit and follow up classes. The study reported the intervention group had a non-statistically significant increase in costs during year 2 and year 4 of the intervention than the control group; the change in costs from baseline to follow up appeared similar between intervention and control (effect sizes could not be calculated) (Table 7, Evidence Table 14a). The fourth RCT randomized

Kaiser Health Plan members ages 35-54 years in 1964 to either being encouraged to undergo an annual multiphasic health checkup or receiving usual care.[41] The multiphasic health checkup consisted of a series of laboratory and radiologic tests, self-administered history, and follow up physical exam by an internist. At both seven and eleven years of follow up, the intervention group had a small increase in cost for physician visits and for multiphasic health exam expenses compared to the control group (effect sizes could not be calculated) (Table 7, Evidence Table 14a). A fifth RCT conducted in England in 1989 evaluated the effectiveness of health checks delivered by nurses in primary care in reducing risk factors for cardiovascular disease and cancer and provides the only cost-effectiveness outcome in this report.[81] The health check consisted of medical history, physical exam, serum cholesterol and post-visit counseling. For participants who received a health check at both baseline and year 4 (intervention group) compared to participants who only received a health check at year 4 (control group), the cost per patient of a 1% reduction in coronary risk using Dundee risk scores was 1.46 British pounds. The cost effectiveness for men was 1.63 pounds and for women was 1.22 pounds. This study was not included in grading the strength and consistency of the evidence because of the inability to assess direction of the results. Limitations of these RCTs include limited generalizability to non-Medicare populations,[53,55,56] issues with blinding,[41,53,56] suboptimal adjustment for potential cofounders,[41] and one trial conducted before contemporary preventive service guidelines were in effect (Table 2).[41] Differences in costs could be attributed to differences in comorbid disease profiles or health habits between study groups in these studies as well, which was not well documented in most studies. Costs of the PHE were variably incorporated into findings regarding outcomes, limiting inferences from these studies.

Observational Studies. Observational studies evaluating the association between the receipt of the PHE and health care costs included three retrospective cohort studies and one cross-sectional study performed in 1956 to 1989 (Table 8, Evidence Tables 14b-c). Study populations for these studies included corporation executives or middle management exposed (or not exposed) to a PHE,[28,29,61] and a sample of Japanese adults in Osaka area 40 years and older covered by National Health Insurance who received (or did not receive) a PHE.[82] Three of these studies reported an association between receipt of the PHE and lower health care costs (positive outcome),[61,82] while one study showed association between receipt of the PHE and higher health care costs (negative outcome).[28] Limitations of these studies included lack of generalizability to non-management employees,[28,29,61] or non-Japanese populations,[82] suboptimal reporting of study population characteristics,[28,61] and comparison between participants and non-participants,[82] suboptimal adjustment for potential confounders,[28,61] and one study performed before contemporary preventive service guidelines in effect.[61] (Table 2) Selection bias must be considered for the employer studies where employees opted to have a physical exam or not to have a physical exam.[28,29,61]

Disability

Summary of findings. Three studies (including two RCTs and one observational study) evaluated the association of receiving the PHE with reduction in disability. Disability outcomes assessed included self-reported limitations in usual activities, self-reported "major disability" such as problems with dressing, and short-term disability days measured from employer records. All disability outcomes were considered as a single outcome. The best available evidence to assess this outcome was comprised of two large RCTs performed in the late 1960s and 1970s, and it was deemed to be "medium" grade based on standard criteria. In these studies, the PHE

had from small negative to small positive effects on reducing disability. While these RCTs were specifically designed to assess the effect of the PHE on this outcome, they were performed before the availability of the USPSTF or other contemporary preventive service guidelines and may be limited. The observational study was limited in external generalizability and raised concerns of selection bias.

Findings

Strength and limitations of the evidence. The best available evidence assessing this outcome, emanating from two large RCTs, received an overall grade of "medium." In grading the evidence, these studies were judged to have at least one serious limitation in quality and inconsistency in the direction of their results. However, they were not found to have sparse data or a high probability of reporting bias (Table 6). One study was performed in community dwelling persons in South London, and the other was performed in Kaiser Health plan enrollees ages 35-54 years. Both studies were performed before USPSTF or other similar clinical guidelines were available. Thus, while they were specifically designed to evaluate the effect of the PHE on disability and other outcomes, inferences drawn from these studies could be limited by dated approaches to the PHE. In addition, both studies had suboptimal reporting on blinding and suboptimal adjustment for potential confounding (Tables 2, 6 and 7).

Randomized Controlled Trials. One study, performed in 1967, was a large randomized controlled trial of nearly 7,000 community dwelling persons in South London who attended one of two group general practices. This study was designed to assess the value of introducing a general practice based screening service (compared to usual care) for persons ages 40-64 and followed patients for nine years for the incidence of illness, hospitalization, disability or death.[76] The general practice based screening service was described as a visit in which patients completed a "symptoms" questionnaire and occupational history followed by a physical examination performed by nurses (primarily, supervised by a physician) and several screening tests. In this study, the intervention group receiving the PHE reported increased major disability (e.g., inability to dress themselves) compared to the control group (small negative effect—(Cohen's d (95%CI) -0.014(-0.016, -0.012)) (Table 7, Evidence Table 15a). The second study, performed in 1964, randomized Kaiser Health Plan members ages 35-54 years to either being encouraged to undergo an annual multiphasic health checkup or receiving usual care.[41] The multiphasic health checkup consisted of a series of laboratory and radiologic tests, self-administered history, and follow up physical exam by an internist. At eleven years of follow up, the intervention group had an improvement in self-reported limitations in usual activities compared to the control group (small positive effect—Cohen's d (95%CI) 0.06(0.05-0.07) (Table 7, Evidence Table 15a). Inferences from these studies are limited by their performance before contemporary preventive service guidelines were in place, suboptimal reporting on blinding and suboptimal adjustment for potential confounding (Table 2).

Observational Studies. The one observational study on the association of receipt of the PHE with disability was a retrospective cohort study of 1773 executive employees at a bank in 1989.[29] Executives volunteering to receive an executive PHE were compared to those who chose not to receive a PHE. The study reported lower rates of mean short-term disability days per employee, total short-term disability days in three years and proportion of employees with short-term disability days for those receiving the PHE compared to those who did not receive the PHE (Evidence table 15b). Limitations of this study included selection bias due to employees choosing whether or not to have a physical exam and limited generalizability to non-management, non-employed populations (Tables 2, 8).

Hospitalization

Summary of findings. Four studies (including three RCTs and one observational study) evaluated the association of receiving the PHE with reduction in hospitalizations. Hospitalization outcomes included hospital days per person (and per 1000) and hospital admissions per person (and per 1000). All hospital outcomes were considered as a single outcome. The best available evidence to assess this outcome was comprised of three large RCTs performed in 1967, 1988 and 1989, and it was deemed to be "high" grade. In these studies, the PHE had from small positive to mixed results on reduction in hospitalizations. While these RCTs were specifically designed to assess the effect of the PHE on this outcome, two studies were performed in Medicare recipients and may have limited generalizability outside of this population. The third study, performed in community dwelling persons in South London, was conducted before USPSTF clinical guidelines were developed.

Findings

Strength and limitations of the evidence. The best available evidence for this outcome, derived from three large RCTs, received an overall grade of "high." In grading the evidence, the studies were judged to have minor limitations in quality, minor inconsistencies, no problems with imprecise or sparse data and not a high probability of reporting bias (Table 6). Two of the studies evaluated the effect of the PHE on hospitalizations among community dwelling Medicare recipients who received reimbursement for the PHE compared to Medicare recipients receiving usual care. Both of these have limited generalizability to non-Medicare populations. The study performed in South London is limited because it was conducted before contemporary preventive service guidelines were in effect. Two of the RCTs were limited also by suboptimal reporting of blinding (Tables 2, 6 and 7).

Randomized controlled trials. Two randomized trials performed in 1988 and 1989 studied Medicare recipients (over 6000 patients combined total) as part of Medicare demonstration projects to determine if Medicare payment for preventive services resulted in better health and less acute care utilization.[55,56] The Medicare studies had two-year interventions, one with twelve and one with 24 month follow up of patients. In one study, the PHE was delivered in the context of a "preventive care package" in which patients received clinical preventive services including a history and physical at least annually. The comparison group received clinical preventive services as customarily offered in their physicians' practices.[55] In this study the PHE showed no effect on hospital days for the 2-year intervention and one year following (Cohen's d (95% CI)):0.06 (-0.03, 0.15) and 0.05(-0.04, 0.14)). A second Medicare demonstration study provided vouchers for participants in the intervention group for free preventive visits to be delivered by participants' primary care physicians.[56] In this study, the PHE had mixed effects on hospitalizations. The intervention group receiving the vouchers for preventive visits had slightly higher mean inpatient days but lower hospital discharges per 1000 than the control group (effect sizes could not be calculated) (Table 7, Evidence Table 16a). The third study, performed in 1967, was a large randomized controlled trial of nearly 7,000 community dwelling persons in South London who attended one of two group general practices. This study was designed to assess the value of introducing a general practice based screening service (compared to usual care) for persons ages 40-64 and followed patients for nine years for the incidence of illness, hospitalization, disability or death.[76] The general practice based screening service was described as a visit in which patients completed a "symptoms" questionnaire and occupational history followed by a physical examination performed by nurses

(primarily, supervised by a physician) and several screening tests. In this study, the intervention group receiving the PHE had fewer hospitalizations per 1000 person-years at risk compared to the control group (small positive effect—(Cohen's d (95%CI) 0.01 (0.00, 0.01)) (Tables 2 and 7, Evidence Table 16a). Inferences from these studies are limited by lack of generalizability to non-Medicare populations,[55,56] performance before contemporary preventive service guidelines were in place,[76] suboptimal reporting on blinding[56,76] and suboptimal adjustment for potential confounding (Table 2).[76]

Observational studies. One observational study reported on the association between receipt of the PHE and hospitalizations. This cross-sectional study, performed in 1992, examined health care utilization for Japanese adults ages 40 years and older covered by the National Health Insurance Program and living in nine cities in the northern part of Osaka Prefecture. Health check-up rates were negatively correlated with both hospital admission rate per 1000 persons and a negative correlation with length of hospital stay of 180 days or more (Table 8, Evidence Table 16b). Limitations of this study include lack of generalizability outside Japan and suboptimal description of study population characteristics (Table 2). In addition, the analysis uses population-level variables (i.e., health check-up rates and hospitalization rates for the whole population) thus limiting ability to draw conclusions about any individuals.

Mortality

Summary of findings. Seven studies (including five RCTs and two observational studies) evaluated the association of receiving the PHE with mortality. The best available evidence to assess this outcome was comprised of five large RCTs performed from the 1960s to early 1990s, and it was deemed to be "medium" grade based on standard criteria. In these studies, the PHE had mixed effects on mortality. While these studies were designed to evaluate the effect of the PHE on this outcome, two were limited to the Medicare population and may not be generalizable to other groups. Three RCTs were performed in the 1960s before contemporary preventive services guidelines were developed. Observational studies limitations included generalizability to other populations, selection bias, and taking place before USPSTF guidelines were in effect.

Findings

Strength and limitations of the evidence. Five large RCTs comprised the best evidence to assess this outcome, which received an overall grade of "medium." When grading the evidence, these studies were judged to have at least one serious limitation in quality and important inconsistency, but not imprecise data or a high probability of reporting bias (Table 6). Two studies funded as Medicare demonstration projects evaluated the effect of the PHE on mortality among community dwelling Medicare recipients, one study was a trial of nearly 7,000 persons dwelling in London who attended one of two group general practices, one study was a trial of over 10,000 Kaiser Health Plan enrollees, and one study was a trial of over 32,000 Stockholm residents. While these studies were designed to evaluate the effect of the PHE on mortality, they were limited in their generalizability to non-Medicare populations and persons living outside the U.K. or Stockholm. In addition, inferences for the three studies performed in the 1960s may be limited by dated approaches to the PHE. Other limitations of these studies include suboptimal blinding. The long follow up time of some of the studies (up to 20 years) may make it difficult to ascertain a durable effect of a PHE or series of PHEs given many years earlier (Tables 2, 6 and 7).

Randomized controlled trials. Two randomized trials performed in 1989 and 1993 studied Medicare recipients (over 6500 patients combined total) as part of Medicare demonstration

projects to determine if Medicare payment for preventive services resulted in better health and less acute care utilization.[53,56] One Medicare demonstration study provided vouchers for participants in the intervention group for free preventive visits over two years to be delivered by participants' primary care physicians.[56] This study showed a reduction in overall mortality at the end of the two-year intervention period for those receiving the vouchers compared to usual care (small positive effect—(Cohen's d (95%CI) 0.06 (0.05, 0.06)) (Table 7, Evidence Table 17a). A second RCT of a Medicare demonstration project provided a "preventive services package" for four years to the intervention group.[53] The "preventive services package" consisted of an annual health-risk assessment, health-promotion visit, disease-prevention visit and follow up classes. The study reported the intervention group had an increase in mortality compared to controls (small negative effect—(Cohen's d -0.03 (-0.04, -0.03)) (Table 7, Evidence Table 17a). The third RCT randomized Kaiser Health Plan members ages 35-54 years in 1964 to either being encouraged to undergo an annual multiphasic health checkup or receiving usual care.[41] The multiphasic health checkup consisted of a series of laboratory and radiological tests, self-administered history, and follow up physical exam by an internist. At seven, eleven and 16 years of follow up, the intervention group receiving the PHE had a small decrease in mortality compared to the control group (small positive effect—Cohen's d (16 years) 0.0004 (0.0004, 0.0005) (Table 7, Evidence Table 17a). The fourth study, performed in 1967, was a large randomized controlled trial of nearly 7,000 community dwelling persons in South London who attended one of two group general practices. This study was designed to assess the value of introducing a general practice based screening service (compared to usual care) for persons ages 40-64 and followed patients for nine years for the incidence of illness, hospitalization, disability or death.[76] The general practice based screening service was described as a visit in which patients completed a "symptoms" questionnaire and occupational history followed by a physical examination performed by nurses (primarily, supervised by a physician) and several screening tests. In this study, the intervention group receiving the PHE had an increase in mortality per 1000 persons at risk compared to the control group (small negative effect—(Cohen's d (95%CI) -0.002 (0.000, 0.003)). The fifth RCT was conducted in Stockholm in 1969 to investigate the long-term effects of one "general health screening" on mortality.[58] In this large study of over 32,000 residents, 2,578 underwent the general health screening. The "general health screening" included social, psychiatric and medical interviews, blood tests, physical examinations, ECGs, exercise tests, psychological tests and eye and dental examinations. At 20 years of follow up, the relative risk of death was not significantly different in the intervention group receiving the PHE than the usual care control group (Relative Risk (95%CI) 1.03 (0.94, 1.14) (Table 7, Evidence Table 17a).

Limitations of these RCTs include limited generalizability to non-Medicare,[53,55] non-U.K.,[76] and non-Stockholm[58] populations. Issues with blinding,[41,53,56,58] and suboptimal adjustment for potential confounders,[58 41,53,76] also contributed to the limitations. Three trials were conducted before contemporary preventive service guidelines were in effect and may be limited to dated approaches to the PHE.[41,58,76] The long follow up time of some of the studies (up to 20 years) may make it difficult to ascertain a durable effect of a PHE or series of PHEs given many years earlier (Table 2).[41,58,76]

Observational studies. Two observational studies reported on the association of the PHE with mortality, one concurrent cohort study and one concurrent cohort study with a historical control. The first study compared over 20,000 employed men from 1950-1964, mostly in middle management positions, receiving at least one "periodic health examination."[62] The periodic

health examination included a health history, "thorough" physical examination, and laboratory, x-ray and electrocardiographic studies. The actual deaths for these men receiving the PHE compared to expected deaths from white, male managerial workers nationally during 1960 was 0.56. The second study was a concurrent cohort study of Taiwanese ages 65 years and older in Kaohsiung City during the time period 1993-1998 when free annual health examinations were offered.[83] The health examinations included a physical exam, urine, fecal occult blood, fasting lipids and glucose, electrocardiography and chest x-ray. A randomly selected sample of 1193 elderly residents was followed from 1993-1998 to determine if receipt of this annual health examination in the past year was associated with decreased mortality. The study reported that the relative risk of mortality was 0.50 (95% CI 0.36-0.69) for those receiving the health examination compared to those who did not (Table 8, Evidence Tables 17b-c). Both of these observational studies have limitations. First, because the PHEs were voluntary, it is possible that healthier persons would seek the PHE, making selection bias important to consider. In addition, one study took place decades before the USPSTF or other contemporary clinical preventive guidelines were in effect.[62] The other study may not be generalizable to those under age 65 or to non-Taiwanese residents (Table 2).[83]

Outcomes of Interest not Reported on in Eligible Studies

No studies reported on changes in patient knowledge of clinical guidelines or health care system use as a result of the PHE. Similarly, no studies reported on ways in which the PHE could affect patients' expectations regarding their care. While eligible studies reported on patients' changes in health habits, no studies reported on whether the PHE could affect patients' motivations to change, self-efficacy, or adherence to continuous care. Few studies (but no RCTs) reported on [59] glucose[77] and hearing and vision.[53] Finally, no studies reported on public health outcomes such family health or communicable disease containment.

Key Question 3: What is the Evidence that a PHE, Delivered at Different Patient Ages or Different Frequencies, Is Associated with Harms Compared to Care Without a PHE?

We identified no studies reporting on the delivery of non-recommended preventive services or the inducement of poor health outcomes as a result of the PHE. Evidence pertaining to costs induced by the PHE is discussed under Key Question 2.

Key Question 4: What System-based Interventions Improve the Receipt or Delivery of the PHE?

Summary of findings. Five studies (one RCT, one non-randomized controlled trial, and three observational studies) assessed the effect of various interventions to enhance the PHE. The best available evidence assessing this outcome, comprised of one RCT and one non-randomized controlled trial performed from 1990 to 1992, was deemed to be of "medium" grade based on standard criteria. In these studies, offering a scheduled PHE (versus an unscheduled open invitation to a PHE) and offering a free PHE (versus a PHE at small expense) had a medium to large positive effect on the receipt of the PHE. These studies were noted to be limited by their lack of detail in describing the PHE itself as well as potentially inadequate adjustment for residual confounding.

Findings

Strength and limitations of the evidence. The best available evidence, comprised of the RCT and non-RCT, received an overall grade of "medium." These studies were felt to have at least moderate limitations in quality, but no major inconsistency in the direction of results (Table 6).The RCT studied the effect of a scheduled invitation (versus an open invitation) on attendance at the PHE. The non-randomized controlled trial studied the effect of offering a free PHE on attendance of the PHE in two communities in Denmark. The most notable limitations of the RCT included poor classification of study withdrawals and potentially inadequate adjustment for residual confounding, while the most notable limitations of the non-randomized controlled trial included limited description of the PHE itself. However, these studies were specifically designed to evaluate the effect of interventions on receipt of the PHE and therefore directly addressed Key Question 4 (Tables 2, 6 and 7).

Randomized controlled trial. In this study, published in 1992, patients of a general practice in the U.K. received either an invitation for a scheduled health check versus an open invitation for a health check. The health check consisted of a history and physical examination performed by a nurse, followed by the generation of a personalized letter summarizing results and providing personalized advice regarding health changes. This study reported a medium to large effect positive effect of the scheduled appointments on receipt of the PHE (Cohen's d (95% CI): 0.69 (0.68, 0.70)) (Tables 2 and 7, Evidence Table 18a).[60]

Observational studies. The non-randomized controlled trial, performed in 1990, studied the effect of offering a free PHE versus offering a PHE costing 40 Danish Krone (converts to six US dollars in 2006) in two similar communities in Denmark. This study reported a medium to large positive effect of offering a free PHE versus the PHE with minimal expense (Cohen's d (95% CI): 0.61 (0.60, 0.61)).[84] Three other observational studies (two cross-sectional studies and one study with pre-post design) studied adults aged 18 to 64 from the Centers for Disease Control's 1991 Behavioral Risk Factor Surveillance System to assess the association of health insurance coverage with the receipt of preventive services,[22] employed individuals who had health insurance (indemnity health insurance plan versus prepaid group health insurance) responding to household survey regarding their receipt of clinical preventive services in the past year,[63] and patients in an ambulatory family practice residency clinic in which physicians participated in a quality improvement program to enhance the delivery of the "health maintenance examination" and clinical preventive services.[71] In this study, patients received written materials and reminder phone calls to enhance their receipt of the PHE.[71] In the study of the BRFSS data, persons receiving more health plan coverage for preventive services were more likely to receive the

PHE.[22] In contrast, the study comparing employees with indemnity health insurance plans versus prepaid group health insurance found no difference in rates of receipt of the PHE.[63] The observational study with pre-post design demonstrated a significant increase in receipt of the PHE after institution of written materials and reminder phone calls (Table 8, Evidence Table 18b-c).

Chapter 4: Discussion

Summary of Main Findings

Key Question 1. What Definitions are Used for the Adult PHE in Studies of its Value?

Two central elements used to define the PHE were a) the clinical history and risk assessment of patients, and b) the performance of a physical examination. However, the specific composition of these central elements of the PHE varied among studies. For history and risk assessment, the most frequently cited types of history and risk assessment performed were assessment of dietary risk, alcohol and substance abuse risk, tobacco smoking risk, and physical activity. In most cases, the physical examination was referred to with no specific clarification of what components were included. When specific components of the physical examination were specified, the most frequently cited components were assessment of blood pressure, assessment of weight, assessment of height, breast examination, gynecological examination, and rectal examination.

Key Question 2. What is the Evidence that a PHE, Delivered at Different Patient Ages or Different Frequencies, is Associated with Benefits Compared to Care Without a PHE?

A summary of study designs assessing outcomes, the strength of the best available evidence assessing each outcomes and the direction of the evidence pertaining to each outcome is contained in Table 9.

Delivery/receipt of clinical preventive services. Among the best available evidence, the PHE consistently improved the delivery/receipt of the gynecological examination/Pap smear, cholesterol screening, and fecal occult blood testing. The strength and consistency of evidence for these outcomes ranged from “medium” (cholesterol screening) to “high” (gynecological examination/Pap smear and fecal occult blood testing). Effects of the PHE were mixed among studies assessing the delivery/receipt of preventive counseling, immunizations, and mammography). The strength and consistency of the evidence regarding these outcomes ranged from “low” (mammography and counseling) to “medium” (immunizations).

Proximal clinical outcomes. One study assessing patient attitudes reported the PHE had a positive effect on patient “worry.” The strength and consistency of the evidence from this study was graded as “medium.” Among the best available evidence, the PHE had mixed effects on disease detection, health habits, blood pressure, serum cholesterol, and BMI. The strength and consistency of the evidence assessing these outcomes ranged from “low” (serum cholesterol) to “medium” (disease detection, health habits, health status, blood pressure, and BMI).

Distal clinical and economic outcomes. Among the best available evidence, the PHE had mixed effects on costs, disability, hospitalization, and mortality. The strength and consistency of the evidence ranged from “medium” (costs, disability, mortality) to “high” (hospitalization).

Key Question 3. What is the Evidence That a PHE, Delivered at Different Patient Ages or Different Frequencies, is Associated With Harms Compared to Care Without a PHE?

We identified no studies focused on the delivery of non-recommended preventive services or the inducement of poor health outcomes as a result of the PHE.

Key Question 4. What System-based Interventions Improve the Receipt or Delivery of the PHE?

Among the best available evidence, two interventions (scheduling of appointment for the PHE and offering a free PHE) improved delivery of the PHE with medium to large positive effects. The strength and consistency of the evidence assessing this outcome was "medium."

Limitations

Limitations of the literature studied and this review deserve mention. First, we used comparative studies of the effect of the PHE on clinical outcomes to assess the ways in which the PHE is defined. Given that the studies did not set out to define the PHE themselves, this may represent a suboptimal approach. It is possible qualitative assessment of definitions of the PHE obtained through interviews of health care providers or patients with a vested interest in the PHE would reveal perceptions regarding the nature of the PHE that are different from our findings. Second, there were few large-scale randomized controlled trials assessing the effect of the PHE on the receipt of clinical preventive services and outcomes. The largest trials to directly assess the effect of the PHE on clinical outcomes were performed in Medicare demonstration projects in the late 1980's and 1990's, among Kaiser enrollees in the early 1960s, and among residents Southeast London in the late 1960s. Thus, inferences are limited not only to these select populations but are also limited by differences in the timeframe of the studies. Studies performed prior to the first USPSTF guidelines in 1989 were less likely to incorporate clinical preventive services that are most frequently used today and may have implemented clinical preventive services in a way that would be considered inappropriate today, further limiting the generalizability of their results. Despite this limitation, we included these studies in the review because we felt they could provide information regarding benefits of the PHE which might not be explicitly linked to the delivery of currently recommended clinical preventive services. Results of studies performed before 1980 largely mirrored results of more recent studies or yielded neutral results (in the case of long-term outcomes such as mortality). Thus, we do not feel their inclusion substantially altered our main conclusions. While we incorporated observational studies in our review in an attempt to observe effects of the PHE across a variety of clinical settings and in various patient populations as well as to include more recent studies, these studies were often limited by their design (many studies were not specifically designed to assess the effect of the PHE on the receipt of clinical preventive services or clinical outcomes) or their inability to completely account for potential confounding of results.

Heterogeneity in the definitions of the PHE incorporated by studies pose a particularly important limitation in this review. Although we developed a standard definition of the PHE for

identification of the PHE in studies, we found substantial differences in the composition of the PHE across studies as well as substantial variation in the degree to which different studies also incorporated interventions to enhance the delivery of the PHE itself (such as patient reminders or physician prompts regarding PHE attendance). This heterogeneity could result in variation in the magnitude and direction of studies' results and hinders drawing broad conclusions regarding the effect of the PHE on a variety of outcomes. For instance, many studies (such as the Medicare demonstration trials) bundled the PHE with other forms of structured counseling (such as nurse-led educational classes). While we attributed changes in outcomes to the PHE delivered in different forms, it is possible changes in outcomes were related to the structured programs themselves and not the PHE. This concern may be particularly relevant when considering studies evaluating the effect of the PHE on patient behaviors, which may be greatly impacted by multifaceted interventions.[48] It is possible findings of positive behavior change associated with the PHE could be attributed to interventions delivered in conjunction with the PHE and not the PHE itself. In addition, many studies contained incomplete descriptions of the PHE, making it difficult to ascertain which components of the evaluation contributed most to observed effects of the PHE. It is unclear how well the PHE employed in these studies reflects the PHE as practiced in real-world settings. The PHE was also delivered by various personnel in these studies, further complicating the interpretation of findings. Many studies identified the PHE as an intervention led by nurses or nurse-practitioners while other identified the PHE as involving physician interaction. In some cases, it was unclear if studies intended to assess the feasibility of performing the PHE without substantial physician involvement. If nurse and physician approaches to the PHE are different (particularly in their approaches to counseling or the performance of diagnostic testing), inferences regarding the effect of the PHE could be influenced by these differences. Finally, many studies included an invitation to the PHE as part of the intervention, however, adherence or uptake of the PHE among study subjects was variably achieved. In addition, people attending the PHE may be more healthy than non-participants. The power to detect differences between the intervention group and persons receiving usual care would be limited if studies failed to achieve a meaningful separation in rates of receipt of the PHE between study groups or if participants had low risk of developing outcomes (such as death). Most RCTs did report moderate to high rates of PHE attendance.

Outcomes in some categories were heterogeneous (e.g., the effect of the PHE on several types of counseling was reported across studies), limiting our ability to draw definitive conclusions regarding the effect of the PHE on many outcomes. In some cases, the assessment of outcomes could be biased by their measurement. For example, many studies assessing the effect of the PHE on behavior change assessed behaviors from patient–self report. Measurement of behavior change in this manner could be strongly biased by patient recall. Further, there was little evidence to address the effect of the PHE on many meaningful intermediate outcomes. For example, few studies assessed the effect of the PHE on blood glucose control, diabetes management, or control of other common risk factors. Similarly, while some studies reported on disability, few studies were performed to measure potential enhancements of worker productivity in association with receipt of the PHE. Evidence regarding the cost-effectiveness of the PHE was similarly sparse. As many studies captured direct costs of care associated with the PHE, few captured indirect costs, and we found only one study directly assessing both the costs and effectiveness of the PHE. In addition, many of our outcomes were reported among a few RCTs. The effect of an individual study's design on the direction of multiple outcomes measured within that study could be substantial. This is important, given the heterogeneity of interventions among

our studies—it is possible the benefit of the PHE could be overestimated if multiple positive outcomes are reported among a select few studies. Studies reporting on multiple studies may also be limited by lack of power to assess some outcomes, potentially contributing to the reporting of neutral results.

Many studies described the PHE being compared to "usual care" with little or no description of the nature of usual care. This limitation reflects not only lack of specificity within the studies, but a lack of clarity in clinical practice regarding what constitutes "usual care." Usual care could vary widely, depending on the system of care which is being examined, and could include the delivery of preventive services at specific intervals during short visits or systems which provide reminders to perform prevention at acute visits. Lack of specificity in identifying the components of usual care could significantly affect outcomes, particularly if some preventive services are delivered as a part of usual care.

Limitations in studies assessing the long-term outcomes associated with receipt of the PHE deserve special attention. While assessment of the PHE's effects on long-term outcomes such as hospitalization or death is desirable, the feasibility of isolating the effect of the PHE on these long-term outcomes is unclear, especially given the periodic nature of the PHE and given multiple other episodes of patient care that typically occur outside of the PHE. It is possible that, although patients receive a PHE at baseline, the effect of other episodes of care (such as management of chronic illnesses detected before or after the PHE) have a more powerful effect on long-term outcomes than the PHE itself. It is also possible that the receipt of more frequent PHEs results in improved outcomes over a single PHE, particularly for persons with chronic illnesses who might require more than one visit to adequately address their prevention needs. While many studies evaluated the institution of a PHE for one to two years, others evaluated the effect of a single PHE. It is possible differences in outcomes could be attributed to differences in the intensity of the PHE or the frequency with which patients received the PHE in different studies. It is also possible differences in outcomes could be related to differences in the burden of comorbid illnesses among participants of different studies.

Our review is also subject to potential publication bias, in that investigators may have been more likely to publish articles reporting the PHE improved outcomes. A lack of enough RCTs assessing the effect of the PHE on several outcomes prohibited a formal analysis of publication bias, however. In addition, all articles reported on benefits of the PHE and none specifically studied the inducement of harms associated with the PHE. Lack of evidence on harms may reflect not only difficulty in collecting this information for some outcomes but also a bias on the part of researchers toward publicizing the benefits of the PHE. While the inclusion of observational studies in this review allowed for the ascertainment of the effect of the PHE across a more broad group of populations than did the RCTs alone, these studies are more subject to residual confounding of results that were incompletely accounted for in analyses, potentially enhancing the probability of positive findings.

Finally, we assigned grades regarding the strength and consistency of the evidence pertaining to each outcome in an effort to provide readers with information regarding the confidence with which inferences regarding summary results can be drawn. However, one tenet of the GRADE framework we used to guide our assessments is that the RCT represents the highest level of evidence to assess any one outcome. While we agree the RCT represents the 'gold standard' approach to assessing the effect of interventions in while minimizing sources of bias and unobserved confounding, institution of the RCT to assess system-level interventions may not

always be feasible. Thus, it is possible our grade of evidence pertaining to studies of system interventions to improve the receipt of the PHE (Key Question 4) is artificially low.

Recommendations for Future Research

While the available evidence reports on the effect of the PHE on the delivery/receipt of some clinical preventive services, it does not report on the effect of the PHE on the delivery of recommended versus non-recommended clinical services. Similarly, little evidence is available to discern the effect of the PHE on clinical harms (e.g., potential increase in patient complications from inappropriate testing). Studies specifically designed to assess whether the PHE could encourage delivery of inappropriate clinical preventive services or enhance the potential for harms inflicted on patients as a result of such inappropriate care could shed important light on ways in which the PHE should best be implemented.

Little evidence is available to ascertain whether the PHE improves intermediate clinical outcomes such as disease management (e.g., blood pressure or glucose control) or changes in worker productivity. The evidence is also sparse with regard to the PHE's effect on the incidence of clinical morbidity (e.g., cardiovascular disease, cancer). In addition, many studies evaluating proximal clinical outcomes followed patients for short time periods, which may not have provided ample enough opportunity to capture long-term changes in proximal clinical outcomes. While the best available evidence is largely neutral with regard to the effect of the PHE on mortality, it is possible the PHE could have an effect on more proximal outcomes, thus potentially leading to improvements in patients' quality of life. Work to elucidate the magnitude and duration of effects of the PHE on more proximal clinical outcomes, including potential enhancements in worker productivity may also help clarify the potential role of the PHE in affecting health care utilization and costs.

Studies reporting on the effect of the PHE on costs of health care reported primarily on direct costs of clinical care, with little focus on the effect of the PHE on indirect health care costs (e.g., potential cost savings associated with less time lost due to premature morbidity, mortality and illness) or the cost-effectiveness of the PHE. Work more fully elucidating the effect of the PHE on both direct and indirect costs may help health care practitioners and policy makers assess the economic value of the PHE more effectively. Cost effectiveness models are needed to more fully understand the complex interplay of induced costs associated with preventive services offered as a result of the PHE as well as reduced costs associated with potentially improved management of chronic illnesses and potential improvements in quality of life which could occur as a result of the PHE.

Although some studies reported on the effect of the PHE on patient health habits, we identified no studies reporting on whether the PHE could affect patients' motivations to change, self-efficacy, or adherence to continuous care. Work to elucidate the PHE's effect in these areas would help to clarify mechanisms through which the PHE could improve both proximal and distal clinical outcomes.

While some evidence is available regarding the effect of the PHE on patient attitudes, we found no evidence regarding the potential effect of the PHE on patient knowledge of clinical guidelines, health care system use, or the patient-physician relationship. As consumer-driven health care is increasingly touted as a mechanism through which health care costs could be contained and greater patient satisfaction could be achieved, research to identify the effects of

the PHE on patient knowledge and health care system use could prove valuable.[85,86] In addition, the patient-physician relationship is increasingly reported as important in affecting patient satisfaction, adherence to clinical recommendations, and receipt of appropriate clinical care.[87-89] Work to determine whether the PHE enhances or detracts from the quality of the patient-physician relationship could be very important in guiding future clinical practice.

The available evidence does not address whether the implementation of preventive services in the context of the PHE results in improved public health outcomes such as communicable disease containment or improvements in family health. Such outcomes represent the potential for broad societal benefit of the PHE's strong focus on risk assessment and disease prevention. While studies of these outcomes may be difficult to perform, work employing modeling techniques to estimate the potential benefits or harms of the PHE for society could prove fruitful for health care policy makers and public health practitioners.

In addition, the evidence did not address in a systematic way the frequency and intensity of the PHE required to achieve potential improvements in clinical outcomes, nor did it assess ways in which the content of the PHE should change for persons of different age groups. Work is needed to ascertain the effects of both the frequency of the PHE (as opposed to a single visit) on outcomes as well as whether tailoring the PHE for persons at different levels of risk would be beneficial. Few studies addressed the persistence of the effect of the PHE, which may be short-lived, particularly if it is delivered only once. It is also unclear if the effect of the PHE would change based on the type of clinician delivering the PHE (i.e., physicians versus nurses or physicians of different clinical specialties) and the resources available to clinicians implementing the PHE. The potential role of the electronic health record in enhancing the delivery of the PHE could provide insight to mechanisms through which the PHE might be delivered more efficiently.

Finally, a paucity of studies evaluated interventions to improve the receipt of the PHE. Performance of additional, well-designed studies is needed to strengthen the evidence for or against such interventions.

Conclusions

The best available evidence suggests delivery of recommended clinical preventive services, patient attitudes, and patient health status are improved by the PHE and may be more directly affected by the PHE than other proximal clinical outcomes or long-term financial and clinical outcomes. Given that it may be impossible to entirely isolate the effect of receipt of the PHE on intermediate clinical outcomes which require ongoing management such as blood pressure or long-term outcomes such as mortality, studies linking the PHE with improved delivery of recommended clinical services may provide the best evidence of its value. Since appropriate implementation of currently recommended clinical preventive services has been demonstrated to improve health in evidence which provides the basis for USPSTF recommendations, findings of increased delivery of preventive services in the setting of the PHE may provide adequate justification for implementation of the PHE. Indeed, if the PHE, instituted in some standard fashion, could be consistently demonstrated to improve the delivery of several recommended clinical preventive services across a variety of settings, the value of the PHE might be substantial. This hypothesis assumes, however, that combining multiple evidence-based preventive services in the context of the PHE has additive benefits and that delivery of the same preventive services during other types of office visits (e.g., visits for management of chronic

illnesses) would not be as beneficial. While achieving consistency in the definition and delivery of the PHE stands as an important remaining challenge, efforts to clarify the underlying long term benefits (or harms) of receiving multiple clinical preventive services in the context of the PHE versus other types of ambulatory care visits are needed to fully clarify the PHE's value.

Mechanisms through which improvements in care attributed to the PHE occur are unclear, as studies were so heterogeneous in terms of the content of the PHE and their institution of additional interventions to enhance delivery of the PHE as to prohibit formal analysis in this regard. The PHE may provide clinicians, who are routinely pressured to deliver care in short intervals of time, time to consider preventive care more fully, thus leading to their institution of preventive measures more frequently. Given the heterogeneity of studies, it is unclear if differences in the effect of the PHE on the delivery of different preventive services represents differences in studies reporting on different preventive services, or if differences are related to the preventive services themselves. It is possible the PHE has a stronger effect in improving the delivery of preventive services which are performed by clinicians at the time of the office visit (such as gynecological examinations/Pap smears or fecal occult blood testing) when compared to preventive services which require patients to schedule appointments outside of the initial office visit for the PHE (such as mammography).

Improvements in patient worry (one study) and health status (one study) associated with the PHE may provide insight to reasons patients and clinicians have persisted in implementing the PHE despite evidence to conclusively support its use as well as why the PHE may be associated with enhanced delivery of clinical preventive services. Elimination of worry or concern regarding possibly undetected illnesses or prevention of illnesses which has not yet occurred may represent a powerful motivator for action on the part of patients. The PHE, in providing an opportunity for both patients and physicians to contemplate potential risks, may provide a vehicle through which worries can be more fully elucidated from patients and addressed through completion of the evaluation. Evidence reflecting improvement in self reported health status may reflect the provision of time for physicians to consider patients' needs in greater entirety and may allow physicians to address less frequently assessed aspects of health (e.g., depression and functional status).

Several unanswered questions remain regarding the circumstances under which the PHE may provide the most benefit. Studies are needed to ascertain the frequency and intensity of the PHE needed to consistently improve outcomes (with study of precisely which components of the PHE are necessary), the patient populations that could benefit most from the PHE, and systems of care in which the PHE might be best delivered. Work is also needed to more adequately assess the potential benefit of the PHE on patient attitudes and patient health status as well as to assess whether the PHE could encourage the delivery of inappropriate clinical services or inflict harm on patients. Work to ascertain mechanisms for differential effects of the PHE on delivery of different clinical preventive services, to identify whether the PHE consistently improves intermediate clinical outcomes, to characterize the effect of the PHE on the patient-physician relationship, and to assess the effect of the PHE on broad societal outcomes such as disease containment will contribute greatly to knowledge regarding the value of the PHE.

The design of future studies to more completely assess the value of the PHE as it is currently delivered will require careful attention. While observational studies leave open the possibility for inadequate adjustment for potential confounding or bias in findings, larger randomized controlled trials should incorporate study populations which are generalizable to the majority of patients seeking health care in the U.S., including persons of a variety of ages, women, persons

of diverse ethnicity and race, and persons utilizing different health plans. In addition, such studies should seek to carefully and clearly define systems of “usual care” with which the PHE is to be compared, to measure the degree to which both intervention and comparison groups comply with assignments to receive the PHE, and to capture outcomes in a standardized way. Large scale trials could be costly and may be unable to adequately capture long-term effects of the PHE on outcomes such as costs and mortality, as these outcomes could be influenced by multiple factors, including the degree to which individuals seek health care for other reasons such as the management of chronic illnesses. For this reason, the development of computerized models (incorporating evidence identified in this review, evidence from future studies, and existing evidence regarding the long-term value of preventive services delivered in the context of the PHE) to simulate trajectories of quality of life, the development of morbidity and mortality as well as direct and indirect costs incurred or saved as a result of the PHE could be most helpful in clarifying the value of the PHE.

Figure 1. Conceptual Framework

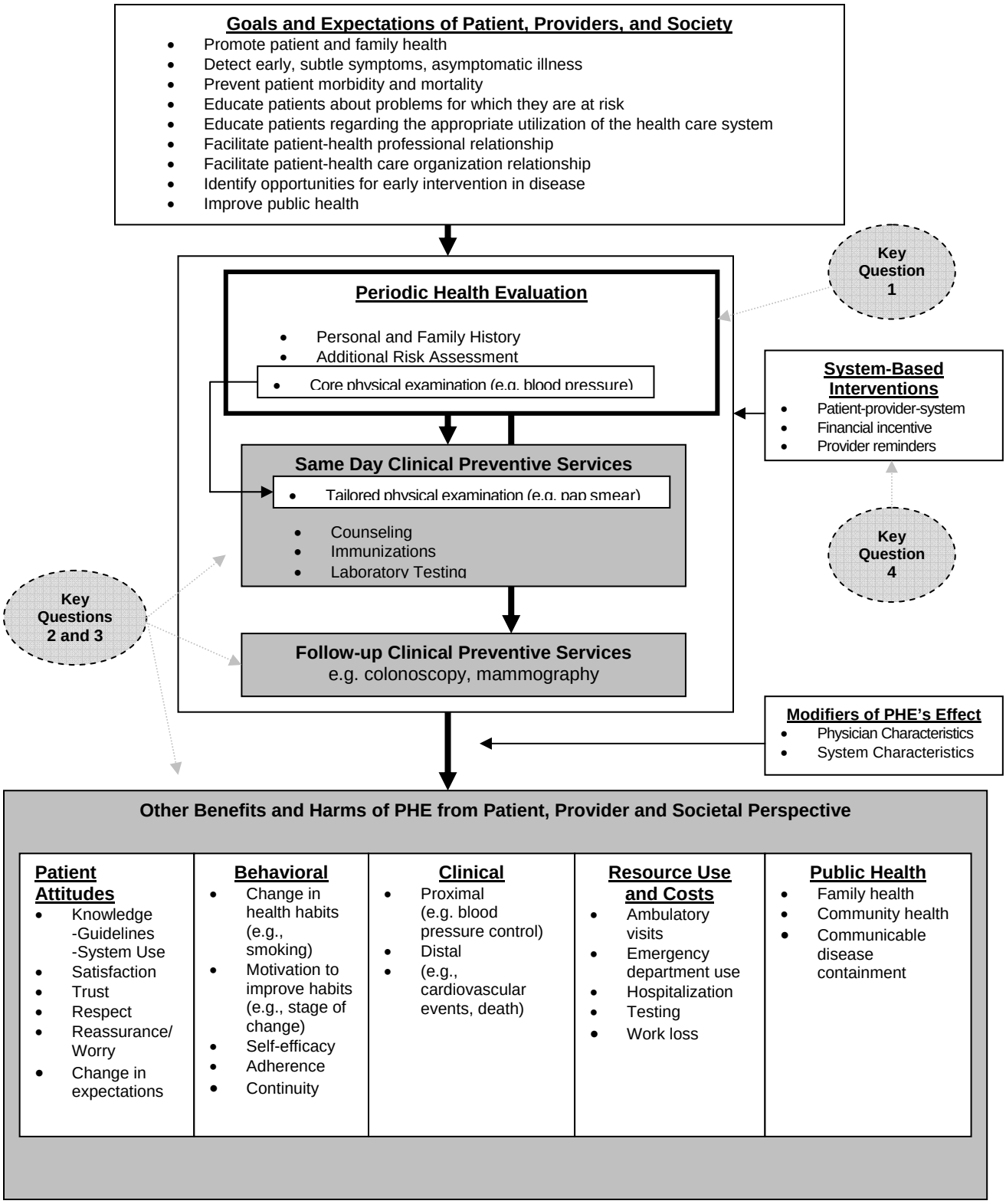
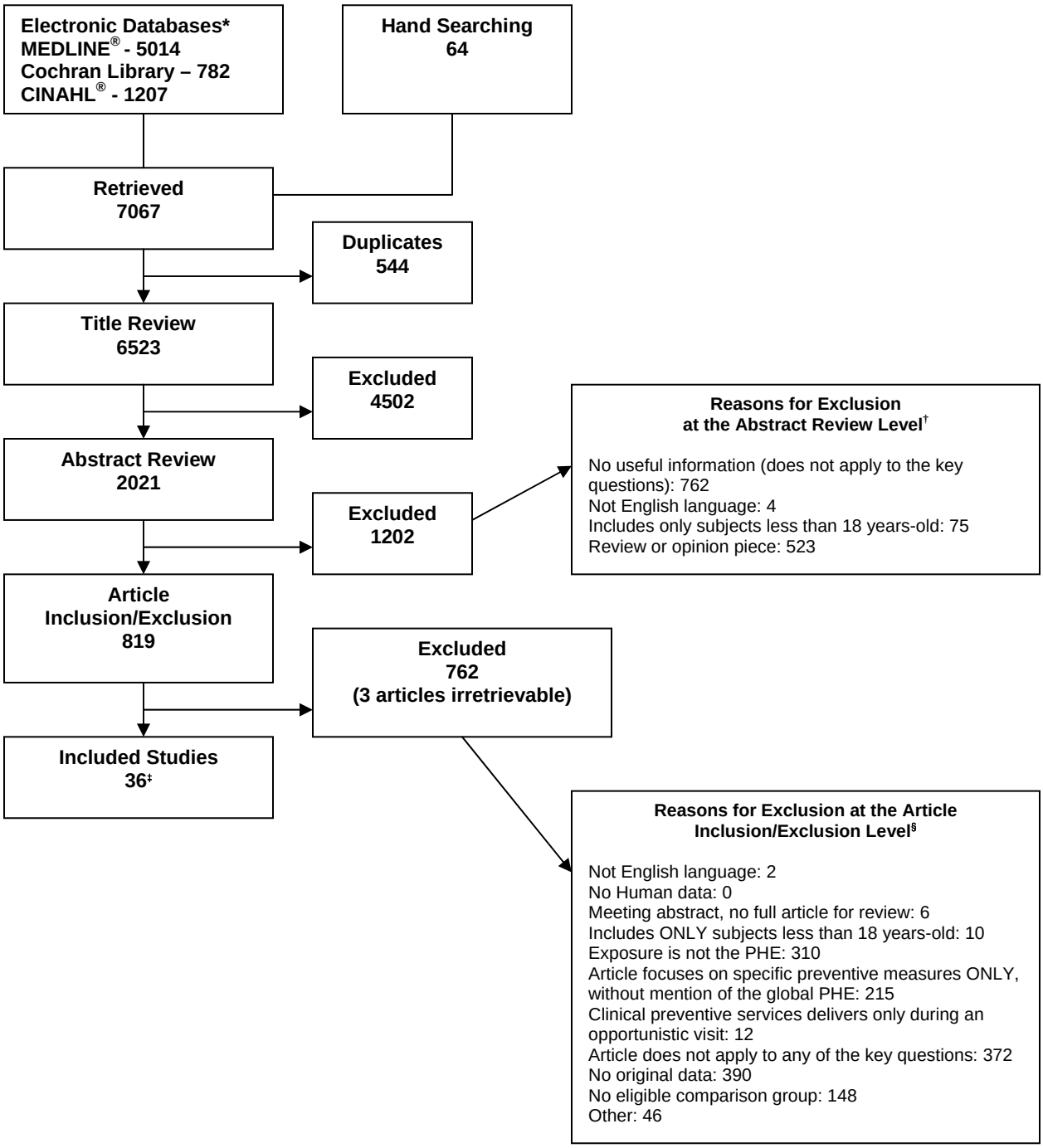


Figure 2. Summary of literature search and review process (number of articles).



* CINAHL® - Cumulative Index of Nursing and Alliance Health Literature.
† Total may exceed 1202, multiple reasons for exclusion at the Abstract Review level were allowed.
‡ A total of 54 articles were included in the data abstraction. These 54 articles represented 36 studies that reported multiple outcomes and/or multiple follow-ups. and condensed into a total of 36 studies included in this review.
§ Total may exceed 759, multiple reasons for exclusion at the Article Inclusion/exclusion Review level were allowed.

Figure 3: Explanation of GRADE Using Colon Cancer as an Example

Outcome	Example: Colon Cancer	Explanation
Number of studies*	2 (2)	Of the 51 articles promoted to full review, 6 examined the effect of the PHE on colon cancer; 2 of these studies comprised the best available evidence, and both were randomized controlled trials (RCTs).
Strength of study design†	4	Evidence is graded based on the highest level of available evidence for that outcome which in this case is the RCT. ‡ Each outcome is given a starting score based on the following matrix: 4 - two or more RCTs 3 - one RCT +/- non-randomized controlled trials 3 - one RCT +/- cohort studies (prospective or retrospective) 3 – one RCT and one Pre-post 2 – cohort studies (prospective or retrospective) 2 – one non-randomized controlled trial + 2 cross-sectional studies 1 – all other study designs This outcome was given a 4 as the body of evidence included four RCTs.
Did the studies have serious (-1) or very serious (-2) limitations in quality? (Enter 0 if none)	-1	The quality scores for the 2 RCTs on colon cancer were 87 (high), and 63 (low). A 1 point deduction for a serious limitation in quality was warranted.
Did the studies have important inconsistency? (-1)	0	Of the 2 RCTs, both reported results in favor of the PHE so 0 points were deducted for this inconsistency.
Were data imprecise or sparse? (-1)	0	Data was not deemed sparse or imprecise as the results included several observations from studies of reasonable size. No points were deducted.
Did the studies have a high probability of reporting bias (-1)?	0	There was a low probability of reporting bias. No points were deducted.
Did the studies show strong evidence of association between intervention and recruitment outcome? §	+1	Of the 2 RCTs evaluated there were no major plausible confounders and the association between intervention and recruitment outcome was deemed “strong” based on a clinically significant relative risk (or Cohen’s d ≥0.8) therefore 1 point was added to the score.
OVERALL GRADE OF EVIDENCE	4 HIGH	Overall Grades of Evidence: <1.0 VERY LOW 1.0-1.9 LOW 2.0-2.9 MEDIUM 3.0 to 4.0 HIGH

* Parentheses contain number of randomized controlled trials considered among the best available evidence.

† High quality – randomized trials, Medium quality – non-randomized control trials, Low quality – observational studies

‡ If an outcome has at least 2 RCTs then the grading is based on the RCTs alone as is the case with colon cancer. If an article has one or no RCTs then the grading of the evidence is based on the next highest level of available evidence (in combination with the one RCT if there is only one available). If cohort studies are the highest grade of evidence available, grading is based on the cohort studies. The levels of evidence are (from highest to lowest): randomized controlled trails, non-randomized controlled trials, prospective cohort studies, retrospective cohort studies, cross-sectional studies, studies with pre-post observational design.

§ Evidence was deemed “strong” if significant relative risk or odds ratio >2 (or Cohen’s d ≥0.8) based on consistent evidence from 2 or more studies with no plausible confounders (+1); “very strong” if significant relative risk or odds ratio >5 based on direct evidence with no major threats to validity (+2).

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Summary Tables

Table 1. Characteristics of Studies Eligible for Inclusion in the Review (*N* = 36).

Characteristics		***n* (%)**
Study design	Randomized controlled trial	11 (31)
	Non-randomized controlled trial	1 (3)
	Prospective cohort	2 (5)
	Retrospective cohort	5 (14)
	Cross-sectional	14 (39)
	Pre-post comparison	3 (8)
First year study conducted	1940-1969	4 (11)
	1970-1989	9 (25)
	1990-2005	19 (53)
	Not specified	4 (11)
Country where study conducted	United States	25 (69)
	United Kingdom	3 (8)
	Canada	3 (8)
	Japan	2 (5)
	Taiwan	1 (3)
	Denmark	1 (3)
	Sweden	1 (3)
Study setting	Urban	17 (47)
	Suburban	8 (22)
	Rural	5 (14)
	Unclear	18 (50)
Delivery site for PHE	Ambulatory practice office	16 (44)
	Academic practice	7 (19)
	Resident/housestaff clinic	5 (14)
	Hospital outpatient clinic	4 (11)
	Community health center	1 (3)
	Health checkup/physical exam clinic	3 (8)
	Military (not otherwise specified)	1 (3)
	Employer health clinic	1 (3)
	Community center	1 (3)
	Not applicable (observational study with survey design)	8 (22)
	Not specified	4 (11)
Physician specialty delivering PHE	Family medicine practice	10 (28)
	Internal medicine practice	7 (19)
	General Practice	6 (17)
	Multispecialty	1 (3)
	Not specified	4 (11)
	Not applicable (observational study with survey design)	8 (22)
Health plan under which PHE delivered	National health system (non-U.S. studies)	10 (28)
	Medicare	4 (11)
	Employer health plan	4 (11)
	Staff model health maintenance organization	2 (5)
	Other managed care plan	2 (5)
	Veterans Affairs or other U.S. Department of Defense health plan	1 (3)
	Not specified or mixed (surveys, or NOS)	15
Subject of study	Patient	
	Not otherwise specified	31 (86)
	Employee or executive	8 (22)
	Medical Providers	
	Family practitioners	8 (22)
	General internists	5 (14)
	General practitioners	4 (11)

Table 1. Characteristics of Studies Eligible for Inclusion in the Review (*N* = 36). (continued)

Characteristics		*n* (%)
	Medical trainees (fellows, residents/house staff, medical students)	3 (8)
	Nurses or nurse practitioners	3 (8)
	Internists	2 (5)
	Physicians' assistants	1 (3)
	Health providers, not otherwise specified	1 (3)
	Obstetricians/gynecologists	0 (0)
	Medical specialist/subspecialist physicians	0 (0)
	Physicians, not otherwise specified	0 (0)
	Office staff	0 (0)

PHE = periodic health evaluation.
Percents may not add to 100. Reviewers were able to give multiple answers to many of the questions.

Table 2. Summary of Study Results.

Author, year	Year Study Began	Years (months of follow up)	Study population	Intervention Group	Comparison Group	Interventions outside of the PHE	Outcome(s) Assessed	Definition of PHE in this study	Study Limitations
Randomized Controlled Trials									
Patrick, 1999[53]	1993	48 months (2 years after inter-vention)	The study population consisted of 2,558 HMO enrollees in Seattle, WA. Medicare demonstration project.	The intervention group included Group Health Comparative of Puget Sound Medicare enrollees invited to receive preventive services benefits package for two years. Uptake of PHE: 90% attended health promotion and disease prevention visits year 1; 83% attended health promotion and disease prevention visits in year 2; 78% had visits in both years,; 9% attended none in any year; 24% attended any classes.	The comparison group consisted of Medicare enrollees receiving usual care.		1. Immunization – influenza 2. Health habits – improvement in: - Physical activity - Diet (fat and fiber) - Advance directives - Breast self-exam - Smoking - Alcohol - Seat belt use 3. Patient attitudes – mean score health worry‡ 4. Body mass index – at risk for obesity, 24-month F/U 5. Costs – average total cost per participant 6. Mortality - Mortality at 24 months - 48 months	The PHE was described as a preventive service package that include - 1)health-risk assessment (telephone interview); 2) health-promotion visit (90 minute nurse visit with health risk appraisals, positive behavior reinforcement and referrals for interventions where appropriate); 3)disease-prevention visit (by nurse and physician who conducted history and physical examination and reviewed patients' health risks) and 4) follow-up	Internal Validity Concerns: 1. Reporting on blinding External Validity Concerns: 1. Description of outcomes not detailed 2. Results potentially not generalizable beyond Medicare recipient population Statistical Validity Concerns: 1. Potentially inadequate adjustment for residual confounding

Table 2. Summary of Study Results. (continued)

Author, year	Year Study Began	Years (months of follow up)	Study population	Intervention Group	Comparison Group	Interventions outside of the PHE	Outcome(s) Assessed	Definition of PHE in this study	Study Limitations
Randomized Controlled Trials									
Patrick, 1999 (cont')								classes (exercise, planning ahead). Counseling on exercise, high fiber/low fat diet and advance directives offered to all. Health promotion visit and disease prevention visits and group exercise were offered in both years.	
Elder, 1995[54]; Mayer, 1994[90]	1992	48 months (2 years after inter-vention comp-letion)	The study population consisted of 1,203 HMO enrollees in San Diego, CA. Medicare demonstration project.	The two-year intervention consisted of Medicare beneficiaries receiving a health risk appraisal with individual counseling and health promotion workshops. Uptake of PHE: 96% completed health risk appraisal and	The comparison group received usual care.		1. Health habits - Fiber servings per day - Fat servings per week - Salt use - Caffeine drinks per day - Stretching minutes per week - Consumption of cruciferous foods 2. Blood	The PHE was described as preventive services through a health risk appraisal with individual counseling, selected clinical tests and immunizations, and a series of 8 weekly group health promotion	Internal Validity Concerns: 1. Reporting on differences between enrollees and non-enrollees 2. Reporting on blinding 3. Reporting on withdrawals or crossovers External Validity Concerns: 1. Results

Table 2. Summary of Study Results. (continued)

Author, year	Year Study Began	Years (months of follow up)	Study population	Intervention Group	Comparison Group	Interventions outside of the PHE	Outcome(s) Assessed	Definition of PHE in this study	Study Limitations
Randomized Controlled Trials									
Elder, 1995; Mayer, 1994 (cont')				individual counseling; 87% attended at least one group session, 72% attended at least 4, 59% attended at least 6.			pressure - Mean systolic blood pressure at 12 months - Mean diastolic blood pressure at 12 months 3. Body mass index - Mean BMI at 24 months (end of intervention period) - Mean BMI at 48 months (end of F/U)	sessions (memory, mental alertness, coping with loss, choices for independent living, self-enhancement, exercise, nutrition, relaxation, self-care). Individual counseling was continued during year 2.	potentially not generalizable beyond Medicare recipient population
Morrissey, 1995[55]	1988	12-26 months after beginning of inter-vention (for cost outcomes, 3 years after beginning of inter-vention – 1year after inter-vention completion)	The study population consisted of 1914 patients from 10 primary-care medical practices in central North Carolina. Medicare demonstration project.	The intervention group received full Medicare reimbursement to physicians for preventive care and health promotion packages, regular reminding of physicians to routinely schedule preventive care visits, a new office system in which nurse carried out many	The comparison group received usual care.	<u>Intervention Group:</u> Patients: 1. written materials 2. phone call Providers: 1. annual capitated payments for preventive care and health promotion visits 2. prompting to schedule preventive care visits 3. office system	1. Pap smear 2. Immunization – influenza 3. Cholesterol screening 4. Colon cancer screening - fecal occult blood testing 4. Mammogram 5. Costs - 3-year post-intervention cumulative Medicare	The PHE was described as a preventive care visit offered once a year including a breast exam, eye exam, pap smear, hearing test, depression test, influenza & pneumovax immunization, cholesterol test, fecal occult blood test, urinalysis	External Validity Concerns: 1. Results potentially not generalizable beyond Medicare recipient population

Table 2. Summary of Study Results. (continued)

Author, year	Year Study Began	Years (months of follow up)	Study population	Intervention Group	Comparison Group	Interventions outside of the PHE	Outcome(s) Assessed	Definition of PHE in this study	Study Limitations
Randomized Controlled Trials									
Morrissey, 1995 (cont')				preventive procedures, and a form for charting preventive care. Duration of intervention was two years. Uptake of the PHE: 88% received at least one clinical screening; 87% received at least one health promotion service.		change for nurse delivery of preventive services 4. form for charting preventive care	charges. - 3-year post-intervention cumulative Medicare reimbursement 6. Hospitalization - Utilization data: hospital days per enrollee over two years of intervention and one year post-intervention - Admissions per enrollee over two years of intervention and one year post-intervention	and a urinary incontinence test. One hour health promotion sessions were conducted every 6 months for physical activity, nutrition, stress management/problem solving and others based on risk.	
Burton, 1995[56]; German, 1995[79]; Burton, 1997[80]; Burton, 1995[78] Burton, 1995; German, 1995; Burton, 1997;	1989	24 months after beginning of intervention and for some outcomes 48 months after beginning of inter-vention (2	The study population consisted of 4,195 older, community-dwelling Medicare recipients in Baltimore. Medicare demonstration project.	The intervention group received coverage for an annual preventive visit and tests (Medicare vouchers for 2 yearly preventive visits and optional counseling visits).	The comparison group received no coverage for an annual preventive visit and tests.	<u>Intervention Group:</u> Patients: 1. Written material	1. Pap smear 2. Health habits - Smoking - Problem alcohol drinking 3. Health status – change in health status of intervention and control	The PHE was described as a physical examination. The examination included a breast, pelvic (including Pap smear), and digital rectal exam, fecal occult blood	Internal Validity Concerns: 1. Reporting on blinding External Validity Concerns: 1. Results potentially not generalizable beyond Medicare

Table 2. Summary of Study Results. (continued)

Author, year	Year Study Began	Years (months of follow up)	Study population	Intervention Group	Comparison Group	Interventions outside of the PHE	Outcome(s) Assessed	Definition of PHE in this study	Study Limitations
Randomized Controlled Trials									
Burton, 1995 (cont') Burton, 1995; German, 1995; Burton, 1997;		years after end of inter-vention)		Uptake of the PHE: 63% made preventive visit year 1; 52% counseling visit year 1; 52% preventive visit year 2; 33% counseling visit year 2.			groups from base-line to 2 years 4. Costs - Total health care charges, Year 1. - Total health care charges, Year 2. - Mean monthly Medicare Part A charges, Year 1 - Mean monthly Medicare Part A, charges Year 2 - Mean monthly Medicare Part A charges Year 3 (1 year post-intervention) - Mean monthly Medicare Part A charges Year 4 (2 years post-intervention) 5. Hospitalization - Mean	testing, cholesterol testing, immunizations, counseling for health risks, and a complete history including vision, hearing, and dentition.	recipient population

Table 2. Summary of Study Results. (continued)

Author, year	Year Study Began	Years (months of follow up)	Study population	Intervention Group	Comparison Group	Interventions outside of the PHE	Outcome(s) Assessed	Definition of PHE in this study	Study Limitations
Randomized Controlled Trials									
Burton, 1995 (cont')							inpatient days for the intervention and control groups who had a hospital discharge in that year (Year 1) - Mean inpatient days Year 2 - Hospital discharges per 1000 Year 1 - Hospital discharges per 1000 Year 2 6. Mortality		
Norman, 1992[60]	1992*		The study population consisted of 818 patients from one general practice in Norfolk, England aged 30 to 41.	The intervention group consisted of patients who received an invitation letter with an appointment for a health check.		<u>Intervention Group:</u> Patients: 1. Written material <u>Control Group:</u> Patients: 1. Written material	1. Receipt of PHE – attendance of PHE	The PHE was described as a health check that included the assessment of smoking behavior, alcohol consumption, diet and	External Validity Concerns: 1. Description of study population characteristics not detailed Statistical Validity Concerns:

Table 2. Summary of Study Results. (continued)

Author, year	Year Study Began	Years (months of follow up)	Study population	Intervention Group	Comparison Group	Interventions outside of the PHE	Outcome(s) Assessed	Definition of PHE in this study	Study Limitations
Randomized Controlled Trials									
Norman, 1992 (cont')				The intervention group also included patients who received an open invitation letter to health				exercise levels, blood pressure and weight.	1. Potentially inadequate adjustment for residual confounding
Belcher, 1990[44]	1981	60 months	The study population consisted of 1,224 male patients who attended the Seattle Veterans Affairs Medical Center during October to December 1980. (We included 674 patients in the study who either attended a health promotion clinic or received usual care. Other groups received other interventions)	The intervention group was offered self-referral to a health promotion clinic. Uptake of the PHE: 71% participated in health promotion clinic in year 1; 78% participated in health promotion clinic in year 1 or year 2; 90% attending in year 1 returned for year 2	The comparison group received usual care.	<u>Intervention Group:</u> Patients: 1. Written material 2. Phone call	1. Counseling - Alcohol abuse - Smoking cessation 2. Immunization – influenza 3. Colon cancer screening - fecal occult blood testing	The PHE was described as a physical examination similar to USPSTF recommended activities. Included history and physical examination items (alcoholism screen, smoking assessment, blood pressure check, breast examination); laboratory testing (fecal occult blood, cholesterol, tuberculin skin test, VDRL, Pap smear and mam-mography); tetanus/diphth	Internal Validity Concerns: 1. Reporting on blinding External Validity Concerns: 1. Description of study population not detailed 2. Results potentially not generalizable beyond Veterans Affairs (male) population

Table 2. Summary of Study Results. (continued)

Author, year	Year Study Began	Years (months of follow up)	Study population	Intervention Group	Comparison Group	Interventions outside of the PHE	Outcome(s) Assessed	Definition of PHE in this study	Study Limitations
Randomized Controlled Trials									
Belcher, 1990 (cont')								eria and influenza vaccination, and counseling on breast self-examination and alcoholism and smoking cessation.	
Stone, 1981[57]; South-east London, 1977[7]; South-east London, 2001[76]; Stone, 1978a[91]; Stone, 1978b[92]; Trevelyan, 1973[93]	1967	60-108 months	The study population consisted of 7229 patients in South-east London aged 40 to 64 years in 1967 receiving care in primary care group practices.	The intervention group were South London patients aged 40 to 64 years in specific group practices; received 2 multiphasic screenings 2 years apart. Uptake of the PHE: 73% participated in first year screening; 99% of these had both physical exam and clinic tests	The comparison group consisted of South London patients aged 40 to 64 years in specific group practices; received usual care.		1. Disease detection - Angina - High diastolic blood pressure - Ischemia on electrocardiogram - Bronchitis symptoms 2. Health habits – percentage still smoking 3. Disability – major disability (e.g. , inability to dress or undress themselves) 4. Hospitalization – hospitalizations/ 1000 person years at risk	The PHE was described as multiphasic screening. Screening for ischemic heart disease, elevated blood pressure, chronic bronchitis, diabetes, thyroid imbalance, arthritis, obesity, venous varicosities, hearing and visual defects. (PFTs, ECG, blood pressure, serum cholesterol, uric acid, fecal occult blood),	Internal Validity Concerns: 1. Reporting on blinding External Validity Concerns: 1. Study performed before USPSTF or similar contemporary preventive services guidelines in effect Statistical Validity Concerns: 1. Differences in control and treatment group at baseline not specifically

Table 2. Summary of Study Results. (continued)

Author, year	Year Study Began	Years (months of follow up)	Study population	Intervention Group	Comparison Group	Interventions outside of the PHE	Outcome(s) Assessed	Definition of PHE in this study	Study Limitations
Randomized Controlled Trials									
Stone, 1981; South-east London, 1977; South-east London, 2001; Stone, 1978a; Stone, 1978b; Trevelyan, 1973 (cont')							(1976) 5. Mortality mortality rate per 1000 person-years at risk: - All cause death - Neoplasm - Central nervous system - Cardiovascular disease - Respiratory disease - All other causes	abdominal exam, leg exam, breast and pelvic exam, chest x-ray, height, weight and skin fold, vision and audiometry testing, skin, mouth, teeth and joint exams	accounted for in analysis 2. Incomplete presentation of statistical significance

Table 2. Summary of Study Results. (continued)

Author, year	Year Study Began	Years (months of follow up)	Study population	Intervention Group	Comparison Group	Interventions outside of the PHE	Outcome(s) Assessed	Definition of PHE in this study	Study Limitations
Randomized Controlled Trials									
Fletcher, 1977[45]	1974	Outcomes (disease detection) measured directly after multi--phasic screening visit. Charts were reviewed at 12 months to assess follow-up of new problems	The study population consisted of 112 patients 40 to 65 years old seen by 112 physicians. Physicians randomized to receiving results of multiphasic screening program versus reviewing prepared chart abstract versus reviewing actual chart	The intervention group consisted of patients who received multiphasic screening. Uptake of the PHE: Not mentioned, but by design, all intervention group participants would have received the multiphasic screening.	The first comparison group was the medical chart abstraction group (physicians given abstracted information about patients from chart). In the second comparison group, physicians reviewed the patient's actual chart.		1. Disease detection - Disease detection of ALL problems before and after intervention (number of new medical problems detected at F/U) - Disease detection of important problems before and after intervention	The PHE was described as multiphasic screening that included a standard questionnaire, measurement of blood pressure, height, weight, visual acuity, tonometry, audiometry, blood leukocyte count, hematocrit and hemoglobin levels, serologic levels for syphilis, biochemistry of random blood specimen, urinalysis, ECG, and chest roentgenogram . The pHE also included clinical breast examination, pap smear and vital capacity.	Internal Validity Concerns: 1. Reporting on blinding External Validity Concerns: 1. Study performed before USPSTF or similar contemporary preventive services guidelines in effect 2. Description of study population not detailed Statistical Validity Concerns: 1. Potentially inadequate adjustment for residual confounding

Table 2. Summary of Study Results. (continued)

Author, year	Year Study Began	Years (months of follow up)	Study population	Intervention Group	Comparison Group	Interventions outside of the PHE	Outcome(s) Assessed	Definition of PHE in this study	Study Limitations
Randomized Controlled Trials									
Cutler, 1973[41]; Collen, 1973[47]; Dales, 1973[94]; Ramcharan, 1973[95]; Friedman, 1986[9]; Dales, 1979[96]; Norinder, 2002[97]	1964	84-192 months	The study population consisted of 10,713 randomly selected California Kaiser Health Plan members in 1964, age 35-54.	The intervention group consisted of California Kaiser Health Plan members aged 35-54 encouraged to have an annual multiphasic checkup for 11 years. Uptake of the PHE: 54% of intervention group received at least 4 PHEs over 7 years, 83% received at least one PHE over 7 years	The comparison group consisted of California Kaiser Health Plan members aged 35-54 who received usual care. Uptake of the PHE: 13% of intervention group received at least 4 PHEs over 7 years, 53% received at least one PHE over 7 years	<u>Intervention Group:</u> Patients: 1. Written Material 2. Reminder 3. Phone calls	1. Costs - Average annual cost for physician visit per participant at 7 years (men, aged 45-54 years at baseline) - Average annual cost for physician visit per participant at 11 years (men, aged 45-54 years at baseline) - Average annual expense per participant in multiphasic health checkup expense at 7 years. (men, aged 45-54 years at baseline) - Average annual expense per participant in multiphasic health checkup expense at 11 years. (men, aged 45-54	The PHE was described as an annual multiphasic health check-up (MHC) consisting of a multiphasic exam (which is a series of tests performed in the automated multi-test lab), and a follow-up evaluation of from multiphasic exam. The multiphasic exam included a standard questionnaire including history and present symptoms questions, measurement of blood pressure, visual acuity, tonometry, audiometry, urinalysis, ECG, and chest & breast	Internal Validity Concerns: 1. Reporting on blinding External Validity Concerns: 1. Study performed before USPSTF or similar contemporary preventive services guidelines in effect Statistical Validity Concerns: 1. Potentially inadequate adjustment for residual confounding

Table 2. Summary of Study Results. (continued)

Author, year	Year Study Began	Years (months of follow up)	Study population	Intervention Group	Comparison Group	Interventions outside of the PHE	Outcome(s) Assessed	Definition of PHE in this study	Study Limitations
Randomized Controlled Trials									
Cutler, 1973; Collen, 1973; Dales, 1973; Ramcharan, 1973; Friedman, 1986; Dales, 1979; Norinder, 2002 (cont')							years at baseline) 2. Disability - Disability at 7 years - Disability at 11 years among men aged 45-54 3. Mortality Deaths, rate per 1000 persons - All cause deaths - Death from potentially postponable causes¶ - Death from colorectal cancer - Death from breast cancer (women only) - Death from cervical/uterine cancer (women only) - Death from prostate cancer (men only) - Death from hypertension-associated causes	x-rays,. The MHC also included anthropometry, spirometry, and a serum chemistry panel.	

Table 2. Summary of Study Results. (continued)

Author, year	Year Study Began	Years (months of follow up)	Study population	Intervention Group	Comparison Group	Interventions outside of the PHE	Outcome(s) Assessed	Definition of PHE in this study	Study Limitations
Randomized Controlled Trials									
Cutler, 1973; Collen, 1973; Dales, 1973; Ramcharan, 1973; Friedman, 1986; Dales, 1979; Norinder, 2002 (cont')							- Death from ischemic heart disease - Death from respiratory system disease. - Death from musculoskeletal disease - Death from mental, nervous, or sensory organ disease - Death from endocrine, nutritional, and metabolic disease - Death from suicide - Death from lymphohemato-poetic cancer		
Theobald, 1998[58]	1969	20 years	The study population consisted of 32,186 patients aged 18-65.	The intervention group consisted of Stockholm residents aged 18-65 who were offered a general health examination. Uptake of PHE: 2578/3064 (84%) of those offered	The comparison group were Stockholm residents aged 18-65 who received usual care.		1. Mortality - All cause mortality - Cardiovascular disease mortality - Cancer mortality - Accidents and intoxication	The PHE was described as a general health examination that included social, psychiatric, and medical interviews and exams to determine social and	Internal Validity Concerns: 1. Reporting on differences between participants and non-participants 2. Reporting on blinding 3. Description

Table 2. Summary of Study Results. (continued)

Author, year	Year Study Began	Years (months of follow up)	Study population	Intervention Group	Comparison Group	Interventions outside of the PHE	Outcome(s) Assessed	Definition of PHE in this study	Study Limitations
Randomized Controlled Trials									
Theobald, 1998 (cont')				the PHE were examined.			mortality	medial needs. Also, blood tests, physical examinations, ECGs, exercise tests, psychological tests and eye and dental examinations.	of PHE is not detailed External Validity Concerns: 1. Description of study population characteristics not detailed 2. Study performed before USPSTF or similar contemporary preventive services guidelines in effect Statistical Validity Concerns: 1. Potentially inadequate adjustment for residual confounding
OXCHECK, 1995[59]; Langham, 1996[81]]	1989	36 months	The study population consisted of 11,090 patients aged 35 to 64 from 5 general practices in Bedfordshire,	The intervention group received a health check at baseline (year 1) and in year 4. Uptake of the PHE: Of the 2205	The comparison group received no health check at baseline but received a health check in year 4.	<u>Intervention Group:</u> Patients: 1. Written Material 2. Reminder 3. Phone call 4. Encou-	1. Health habits - Smoking - Alcohol use - Exercise less than once per month - Use full	The PHE was described as a health check and consisted of medical history, lifestyle questionnaire,	Internal Validity Concerns: 1. Reporting on blinding Statistical Validity Concerns:

Table 2. Summary of Study Results. (continued)

Author, year	Year Study Began	Years (months of follow up)	Study population	Intervention Group	Comparison Group	Interventions outside of the PHE	Outcome(s) Assessed	Definition of PHE in this study	Study Limitations
Randomized Controlled Trials									
OXCHECK, 1995; Langham, 1996 (cont')			England. 4,908 patients receiving PHE n year 1, year 4 (intervention group) and in year 4 (control group) comprise the study population for this analysis.	receiving PHE in year 1, 75% received PHE in year 4		ragement to make a visit during other healthcare visits <u>Control Group:</u> Patients: 1. Written Material 2. Reminder 3. Phone call 4. Encourage-ment to make a visit during other healthcare visits	cream milk - Use butter or hard margarine 2. Blood pressure - Systolic blood pressure at 3-year follow up - Diastolic blood pressure at 3-year follow up - Proportion of high risk diastolic pressure (≥100mm Hg) from 3 year F/U when compared to control 3. Changes in serum cholesterol - Mean total cholesterol at 3-year F/U - Proportion of high risk cholesterol (≥8mmol/l) at 3 year F/U 4. Body mass index - Mean BMI at 3-year F/U	measurements of height, weight, blood pressure, and serum cholesterol levels, and post-visit counseling.	1. Potentially inadequate adjustment for residual confounding

Table 2. Summary of Study Results. (continued)

Author, year	Year Study Began	Years (months of follow up)	Study population	Intervention Group	Comparison Group	Interventions outside of the PHE	Outcome(s) Assessed	Definition of PHE in this study	Study Limitations
Randomized Controlled Trials									
OXCHECK, 1995; Langham, 1996 (cont')							- Percentage of participants with BMI ≥ 30 5. Cost-effectiveness		

Table 2. Summary of Study Results. (continued)

Author, year	Year Study Began	Years (months of follow up)	Study population	Intervention Group	Comparison Group	Interventions outside of the PHE	Outcome(s) Assessed	Definition of PHE in this study	Study Limitations
Non-randomized Controlled Trials									
Christensen, 1995[84]	1990		The study population consisted of 2,452 patients of 65 general practitioners.	The intervention group consisted of Denmark patients of general practitioners who received mailing that a preventive health examination was free.	The comparison group were Denmark patients of general practitioners who received mailing that a preventive health examination was 40 Danish Krone.	Intervention Group: Patients: 1. Written material 2. Financial disincentive (charge) Control Group: Patients: 1. Written material 2. Financial disincentive (charge)	1. Receipt of PHE – attendance at PHE	The PHE in this study was described as a preventive health examination.	External Validity Concerns: 1. Description of PHE is not detailed

Table 2. Summary of Study Results. (continued)

Author, year	Year Study Began	Years (months of follow up)	Study population	Intervention Group	Comparison Group	Interventions outside of the PHE	Outcome(s) Assessed	Definition of PHE in this study	Study Limitations
Prospective Cohorts									
Roberts, 1969[62]	1950	180 months	The study population consisted of 20,648 male patients who had employee-sponsored periodic health exams.	The intervention group consisted of U.S. employed men receiving a employer-sponsored periodic health examination.	The comparison group consisted of a historical comparison of U.S. white men.		1. Mortality – actual/expected deaths	The PHE was described as a periodic health exam that included a health history, and a thorough physical examination supplemented by laboratory, x-ray, and ECG studies.	External Validity Concerns: 1. Study performed before USPSTF or similar contemporary preventive services guidelines in effect 2. Results potentially not generalizable beyond persons who are non-White men

Table 2. Summary of Study Results. (continued)

Author, year	Year Study Began	Years (months of follow up)	Study population	Intervention Group	Comparison Group	Interventions outside of the PHE	Outcome(s) Assessed	Definition of PHE in this study	Study Limitations
Prospective Cohorts									
Chiou, 2002[83]	1993	6 years	The study population consisted of a sample of 1,193 elderly people in each of the 11 districts in Kaohsiung City, Taiwan.	The intervention group consisted of Taiwanese adults aged 65 years and older reporting receiving a physical examination in past year.	The comparison group were Taiwanese adults aged 65 and older not receiving physical examination in past year		1. Mortality – Relative risk of mortality	The PHE was defined as an annual physical exam that included measurements of weight, height, blood pressure, pulse, visual acuity, oral health, and hearing. A PHE also included urine, fecal occult blood, fasting blood lipids, and glucose laboratory tests.	External Validity Concerns: 1. Results potentially not generalizable beyond elderly Taiwanese.

Table 2. Summary of Study Results. (continued)

Author, year	Year Study Began	Years (months of follow up)	Study population	Intervention Group	Comparison Group	Interventions outside of the PHE	Outcome(s) Assessed	Definition of PHE in this study	Study Limitations
Retrospective Cohorts									
Burton, 2002[29]	1989	3 years	The study population consisted of 1,773 Bank One executives who were enrolled in the Bank Medical Plan, or a preferred provider plan.	The intervention group consisted of executives that were eligible for and receiving the periodic health examination.	The comparison group consisted of executives eligible for but not participating in the periodic health examination.		1. Costs – average cost in medical claims paid per employee 2. Disability - Average number of short-term disability days per employee - Total short-term disability days in 3 years - Any short-term disability days (%)	The PHE was described as a complete history and physical examination, fasting laboratory tests including multiphasic chemistries (blood count etc), lipid profile, total cholesterol, HDL-cholesterol, calculated LDL-cholesterol, dipstick urinalysis, resting 12 lead-electrocardiogram, pulmonary function testing and vision and glaucoma screening.	Internal Validity Concerns: 1. Use of claims data not specified for research purposes External Validity Concerns: 1. Results potentially not generalizable beyond executive employees

Table 2. Summary of Study Results. (continued)

Author, year	Year Study Began	Years (months of follow up)	Study population	Intervention Group	Comparison Group	Interventions outside of the PHE	Outcome(s) Assessed	Definition of PHE in this study	Study Limitations
Retrospective Cohorts									
Hama, 2001[77]	1999	12 months	The study population consisted of 240 employees of the Japan Maritime Self-Defense Force working on the Iwo Jima military defense base.	The patients in the intervention group received a pre-assignment medical exam 1 year before their assignment.	The patients in the comparison group didn't receive a pre-assignment medical exam 1 year before their assignment.		1. Disease detection - Cardiac arrhythmia - Neurological problems Hyperlipidemia - GI ulcers Hypertension - Severe obesity (BMI >28.6 kg/m^2) - Proteinuria 2. Blood pressure - Mean systolic blood pressure - Mean diastolic blood pressure - Proportion of hypertension 3. Changes in serum cholesterol levels - Mean total cholesterol - Mean LDL cholesterol - Mean triglycerides - Mean HDL cholesterol	The PHE was defined as an annual health examination including analysis of height, body weight, blood pressure, BMI, chest radiography, electrocardiography, vital capacity, serum chemistry, stool samples, and urine samples.	External Validity Concerns: 1. Results potentially not generalizable beyond Japanese males. Statistical Validity Concerns: 1. Potentially inadequate adjustment for residual confounding

Table 2. Summary of Study Results. (continued)

Author, year	Year Study Began	Years (months of follow up)	Study population	Intervention Group	Comparison Group	Interventions outside of the PHE	Outcome(s) Assessed	Definition of PHE in this study	Study Limitations
Retrospective Cohorts									
Hama, 2001 (cont')							- Proportion of hyperlipidemia 4. Body mass index - Mean BMI; - Proportion of severe obesity (BMI ≥ 28.6)		
Freedman, 2000[16]	1995	18 months	The study population consisted of 136 community-dwelling patients aged 70 and older.	The intervention group included patients who received a periodic health examination.	The comparison group received no periodic health examination and attended clinic 3 or more times.	Intervention Group: Providers: 1. Chart-based reminders	1. Immunization - Received influenza vaccine - Received tetanus vaccine	The PHE in this study included screening for smoking, alcohol, influenza vaccination, tetanus vaccination, exercise, nutrition, blood pressure, hearing, and vision.	Internal Validity Concerns: 1. Reporting on differences between enrollees and non-enrollees External Validity Concerns: 1.Description of study inclusion/exclusion criteria not detailed 2. Description of study population characteristics not detailed 3. Description of PHE is not detailed Statistical Validity

Table 2. Summary of Study Results. (continued)

Author, year	Year Study Began	Years (months of follow up)	Study population	Intervention Group	Comparison Group	Interventions outside of the PHE	Outcome(s) Assessed	Definition of PHE in this study	Study Limitations
Retrospective Cohorts									
Freedman, 2000 (cont')									Concerns: 1. Potentially inadequate adjustment for residual confounding 2. Incomplete presentation of statistical significance
Williams, 1998[65]	1998*	12 months	The study population consisted of 50 adult patient's medical records before and 50 after intervention in each of 60 primary care practices.	The intervention group consisted of patients who received a Health Maintenance Exam (HME) and interacted with a touch-sensitive computer system (TSCS), which provided patient-specific preventive service recommendations.	The comparison group consisted of patients who had an HME and did not use a TSCS.	<u>Intervention Group:</u> Patients: 1. touch-sensitive computer system Providers: 1. touch-sensitive computer system <u>Control Group:</u> Patients: 1. touch-sensitive computer system Providers: 1. touch-sensitive computer system	1. Pap smear 2. Colon cancer screening - Flexible sigmoidoscopy - Fecal occult blood test 3. Mammogram	The PHE, called a HME in this study, was defined as an office visit specifically for a physical exam, breast examination, pap smear, and pelvic examination, or annual check-up.	Internal Validity Concerns: 1. Reporting on differences between enrollees and non-enrollees External Validity Concerns: 2. Description of study population characteristics not detailed

Table 2. Summary of Study Results. (continued)

Author, year	Year Study Began	Years (months of follow up)	Study population	Intervention Group	Comparison Group	Interventions outside of the PHE	Outcome(s) Assessed	Definition of PHE in this study	Study Limitations
Retrospective Cohorts									
Williams, 1998 (cont')			The study population also consisted of 507 touch-sensitive computer system users.						3. Description of PHE is not detailed Statistical Validity Concerns: 1. Potentially inadequate adjustment for residual confounding 2. Incomplete presentation of statistical significance
Bernacki, 1988[28]	1983	36 months	The study population consisted of 710 male executives of a multinational US corporation.	The intervention group consisted of corporation executives that were eligible for periodic physical exam (PPE) and receiving 3 PPEs during 3-year study period.	The comparison group consisted of corporation executives eligible for PPE and not receiving a PPE during the 3-year study period.		1. Costs – health care claims cost per capita in Year 3	The PHE was described as a periodic physical examination that included a medical history, physical examination, visual acuity testing, resting electrocardiogram, multiple	Internal Validity Concerns: 1. Reporting on withdrawals 2. Standard/valid reporting of outcomes External Validity Concerns: 1. Description of study

Table 2. Summary of Study Results. (continued)

Author, year	Year Study Began	Years (months of follow up)	Study population	Intervention Group	Comparison Group	Interventions outside of the PHE	Outcome(s) Assessed	Definition of PHE in this study	Study Limitations
Retrospective Cohorts									
Bernacki, 1988 (cont')				The second intervention group were corporation executives eligible for PPE and receiving 1 or 2 PPEs during 3-year study period				lab studies, audiometry, cervical cytology, chest radiograph, proctosig-moidoscopy, tonometry, pulmonary function test, maximal exercise electrocardiography, and a barium enema.	population characteristics not detailed Statistical Validity Concerns: 1. Potentially inadequate adjustment for residual confounding
Grimaldi, 1965[61]	1956	96 months	The study population consisted of 194 employees.	The intervention group consisted of corporation middle management employees opting to participate in a periodic physical examination (PPE).	The first comparison group consisted of corporation middle management employees opting not to participate in PPE.		1. Costs – mean medical expense per claim	The PHE was described as a preventive health examination that included a thorough self-administered health inventory question-naire, a physical examination, a 14 X 17 x-ray film of the chest, audiometric testing, visual	External Validity Concerns: 1. Study performed before USPSTF or similar contemporary preventive services guidelines in effect 2. Description of study population characteristics not detailed

Table 2. Summary of Study Results. (continued)

Author, year	Year Study Began	Years (months of follow up)	Study population	Intervention Group	Comparison Group	Interventions outside of the PHE	Outcome(s) Assessed	Definition of PHE in this study	Study Limitations
Retrospective Cohorts									
Grimaldi, 1965 (cont')					The second comparison group were employees from another site not offered the PPE.			acuity, tonometry, 12-lead ECG, urinalysis for albumin and sugar, hematocrit and microscopic study of the blood smear, blood sugar determina-tion, and a protoscopic examination when indicated.	Statistical Validity Concerns: 1. Potentially inadequate adjustment for residual confounding 2. Incomplete presentation of statistical significance

Table 2. Summary of Study Results. (continued)

Author, year	Year Study Began	Years (months of follow up)	Study population	Intervention Group	Comparison Group	Interventions outside of the PHE	Outcome(s) Assessed	Definition of PHE in this study	Study Limitations
Cross-sectional Studies									
Lin, 2004[73]	1997		The study population consisted of 21,025 patients who visited the outpatient department from 1997 through 2000. (NHAMCS data)	Patients receiving an outpatient department visit including a nurse practitioner defined the Intervention group.	Patients receiving an outpatient visit not including a nurse practitioner defined the comparison group.		1. Counseling - Diet counseling - Injury prevention counseling - Physical activity counseling - Safe sexual practices counseling - Tobacco use counseling	The PHE was defined as a non-illness care visit to the outpatient department.	External Validity Concerns: 1. Data from pediatric outpatient clinics included 2. Study not specifically designed to address Key Question Statistical Validity Concerns: 1. Potentially inadequate adjustment for residual confounding
Flocke, 2004[74]; Eaton, 2002[98]	1994		The study population consisted of 2,670 adult outpatients, visiting 138 family physicians in 84 practices from October 1994 through August 1995 in Northeast Ohio.	The intervention group included patients who were seen by a health care professional for well care.	The first comparison group included patients who were seen for chronic illness. The second comparison group included patients who were seen for acute illness.		1. Counseling - Patient diet advice recall - Patient smoking counseling recall - Physical activity patient recall - Nutritional counseling—univariate	The PHE was defined as a well care visit with a health care professional.	Internal Validity Concerns: 1. Reporting on differences between enrollees and non-enrollees External Validity Concerns: 1. Study not specifically

Table 2. Summary of Study Results. (continued)

Author, year	Year Study Began	Years (months of follow up)	Study population	Intervention Group	Comparison Group	Interventions outside of the PHE	Outcome(s) Assessed	Definition of PHE in this study	Study Limitations
Cross-sectional Studies									
Flocke, 2004; Eaton, 2002 (cont')					The last comparison group included patients who were seen for things other than chronic illness, acute illness or well care.		analysis total n = 3475 - Nutritional counseling—multivariate analysis total n = 3475		designed to address Key Question Statistical Validity Concerns: 1. Potentially inadequate adjustment for residual confounding
Finkelstein, 2002[67]	1994		The study population consisted of 2,232 women aged 20 and older who were residents in Ontario, Canada that completed the National Population Health Survey reporting their use of annual examinations with answers linked to their use of services in a national health insurance plan	The intervention group received an annual health examination/ preventive screening.	The comparison group received no annual health examination/preventive screening.		1. Pap smear 2. Cholesterol screening 3. Mammogram	The PHE was defined as an annual or periodic health examination by a healthcare professional.	Internal Validity Concerns: 1. Data obtained from questionnaire, results subject to recall bias External Validity Concerns: 1. Description of study population characteristics not detailed 2. Results potentially not generalizable beyond female population

Table 2. Summary of Study Results. (continued)

Author, year	Year Study Began	Years (months of follow up)	Study population	Intervention Group	Comparison Group	Interventions outside of the PHE	Outcome(s) Assessed	Definition of PHE in this study	Study Limitations
Cross-sectional Studies									
Hahn, 1999[66]	1995		The study population consisted of an audit of the computerized billing data of 75,621 cross-sectional audit of outpatient billing claims for adults seen at least once by a primary care provider in 1995, classified by visit type (visits for preventive care vs. acute care).	The first intervention group received preventive services with only HMO insurance The other intervention group received preventive services with only FFS insurance.	The first comparison group did not receive preventive services with HMO insurance. The second comparison group did not receive preventive services with FFS insurance.		1. Pap smear 2. Immunization – tetanus 3. Cholesterol screening 4. Colon cancer screening - Sigmoidoscopy - Fecal occult blood testing 5. Mammogram	The PHE was defined as a physical exam or preventive services.	External Validity Concerns: Description of study population characteristics not detailed Study did not provide information on level of insurance for the PHE and screening tests in HMO and FFS plans Statistical Validity Concerns: Potentially inadequate adjustment for residual confounding

Table 2. Summary of Study Results. (continued)

Author, year	Year Study Began	Years (months of follow up)	Study population	Intervention Group	Comparison Group	Interventions outside of the PHE	Outcome(s) Assessed	Definition of PHE in this study	Study Limitations
Cross-sectional Studies									
Tao, 2001[64]	1997		The study population consisted of data on women age >18 years from the 1997 National Ambulatory Medical Care and National Hospital Ambulatory Medical Care Surveys in which physicians completed forms describing reasons for ambulatory visits (including general medical visits or gynecological) and the receipt of preventive services	The intervention group received general medical or gynecologic exam as defined by either physician or patient.	The comparison group received non-general medical or gynecologic exam visits as defined by both patient and physician.		1. Pap smear 2. Counseling - family planning or contraceptive given 3. Mammogram	The PHE was defined as a general medical examination, gynecologic exam, or periodic health examination.	Internal Validity Concerns: 1. Data obtained from questionnaire, results subject to recall bias External Validity Concerns: 1. Study not specifically designed to address Key Question Statistical Validity Concerns: 1. Potentially inadequate adjustment for residual confounding
Parchman, 2001[69]	1996		The study population consisted of 1,409 Mexican American El Paso County, Texas residents, aged 18 to 64 years of age participating in a telephone and door-to door	The intervention group reported they had received a check-up in the past year.	The comparison group reported they hadn't received a check-up in the past year.		1. Pap smear 2. Cholesterol screening in past 5 years 3. Mam-mogram	The PHE was defined as a check-up or visit to a healthcare professional.	Internal Validity Concerns: 1. Data obtained from questionnaire, results subject to recall bias External Validity Concerns: 1. Study not

Table 2. Summary of Study Results. (continued)

Author, year	Year Study Began	Years (months of follow up)	Study population	Intervention Group	Comparison Group	Interventions outside of the PHE	Outcome(s) Assessed	Definition of PHE in this study	Study Limitations
Cross-sectional Studies									
Parchman, 2001 (cont')			survey designed to assess access to and use of ambulatory health care						specifically designed to address Key Question Statistical Validity Concerns: 1. Potentially inadequate adjustment for residual confounding
Nutting, 2001[75]	1991		The study population consisted of 1,138 patient-visits by 93 physicians in the Ambulatory Sentinel Practice Network, in 50 community-based practices. Physicians were surveyed to recall the content of nonacute care visits with women age 40-75 years seen in their practices.	The intervention group had an annual examination.	The comparison group had a routine chronic are visit.		1. Mam-mogram	The PHE was described as a routine annual examination that didn't included visits for chronic care, intercurrent illness, emergent conditions, or injuries.	Internal Validity Concerns: 1. Data obtained from questionnaire, results subject to recall bias External Validity Concerns: 1. Description of PHE is not detailed Statistical Validity Concerns: 1. Potentially inadequate adjustment for residual confounding

Table 2. Summary of Study Results. (continued)

Author, year	Year Study Began	Years (months of follow up)	Study population	Intervention Group	Comparison Group	Interventions outside of the PHE	Outcome(s) Assessed	Definition of PHE in this study	Study Limitations
Cross-sectional Studies									
Stange, 2000[42]	1994		The study population consisted of 4,049 patient-visits in the offices of 138 family physicians in North-east Ohio.	The intervention group was described by well care visits.	The comparison group was described by illness visits.		1. Counseling - Mean % (SD) receipt of USPTF health habits counseling - Mean % (SD) receipt of cancer-related health habits counseling 2. Immunization - Mean % receiving USPSTF recommended vaccinations	The PHE was described as preventive services that consisted of screening, health habit counseling, and immuniza-tion services.	External Validity Concerns: 1. Description of study inclusion/exclu sion criteria not detailed Statistical Validity Concerns: 1. Potentially inadequate adjustment for residual confounding 2. Incomplete presentation of statistical significance

Table 2. Summary of Study Results. (continued)

Author, year	Year Study Began	Years (months of follow up)	Study population	Intervention Group	Comparison Group	Interventions outside of the PHE	Outcome(s) Assessed	Definition of PHE in this study	Study Limitations
Cross-sectional Studies									
Faulkner, 1997[22]	1991		The study population consisted of 34,236 adults aged 18 to 64 from the Centers for Disease Control's 1991 Behavioral Risk Factor Surveillance System studied to assess the association of health insurance coverage with the receipt of preventive services.	The intervention consisted of a Behavioral Risk Factor Surveillance Survey 1991: All preventive services covered by health plan.	The first comparison group consisted of patients having most preventive services covered by a health plan. The second comparison group consisted of patients that had some preventive services covered by a health plan.		1. Receipt of PHE odds of receiving checkup according to level of health insurance compared to no health insurance coverage - Men, aged 18-39 years - Men, aged 40-64 years - Women, aged 18-39 years - Women, aged 40-64 years	The PHE was defined as a period health exam where a patient has receipt of recommended services within the periodicity schedules recommended for specific age/gender groups.	Internal Validity Concerns: 1. Reporting on differences between enrollees and non-enrollees External Validity Concerns: 1. Description of study inclusion/exclusion criteria not detailed 2. Description of study population characteristics not detailed 3. Description of PHE is not detailed Statistical Validity Concerns: 1. Potentially inadequate adjustment for residual confounding 2. Incomplete presentation of statistical significance

Table 2. Summary of Study Results. (continued)

Author, year	Year Study Began	Years (months of follow up)	Study population	Intervention Group	Comparison Group	Interventions outside of the PHE	Outcome(s) Assessed	Definition of PHE in this study	Study Limitations
Cross-sectional Studies									
Kottke, 1997[31]	1994		The study consisted of 6,830 randomly selected patients from 44 primary-care clinics who completed a mail survey to ascertain their receipt of preventive services in the context of "checkup physical examinations" versus other types of visits	The intervention group consisted of patients who had a visit (reason for visit as declared by patient) for a health risk appraisal.	The first comparison group included patients with visits (reason for visit as declared by patient) for urgent problems. The second comparison group included patients with visits (reason for visit as declared by patient) for continuing condition. The third comparison group included patients with visits (reason for visit as declared by patient) for a follow-up. The fourth comparison group included patients with visits (reason for visit as declared by patient) other than for follow-up, continuing education, urgent problems, or health risk	Intervention Group: Providers: 1. continues quality improve-ment initiative	1. Pap smear 2. Counseling – smoking cessa-tion 3. Immunization - Rate** influenza vaccine offered by providers - Rate** pneumococcal vaccine offered by providers 4. Cholesterol screening** 5. Mammogram	The PHE was defined as a physical examination or check up that consisted of a breast exam, blood pressure measurement, pap smear, smoking cessation counseling, influenza & pneumovax immunization, cholesterol screening, and mammogram.	Internal Validity Concerns: 1. Reporting on differences between enrollees and non-enrollees External Validity Concerns: 1. Description of study population characteristics not detailed 2. Description of PHE is not detailed Statistical Validity Concerns: 1. Potentially inadequate adjustment for residual confounding 2. Incomplete presentation of statistical significance

Table 2. Summary of Study Results. (continued)

Author, year	Year Study Began	Years (months of follow up)	Study population	Intervention Group	Comparison Group	Interventions outside of the PHE	Outcome(s) Assessed	Definition of PHE in this study	Study Limitations
Cross-sectional Studies									
					appraisal.				
Sox, 1997[70]	1992		The study population consisted of 2,775 patients of family physicians and general internists in Vermont, age 42 years and older, with no life-threatening illness, and recently visited a physician completing a questionnaire and agreeing to review of medical records to assess their receipt of a "periodic health examination" and their receipt of recommended clinical preventive services	The intervention group received a periodic health examination.	The comparison group received cancer-specific, age-appropriate and sex-appropriate exams during usual care.		1. Pap smear 2. Counseling – dietary 3.Colon cancer screening - Mean proportion of persons in each practice receiving sigmoidoscopy - Mean proportion of persons in each practice receiving fecal occult blood testing 4. Mammogram	The PHE is this study was described as a routine physical examination that wasn't for a particular illness, but for a general check-up.	Internal Validity Concerns: 1. Reporting on differences between enrollees and non-enrollees External Validity Concerns: 1. Description of study inclusion/exclusion criteria not detailed 2. Description of study population characteristics not detailed 3. Description of PHE is not detailed Statistical Validity Concerns: 1. Concern regarding unit of analysis employed in presentation of

Table 2. Summary of Study Results. (continued)

Author, year	Year Study Began	Years (months of follow up)	Study population	Intervention Group	Comparison Group	Interventions outside of the PHE	Outcome(s) Assessed	Definition of PHE in this study	Study Limitations
Cross-sectional Studies									
									results 2. Incomplete presentation of statistical significance
Slesinger, 1976[63]	1973		The study population consisted of 989 employed individuals who had health insurance responding to household survey regarding their receipt of clinical preventive services in the past year	The intervention group consisted of employees who chose a prepaid group insurance plan.	The comparison group consisted of a random sampling of employees who chose the traditional Blue Cross/Blue Shield plan.	<u>Intervention Group:</u> Patients: 1. Comprehen-sive benefit package on a pre-payment basis <u>Control Group:</u> Patients: 1. Did not offer prepaid compre-hensive benefits package (no reimbursement for MD office visits or physical exams)	1. Pap smear 2. Receipt of PHE – receipt of general checkup in the past year	The PHE was described as a general physical check-up or Physical examination.	External Validity Concerns: 1. Study performed before USPSTF or similar contemporary preventive services guidelines in effect Statistical Validity Concerns: 1. Potentially inadequate adjustment for residual confounding

Table 2. Summary of Study Results. (continued)

Author, year	Year Study Began	Years (months of follow up)	Study population	Intervention Group	Comparison Group	Interventions outside of the PHE	Outcome(s) Assessed	Definition of PHE in this study	Study Limitations
Cross-sectional Studies									
Nakanishi, 1996[82] Nakanishi, 1996 (cont')	1992		The study population consisted of 227,581 inpatient and outpatient claims of residents aged 40 and over in 9 cities in Japan.	The intervention group consisted of Japanese adults aged 40 years and older in the National Health Insurance program.			1. Costs - Inpatient cost per insured person (yen) correlated with rate of use of health check-ups - High inpatient cost (600,000 yen or more) correlated with rate of use of health check-ups - Outpatient cost per insured person correlated with rate of use of health check-ups 2. Hospitalization - Hospital admission rate per 1000 insured persons correlation with rate of use of health checkups - Length of stay of 180	The PHE was described as a health examination that included (1) health check-ups as basic health examination (interview, body measure-ment, physical tests, blood pressure measure-ment, urinalysis and blood test) with special examina-tions when indicated, and screenings for stomach cancer (stomach radiography), uterus cancer (visual examination, cytodiagnosis and internal examination as cervical cancer screening and cytodiagnosis as uterine	Internal Validity Concerns: 1. Reporting on differences between enrollees and non-enrollees External Validity Concerns: 1. Results potentially not generalizable beyond Japanese population

Table 2. Summary of Study Results. (continued)

Author, year	Year Study Began	Years (months of follow up)	Study population	Intervention Group	Comparison Group	Interventions outside of the PHE	Outcome(s) Assessed	Definition of PHE in this study	Study Limitations
Cross-sectional Studies									
Nakanishi, 1996 (cont')							days or more per 1000 insured persons correlated with rate of use of health checkups	body screening), lung cancer (chest radiography and phlegm cellular test), breast cancer (visual examination and palpation), and colon cancer (occult blood test, starting in 1992) (for uterus cancer screening and breast cancer screening, women aged 30 or more are eligible); (2) issuance of a health notebook (recording health examinations, providing the eligibility of patients to receive medical care and maintaining	

Table 2. Summary of Study Results. (continued)

Author, year	Year Study Began	Years (months of follow up)	Study population	Intervention Group	Comparison Group	Interventions outside of the PHE	Outcome(s) Assessed	Definition of PHE in this study	Study Limitations
Cross-sectional Studies									
Nakanishi, 1996 (cont')								medical care records); (3) health education (health classes using brochures, posters, cable broadcasting, etc.); (4) individual health counseling; (5) rehabilitation programs; and (6) home-visit guidance (nursing techniques, treatment methods, training for activities for daily living at home, etc.).	
Somkin, 2004[68]	1999		The study population consisted of, 463 subjects aged 40 to 74 residing in Alameda County, California respondents to a telephone survey assessing their access to and	The intervention group included persons reporting they received a check-up in the last 12 months.	The comparison group included persons reporting they had not received a check-up in the last 12 months.		1. Pap smear 2. Mam-mogram	The PHE was defined as a check-up in the last 12 months.	External Validity Concerns: 1. Study not specifically designed to address Key Question

Table 2. Summary of Study Results. (continued)

Author, year	Year Study Began	Years (months of follow up)	Study population	Intervention Group	Comparison Group	Interventions outside of the PHE	Outcome(s) Assessed	Definition of PHE in this study	Study Limitations
Cross-sectional Studies									
			satisfaction with preventive services						

Table 2. Summary of Study Results. (continued)

Author, year	Year Study Began	Years (months of follow up)	Study population	Intervention Group	Comparison Group	Interventions outside of the PHE	Outcome(s) Assessed	Definition of PHE in this study	Study Limitations
Pre-post Studies									
Schneider, 2003[71]	1999	2 months	The study population consisted of 319 adult patients in an ambulatory family practice residency clinic in which physicians participated in a quality improvement program to enhance the delivery of the "health maintenance examination" and clinical preventive services	Patients received written material, and a reminder phone call. Providers received education on prevention measures.		Intervention Group: Patients: 1. Patient-held medical records Providers: 1. Chart-based reminders 2. Educational sessions on preventive measures Control Group: Patients: 1. Patient-held medical records Providers: 1. Chart-based reminders 2. Educational sessions on preventive measures	1. Pap smear 2. Counseling - Exercise counseling - Diet counseling - Alcohol counseling - Substance abuse counseling - Tobacco cessation counseling 3. Cholesterol screening 4. Colon cancer screening - Percentage receiving fecal occult test. - Percentage receiving sigmoidoscopy 5. Mammogram 6. Receipt of PHE	The PHE was defined as a health maintenance examination.	External Validity Concerns: 1. Study not specifically designed to address Key Question Statistical Validity Concerns: 1. Potentially inadequate adjustment for residual confounding

Table 2. Summary of Study Results. (continued)

Author, year	Year Study Began	Years (months of follow up)	Study population	Intervention Group	Comparison Group	Interventions outside of the PHE	Outcome(s) Assessed	Definition of PHE in this study	Study Limitations
Pre-post Studies									
Geiger, 1993[72]	1990	5 months	The study population consisted of 23 family practice residents and faculty physicians who provided for 3,300 patients, using a practice-based teaching model to increase resident compliance with USPSTF guidelines	The intervention consisted of two sequential phases. In phase one, physicians were educated about providing preventive services in accordance with USPSTF guidelines in the context of a "health check." In phase two, physicians were monitored for their delivery of a recommended preventive services during scheduled health checks.		Intervention Group: Patients: 1. Written Material Control Group: Patients: 1. Written Material	1. Pap smear 2. Counseling - Substance abuse counseling - Diet counseling - Oral health counseling (dental care) - Physical activity counseling 3. Cholesterol screening 4. Mammogram	Te PHE was described as preventive services (health check; physical examination) that assessed blood pressure, breast exam, pap smear, height, weight, visual acuity, hearing, substance abuse activity, diet activity, injury prevention activity, oral health, and physical activity use. In addition, Influenza, pneumovax, & tetanus immunizations, cholesterol screening, mammography, urinalysis, and thyroid function.	Internal Validity Concerns: 1. Standard/valid reporting of outcomes Statistical Validity Concerns: 1. Potentially inadequate adjustment for residual confounding

Table 2. Summary of Study Results. (continued)

‡ Larger values indicate worse health.
¶ Colon/rectum, breast, cervix/uterine, prostate, and kidney cancer, hypertension, hypertensive cardiovascular disease, hemorrhagic cerebrovascular disease.
*Date published; unspecified
**Clinic weighted rate across 44 primary care clinics.

Table 3. Type and Number of Outcomes Reported in Studies.

Type of outcomes and number reported in studies	*n*(%) studies
Delivery of Clinical Preventive Services	
1 outcome	7(19)[16,53,56,63,73-75]
2 outcomes	2(6)[42,68]
3 or more outcomes	11(31)[31,44,55,64-67,69-72]
Proximal Clinical Outcomes	
1 outcome	1(3)[45]
2 outcomes	2(6)[56,57]
3 or more outcomes	3(8)[53,54,59,77]
Distal Clinical and Economic	
1 outcome	5(14)[28,58,61,62,83]
2 outcomes	4(11)[29,53,55,82]
3 or more outcomes	3(8)[41,56,57]
Interventions to improve receipt of PHE	
1 outcome	5(14)[22,60,63,71,84]
All Outcomes (regardless of type)	
1 outcome	13(36)[45,58,60,62,83,84 16,22,28,61,73-75]
2 outcomes	5(14)[29,42,63,68,82]
3 or more outcomes	18(50)[44,53-57 31,41,59,64-67,69-72,77]

Table 4. Quality of Identified Studies on the Value of the Periodic Health Evaluation.

Author, year	External validity*	Internal validity†	Statistical Analysis‡	Total score§
Lin, 2004	low	high	high	high
Somkin, 2004	high	medium	high	high
Flocke, 2004; Eaton, 2002	medium	high	high	high
Schneider, 2003	medium	medium	medium	medium
Finkelstein, 2002	low	medium	high	medium
Hahn, 1999	medium	low	low	low
Chiou, 2002	low	low	high	medium
Burton, 2002	high	low	low	low
Tao, 2001	low	low	low	low
Parchman, 2001	low	medium	low	low
Nutting, 2001	low	low	medium	low
Hama, 2001	medium	high	medium	high
Patrick, 1999	medium	medium	low	low
Stange, 2000	high	high	medium	high
Freedman, 2000	high	high	medium	high
Williams, 1998	high	low	high	medium
Faulkner, 1997	low	high	medium	medium
Kottke, 1997	medium	low	high	medium
Sox, 1997	low	medium	medium	medium
Elder, 1995; Mayer, 1994	high	medium	high	high
Christensen, 1995	high	medium	high	high
Morrissey, 1995	high	high	high	high
Burton, 1995; German, 1995; Burton, 1997; Burton, 1995	high	high	medium	high
Morrissey, 1995	medium	high	medium	high
Norman, 1992	medium	high	low	medium
Belcher, 1990	medium	medium	medium	low
Bernacki, 1988	low	low	low	low
Stone, 1981; Stone, 1978; South-east London, 1977; Trevelyan, 1973; South-east London, 2001	high	medium	low	medium
Fletcher, 1977	high	low	medium	medium
Slesinger, 1976	low	low	low	low
Cutler, 1973; Collen, 1973; Dales, 1973; Ramcharan, 1973; Friedman, 1986; Dales, 1979; Norinder, 2002	high	medium	low	low
Robert, 1969	low	low	low	low
Grimaldi, 1965	low	low	low	low
Theobald, 1998	medium	low	medium	low
OXCHECK, 1995a; OXCHECK, 1995b	medium	medium	low	medium
Nakanishi, 1996	medium	high	medium	high

Table 4. Quality of Identified Studies on the Value of the Periodic Health Evaluation. (continued)

*External validity includes quality of reporting on study inclusion/exclusion criteria, characteristics of study population, description of periodic health evaluation (PHE) or interventions to change the delivery of the PHE, and description of outcomes. See text under "Article summary quality" for more detail regarding assessment of quality.
†Internal validity includes assessment of randomization scheme (for trials), appropriateness of control group (for trials), assessment of those who enrolled versus those who did not enroll, assessment of withdrawals, blinding of intervention assignment and outcome assessment (for trials), and adequacy of outcome measurement. See text under "Article summary quality" for more detail regarding assessment of quality.
‡ Statistical analysis quality includes reporting on sample size calculations, presentation of statistical significance, and appropriateness of statistical methods. See text under "Article summary quality" for more detail regarding assessment of quality.
§ Scores of high, medium, or low indicate that the article scored in the highest, middle, or lowest tertile of scores.

Table 5. Components Which were Included (or may have been included) in Studies on the Periodic Health Evaluation (*N*=36)

Component of PHE	*n*(%)
History and Risk Assessment	
Tobacco smoking	14(39)
Alcohol/ substance abuse	13(36)
Dietary risk factors	12(33)
Physical Activity	10(27)
Injury prevention	6(17)
Safe sexual practices	6(17)
Sun exposure	4(11)
Oral health	4(11)
Medications/ Poly-pharmacy	4(11)
Calcium intake	2(6)
Folic acid intake	2(6)
Physical Examination	
Blood pressure assessment	18(50)
Examination (not otherwise specified)	14(39)
Breast examination	12(33)
Weight	12(33)
Height	10(28)
Gynecological examination	10(28)
Cardiovascular examination	5(14)
Pulmonary examination	5(14)
Eye* examination	5(14)
Pulse	4(11)
Rectal examination	4(11)
Prostate examination	4(11)
Abdominal examination	4(11)
Neurological examination	3(8)
Foot examination	2(6)
Other†	13(36)

* fundoscopic
† vision testing, tonometry, audiometry

Table 6. Grading of the Overall Strength of Evidence on the Value of the Periodic Health Evaluation.

Outcome	Pap smear	Coun-seling	Immun-izations	Choles-terol	Colon cancer	Mam-mogram	Disease detection	Health habits	Patient attitudes	Health Status	Blood Pressure	Serum Choles-terol	Body Mass Index	Costs
Number of studies§	2 (2)	7 (1)	3 (3)	5(1)	2 (2)	2 (1)	2 (2)	5 (5)	1 (1)	2 (2)	2 (2)	2 (1)	3 (3)	4(4) ‡
Strength of study design*	4	3	4	3	4	3	4	4	4	4	4	3	4	4
Did the studies have serious (-1) or very serious (-2) limitations in quality? (Enter 0 if none)	-0.5	-1	-1	-1	-1	-1	-1	-1	-1	-1	-0.5	-1	-1	-1
Did the studies have important inconsistency? (-1)	0	-0.5	-1	0	0	-0.5	-1	-1	0	-0.5	-0.5	-0.5	-1	-1
Were data imprecise or sparse? (-1)	0	0	0	0	0	0	0	0	-1	0	0	0	0	0
Did the studies have high probability of reporting bias? (-1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Did the studies show strong evidence of association between intervention and recruitment outcome?†	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Overall grade of evidence (high, medium, low, very low)	3.5 High	1.5 Low	2 Med.	2 Med	4 High	1.5 Low	2 Med	2 Med	2 Med	2.5 Medium	3 High	1.5 Low	2 Med	2 Med

Table 6. Grading of the Overall Strength of Evidence on the Value of the Periodic Health Evaluation. (continued)

Outcome	Dis-ability	Hospi-talization	Mortality	Receipt of PHE
Number of studies§	2 (2)	3 (3)	5 (5)	2 (1)
Strength of study design*	4	4	4	3
Did the studies have serious (-1) or very serious (-2) limitations in quality? (Enter 0 if none)	-1	-0.5	-1	-0.5
Did the studies have important inconsistency? (-1)	-1	-0.5	-1	0
Were data imprecise or sparse? (-1)	0	0	0	0
Did the studies have high probability of reporting bias? (-1)	0	0	0	0
Did the studies show strong evidence of association between intervention and recruitment outcome?†	0	0	0	0
Overall grade of evidence (high, medium, low, very low)	2 Med	3 High	2 Med	2.5 Med

Table 6. Grading of the Overall Strength of Evidence on the Value of the Periodic Health Evaluation. (continued)

* Were study designs randomized trials (high quality), non-randomized controlled trials (medium quality), or observational studies (low quality)?
† Evidence was deemed "strong" if significant relative risk or odds ratio >2 (or Cohen's d ≥0.8) based on consistent evidence from 2 or more studies with no plausible confounders (+1); "very strong" if significant relative risk or odds ratio >5 based on direct evidence with no major threats to validity (+2).
PHE = periodic health evaluation
§ Parentheses contain number of randomized controlled trials considered among the best available evidence.
‡One study evaluating cost-effectiveness as cost per percent coronary risk reduction not included[81] due to inability to assess direction of results.

Table 7. Comparison of Effect Sizes in Randomized Controlled Trials.

	Effect size (95% CI)			Not able to calculate ES
	Outcomes in studies with positive effect of PHE	Outcomes in studies with negative effect of PHE	Confidence interval crosses 0	
Outcomes				
Receipt of Pap smear	1.71 (1.69, 1.73)[55] 0.07 (0.07, 0.07)[80]			
Preventive counseling	1.09 (1.08,1.11)[44c] 1.19 (1.17, 1.21)[44b]			
Immunizations	0.35 (0.33, 0.36)[55a] 0.10 (0.10, 0.10)[53a]	-0.22 (-0.24, -0.20)[44a]		
Cholesterol screening	0.02 (0.00, 0.04)[55]			
Colon cancer screening (fecal occult blood testing)	1.19 (1.17, 1.21)[55] 1.07 (1.05, 1.08)[44]			
Mammography	0.14 (0.12, 0.16)[55]			
Disease detection	0.03 (0.02, 0.03)[76f] 0.96 (0.84, 1.08)[45a] 0.53 (0.41, 0.64)[45b]	-0.01 (-0.01, -0.01)[76d] -0.03 (-0.03, -0.03)[76g]	-0.01 (-0.01, 0.00)[76e]	
Health habits	0.28 (0.14, 0.42)[54a] 0.120 (0.117, 0.123)[53b] 0.040 (0.037, 0.043)[53c] 0.345 (0.342, 0.348)[53d] 0.080 (0.077, 0.083)[53e] 0.020 (0.017, 0.023)[53f] 0.020 (0.017, 0.023)[53g] 0.100 (0.098, 0.102)[59a] 0.032 (0.030, 0.034)[59b] 0.088 (0.086, 0.090)[59c] 0.244 (0.242, 0.246)[59d] 0.250 (0.248, 0.252)[59e] 0.13 (0.11,0.14) [78a]	-0.040 (-0.043, -0.037)[53h] -0.014 (-0.016, -0.012)[76c] -.02 (-.03, -.02)[78b]	0.000 (-0.14, 0.14)[54b] 0.01 (-0.13, 0.15)[54c] 0.02 (-0.12, 0.16)[54d] 0.05 (-0.09, 0.19)[54e] 0.01 (-0.13, 0.15)[54f]	
Patient attitudes				[53]
Health Status				[56]
Blood Pressure	0.12 (0.02,0.21)[54g] 0.11(0.04, 0.18)[59f] 0.13 (0.06, 0.19)[59g] 0.022 (0.019, 0.024)[59h]		0.03 (-0.06, 0.13)[54h]	
Changes in serum cholesterol levels	0.22 (0.16, 0.29)[59k] 0.09 (0.09, 0.10)[59l]			

Table 7. Comparison of Effect Sizes in Randomized Controlled Trials. (continued)

	Effect size (95% CI)			Not able to calculate ES
	Outcomes in studies with positive effect of PHE	Outcomes in studies with negative effect of PHE	Confidence interval crosses 0	
Outcomes				
Body Mass Index	0.087 (0.022, 0.153)[59i] 0.032 (0.030, 0.034)[59j]	-0.020 (-0.023,-0.017)[53i]	-0.031 (-0.170, 0.108)[54i] -0.036 (-0.174, 0.103)[54j]	
Reduction in health care costs			0.06 (-0.03, 0.15)[55d] 0.05(-0.04, 0.14) [55e]	[47,53,56]
Reduction in disability	0.060 (0.054, 0.066)[96a]	-0.014 (-0.016, -0.012)[76]		
Reduction in hospitalizations	0.01 (0.00, 0.01)[76a]		0.02 (-0.07, 0.11)[55b] -0.04 (-0.13, 0.05)[55c]	[56b,c,d,e]
Reduction in all-cause mortality	0.06 (0.05, 0.06)[56a] 0.004 (0.004, 0.005)[9a]	-0.03 (-0.04, -0.03)[53a] -0.002 (-0.003, -0.0003)[76b]	Rate ratio: 1.03 (0.94,1.14)[58]	
Receipt of PHE (Question 4)	0.69 (0.68,0.70)[60]			

ES = effect size; CI = confidence interval

Citation([55]) a: influenza vaccination, b: hospital days per enrollee, c: Admissions per enrollee, d: 3-year post-intervention cumulative Medicare charges; e: 3-year post-intervention cumulative Medicare reimbursement

Citation([45]) a: disease detection of ALL problems before and after intervention, b: disease detection of important problems before and after intervention;

Citation([53]) a: Influenza vaccination, b: Physical activity, c: Diet (fat and fiber), d: Advance directives, e: Breast self-exam, f: Smoking, g: Alcohol, h: Seat belt use; I: at risk for obesity, 24-month F/U

Citation([44]) a: influenza vaccination, b: alcohol abuse, c: smoking cessation

Citation([76]) a: Hospitalizations, b: Mortality rate per 1000 person-years at risk: all cause death, c: percentage still smoking, d: angina, e: high diastolic blood pressure, f: ischemia on electrocardiogram, g: bronchitis symptoms;

Citation([56]) a: Death; b: Mean inpatient days for the intervention and control groups who had a hospital discharge in that year (Year 1), c: Mean inpatient days Year 2, d: Hospital discharges per 1000 Year 1, e: Hospital discharges per 1000 Year 2;

Citation([53]) a: Mortality at 48 months;

Citation([9]) a: Deaths, rate per 1000 persons 16 years;

Citation([96]) a: Disability at 11 years

Citation([54]) a: fiber servings per day, b: fat servings per week, c: salt use, d: caffeine drinks per day, e: stretching minutes per week, f: consumption of cruciferous foods; g: mean systolic blood pressure at 12 months; h: mean diastolic blood pressure at 12 months; i: mean BMI at 24 months (end of intervention period); j: mean BMI at 48 months (end of F/U)

Citation([59]) a: smoking, b: alcohol use, c: exercise less than once per month, d: use full cream milk, e: use butter or hard margarine; f: systolic blood pressure at 3-year follow up; g: diastolic blood pressure at 3-year follow up; h: proportion of high risk diastolic pressure (≥100mm Hg) from 3 year F/U when compared to control; i: mean BMI at 3-year F/U; j: percentage of participants with BMI ≥ 30; k: mean total cholesterol at 3-year F/U; l: proportion of high risk cholesterol (≥8mmol/l) at 3 year F/U

Citation([78]) a: smoking, b: problem alcohol drinking

Table 8. Number of Studies (presented in cells) Reporting Outcomes According to Study Design and Direction of Results Reported.

	Number of Studies According to Study Design and Direction‡ of Results															Totals					
	Experimental						Observational									Experimental			Observational		
	RCT* (N†= 11)			Non-RCT* (N†= 1)			Cohort* (N†= 7)			Cross-Sectional* (N†= 14)			Pre-Post* (N†= 3)								
Examined Outcome	+ PHE	ø PHE	- PHE	+ PHE	ø PHE	- PHE	+ PHE	ø PHE	- PHE	+ PHE	ø PHE	- PHE	+ PHE	ø PHE	- PHE	+ PHE	ø PHE	- PHE	+ PHE	ø PHE	- PHE
Delivery of Clinical Preventive Services																					
Physical Examination																					
Pap Smear	2							1		7	1		1	1		2			8	3	
Preventive Counseling																					
Counseling	1									5		1	1	1		1			6	1	1
Preventive Immunizations																					
Immunizations	2		1				1			3			2			2		1	6		
Laboratory, Radiological Testing																					
Cholesterol Screening	1									4				2		1			4	2	
Colon Cancer Screening	2							1		2			1			2			3	1	
Mammography	1							1		7		1		2		1			7	3	1
Proximal Clinical Outcomes																					
Disease Detection	1	1					1									1	1		1		
Health Habits	1	3	1													1	3	1			
Patient Attitudes	1															1					
Health Status	1	1														1	1				
Blood Pressure	1	1						1								1	1			1	
Serum Cholesterol	1							1								1				1	
Body Mass Index	1	1	1					1								1	1	1		1	
Distal Clinical and Economic Outcomes																					
Costs[£]	1	2	1				2		1	1						1	2	1	3		1
Disability	1		1				1									1		1	1		
Hospitalization	1	2								1						1	2		1		
Mortality	2	2	1				2									2	2	1	2		
Interventions to improve receipt of PHE	1			1						1	1		2			2			2	1	

Table 8. Number of Studies (presented in cells) Reporting Outcomes According to Study Design and Direction of Results Reported. (continued)

*Study design definitions: RCT=randomized controlled trial (study of two groups randomly assigned to intervention (versus control)); non-RCT=non-randomized controlled trial (study of two groups randomly assigned to intervention (versus control)—intervention assignment not random); Cohort (study with prospective or retrospective longitudinal observation of study population (no intervention assignment)); Cross-sectional (study population observed at one point in time (no intervention assignment, no prospective or retrospective observation); Pre-Post=Pre-post observational design (one study group in which baseline measurements are taken (pre-intervention phase). These measurements are repeated on the same study group following the implementation of an intervention (post-intervention phase).

†N represents total number for entire review.

‡Direction of results: +PHE = Articles reporting the PHE improves delivery (or is associated with improved delivery) of clinical preventive services, proximal clinical outcomes, or distal and economic outcomes; -PHE = Articles reporting the PHE worsens delivery (or is associated with worse delivery) of clinical preventive services, proximal clinical outcomes, or distal and economic outcomes; ø PHE = Articles reporting mixed results (positive, negative, or neutral) with regard to the association of receipt of the PHE with clinical outcomes.

£One RCT examining cost-effectiveness is not included because of the inability to assess direction of results.[81]

Table 9. Summary of Results from Best Available Evidence to Assess Each Outcome.

Outcome	Type* of Evidence Assessing Considered (number of studies)	Strength and Consistency of Evidence	Range of Magnitude and Direction of Effects of PHE on Outcome**
Delivery of Clinical Preventive Services			
Gynecological examination/ Pap smear	RCTs (2)	High	Small to Large Positive
Counseling	RCTs (1) Observational (6)	Low	Mixed
Immunizations	RCTs (3)	Medium	Mixed
Cholesterol Screening	RCTs (1) Observational (4)	Medium	Small to Large Positive
Colon Cancer Screening (Fecal Occult Blood Testing)	RCTs (2)	High	Large Positive
Mammography	RCTs (1) Observational (1)	Low	Mixed
Proximal Clinical Outcomes			
Disease Detection	RCTs (2)	Medium	Mixed
Health Habits	RCTs (5)	Medium	Mixed
Patient Attitudes (Worry)	RCTs (1)	Medium	Positive†
Health Status	RCTs (2)	Medium	Mixed†
Blood Pressure	RCTs (2)	High	Mixed
Serum Cholesterol	RCTs (1) Observational (1)	Low	Mixed
Body Mass Index	RCTs (3)	Medium	Mixed
Distal Clinical and Economic Outcomes			
Costs	RCTs (4)	Medium	Mixed
Disability	RCTs (2)	Medium	Mixed
Hospitalization	RCTs (3)	High	Mixed
Mortality	RCTs (5)	Medium	Mixed
Improvement in Receipt of PHE	RCTs (1) Non-RCTs (1)	Medium	Medium to Large Positive

*RCT=Randomized controlled trial; Observational=Studies with observational design; non-RCT=non-randomized controlled trials

**Magnitude and direction of effect of receipt of PHE on outcome, based on standardized effect sizes calculated using Cohen's d. We considered effect sizes ranging from 0 to 0.25 to represent "small" effects, ranging from 0.25 to 0.8 to represent "medium" sized effects, and effect sizes greater than 0.8 to represent "large" effects. Effect sizes can be thought of as the average percentile standing of the average treated (or experimental) participant relative to the average untreated (or control) participant. An ES of 0.0 indicates that the mean of the treated group is at the 50th percentile of the untreated group. An ES of 0.25 indicates that the mean of the treated group is at the 58th percentile of the untreated group. An ES of 0.8 indicates that the mean of the treated group is at the 79th percentile of the untreated group.

†Standardized effect size could not be calculated for the study or studies assessing this outcome.

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All Journals Hand Searched January 2005 through January 2006.

American Family Physician
American Journal of Managed Care
American Journal of Preventive Medicine
American Journal of Public Health
Annals of Internal Medicine
Archives of Family Medicine
Archives of Internal Medicine
Canadian Family Physician
Canadian Medical Association Journal
Cancer
Family Medicine
Journal of Community Health
Journal of Family Practice
Journal of General Internal Medicine
Journal of Occupational Medicine
Journal of the American Academy of Nurse Practitioners
Journal of the American Geriatrics Society
Journal of the American Medical Association (JAMA)
Mayo Clinic Proceedings
Medical Care
Medical Journal of Australia
New England Journal of Medicine
Preventive Medicine
Public Health Reports

MEDLINE Strategy

("Periodic physical examination"[tiab] OR "Periodic physical examinations"[tiab] OR "Periodic health examination"[tiab] OR "Periodic health examinations"[tiab] OR "Periodic health evaluations"[tiab] OR "Periodic screening"[tiab] OR "Periodic check up"[tiab] OR "Periodic checkup"[tiab] OR "Annual physical examination"[tiab] OR "Annual physical examinations"[tiab] OR "Annual health examination"[tiab] OR "Annual health examinations"[tiab] OR "Annual screen"[tiab] OR "Annual screening"[tiab] OR "Annual health check up"[tiab] OR "Annual check up"[tiab] OR "Annual checkup"[tiab] OR "Multiphasic health examination"[tiab] OR "Multiphasic screening"[tiab] OR "Multiphasic checkup"[tiab] OR "Multiphasic Health testing "[tiab] OR "Preventive health examinations"[tiab] OR "Preventive screening"[tiab] OR "primary care screening"[tiab] OR "Initial physical examination"[tiab] OR "Initial screen"[tiab] OR "Initial screening"[tiab] OR "Initial check up"[tiab] OR "preventive services delivery"[tiab] OR "preventive service delivery"[tiab] OR "preventive service"[tiab] OR "preventive services"[tiab] OR "well care visit"[tiab] OR "well care visits" [tiab]) NOT (animal[mh] NOT human[mh]) AND English[lang]	4827

Cochrane Library (all databases)

(Periodic NEAR (examination OR physical OR health OR evaluation OR screening OR checkup)) OR (Multiphasic NEAR (health OR examination OR screen OR screening OR checkup OR testing)) OR (Preventive NEAR (health OR examination OR screening OR screen OR services OR delivery))	782

CINAHL Strategy

((TX Periodic W1 Health W1 Examination) OR (TX Periodic W1 Health W1 Evaluation)) OR ((TX Annual W1 physical) OR (TX Annual W1 health W1 examination) OR (TX Annual W1 checkup)) OR ((TX Multiphasic W1 Health W1 screening) OR (TX Multiphasic W1 Health W1 testing)) OR ((TX Preventive W1 Health W1 Examination) OR (TX Preventive W1 Health W1 screening) OR (TX Preventive W1 Health W1 services) OR (TX Preventive W1 screening) OR (TX Preventive W1 services)) OR ((TX Initial W1 screening) OR (TX Initial W1 screen))	1207

Previewing Only: You cannot submit data from this form

Previewing at Level 1

REF ID1Cole, R. C., Morandi, F., Avenell, J., and Daniel, G. B.Trans-splenic portal scintigraphy in normal dogsVet Radiol Ultrasound2005462146-52
State: Excluded, Level: Abstract Review

Save to finish later | Submit Data

1. Does this article **POTENTIALLY apply** to any of our Key Questions?

- Potentially eligible
- Ineligible--contains NO USEFUL INFORMATION
- Ineligible--SAVE as a reference article/ SCAN references

Clear Selection

Save to finish later | Submit Data

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Previewing Only: You cannot submit data from this form

Previewing at Level 2

REF ID1Cole, R. C., Morandi, F., Avenell, J., and Daniel, G. B.Trans-splenic portal scintigraphy in normal dogsVet Radiol Ultrasound2005462146-52
State: Excluded, Level: Abstract Review

Keywords:
No keywords available

Increase Font Size
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Abstract:
The purpose of this study was to (1) establish a technique for ultrasound-guided trans-splenic portal scintigraphy (TSPS) using 99mTcO4(-), (2) evaluate portal vein morphology, (3) compare the radiation exposures for TSPS vs. per-rectal portal scintigraphy (PRPS), and (4) compare the quality of numerical data from the TSPS vs. PRPS. Eight juvenile dogs underwent PRPS and TSPS (minimum of 48h between studies) after initial screening tests. PRPS was done according to established protocol using 425 +/- 36MBq (mean +/- SD) of 99mTcO4(-). TSPS was done with the dogs in right lateral recumbency over the gamma camera. 99mTcO4(-) (57 +/- 13.9 MBq) was injected into the spleen 1-2s following initiation of the dynamic acquisition. The frame rate was 4 frames/s for 5 min. There was significantly lower radioactivity of 99mTcO4(-) given and significantly higher total counts recorded in the liver and heart during the TSPS compared with PRPS. The total counts for the TSPS and PRPS were 7120 +/- 4386 and 830 +/- 523, respectively. Percent absorption from the spleen was 52.5 +/- 19.1% compared with 9.2 +/- 5.7% for the colon. Calculated transit time for the TSPS studies was 7 +/- 2.3s. In TSPS studies, the splenic and portal veins were clearly identified. Radiation exposure levels of the dogs were significantly lower following TSPS than after PRPS. TSPS appears superior to PRPS as a method to image the portal venous system representing a valid alternative diagnostic test for animals with suspected portosystemic shunts.

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Save to finish later Submit Data

1. No Abstract provided (check ONLY if the abstract is unavailable on screen).

- (●) Pull article

Clear Selection

3. Reason for exclusion (check ONE)

- ( ) No useful information (does not apply to the key questions)
- ( ) Not English language
- ( ) Includes only subject less than 18 years-old
- ( ) Review or Opinion piece, OR no original data
- ( ) Review or opinion piece: : PULL FOR REFERENCE SEARCHING

Clear Selection

4. Inclusion criteria (choose ALL that apply)

- [ ] Key Question 2. What is the evidence that a PHE, delivered at different patient ages or different frequencies, is associated with benefits (i.e. improved outcomes) compared to care without a PHE (e.g. usual care or opportunistic delivery of clinical preventive services)?
- [ ] Key Question 3. What is the evidence that a PHE, delivered at different patient ages or different frequencies, is associated with harms (i.e. worse outcomes) compared to care without a PHE (e.g. usual care or opportunistic delivery of clinical preventive services)?
- [ ] Key Question 4. What system-based interventions improve the receipt or delivery of the PHE (e.g. cost sharing such as deductibles, provider reminders)?

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Previewing at Level 3

REF ID1Cole, R. C., Morandi, F., Avenell, J., and Daniel, G. B.Trans-splenic portal scintigraphy in normal dogsVet Radiol Ultrasound2005462146-52
State: Excluded, Level: Abstract Review

Save to finish later | Submit Data

1. After reviewing the ENTIRE artcile, should this article be included in the review?

- YES
- NO

Clear Selection

2. Exclusion criteria. Check all that apply:

- Not English language
- No human data
- Meeting abstract--no full article for review
- Includes ONLY subjects less than 18 year of age
- Exposure is NOT the PHE (at least one group in the intervention must meet the minimu definition of the PHE)
- Article focuses on specific preventive measures ONLY without mention of the global PHE
- Clinical preventive services delivered only during opportunistic visit (e.g., illness or symptom-related visit) without mention of the PHE
- Article does not apply to any of the key questions
- No Original Data -- no useful information
- No Original Data -- pull for reference check
- No eligible comparison group (not pre-post, historical control, clinical trial, or concurrent cohort)
- No eligible comparison group but article contains valuable qualitative information
- Other

3. KEY QUESTIONS: (check all that apply)

- Key Question 2: What is the evidence that a PHE, delivered at different patient ages or different frequencies, is associated with benefits (i.e. improved outcomes) compared to care without a PHE (e.g. usual care or opportunistic delivery of clinical preventive services)? GO TO question 4 and choose outcomes
- Key Question 3: What is the evidence that a PHE, delivered at different patient ages or different frequencies, is associated with harms (i.e. worse outcomes) compared to care without a PHE (e.g. usual care or opportunistic delivery of clinical preventive services)? GO TO question 5 and choose outcomes
- Key Question 4: What system-based interventions improve the receipt or delivery of the PHE (e.g. cost sharing such as deductibles, provider reminders)? See the "Minimum definition of the PHE"

4. Key Question 2 outcomes (choose all that apply):

- a. Delivery of recommended clinical preventive services
- b. Patient attitudes/perceptions (e.g. knowledge, satisfaction, trust, respect)
- c. Behavioral outcomes (e.g. tobacco cessation, adherence)
- d. Proximal/intermediate clinical outcomes (e.g. cholesterol lowering, disease management)
- e. Distal clinical outcomes (e.g. measurable clinical events such as death, myocardial infarction)
- f. Economic outcomes (cost savings, improved health care utilization)
- g. Public Health (e.g. .improvements in family and community health, communicable disease containment)

5. Key Question 3 outcomes (choose all that apply):

- [ ] a. Delivery of non-recommended clinical preventive services
- [ ] b. Patient attitudes/perceptions (e.g. worry/anxiety)
- [ ] c. Behavioral outcomes (e.g. continuation of risky behaviors)
- [ ] d. Proximal/intermediate clinical outcomes (e.g. complications from testing)
- [ ] e. Distal clinical outcomes (e.g. measurable clinical events such as death)
- [ ] f. Economic outcomes (induced costs, less efficient health care utilization)
- [ ] g. Public Health (e.g. declines in family and community health)

DEFINITION OF THE PHE

The Periodic Health Evaluation (PHE) consists of one or more visits with a health care provider for the primary purpose of assessing a patient's overall health and risk factors for disease which may be prevented by early intervention. During the PHE, health care providers perform a history and risk assessment, followed by a physical exam. Based on the information gathered, patients may receive counseling, immunizations, lab testing or arrangements for other preventive health services during the evaluation. This opportunity may serve to improve intermediate and long-term patient outcomes and ultimately the public's health by appropriate clinical management of chronic conditions, patient education, and fostering the patient-provider relationship. The PHE has the potential to affect patient health and health care cost for the individual, the health care industry, and society as a whole.

Save to finish later Submit Data

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Previewing Only: You cannot submit data from this form

Previewing at Level 4

Refid: 1, Cole, R. C., Morandi, F., Avenell, J., and Daniel, G. B., Trans-splenic portal scintigraphy in normal dogs, *Vet Radiol Ultrasound*, 46(2), 2005, p.146-52
State: Excluded, Level: 2

Save to finish later | Submit Data

1. Pull previous article on this study for methods description (fill in only if this applies).

Pull reference #

Clear Selection

STUDY CHARACTERISTICS

2. What is the study design?

- Randomized controlled trial
- Controlled trial, non-randomized
- Concurrent cohort
- Historical comparison
- Pre-post comparison
- Other (specify)
- Not reported

Clear Selection

3. What are the years that the study was conducted?

If this infomation is not given please enter "NS" in each of the boxes below.

Year beginning

Year ending 199

4. Length of study follow-up

- Months
- Years
- Not specified
- not applicable (cross-sectional study)

Clear Selection

5. What country(ies) was the study conducted in (choose all that apply).

- U.S.
- U.K.
- Canada
- Japan
- Other
- Other
- Other

6. Check all that apply about the study setting:

- [ ] Urban
- [ ] Suburban
- [ ] Rural
- [ ] unclear

HEALTH CARE DELIVERY STRUCTURE

Choose all that apply to STUDY RECRUITMENT

7. Health care delivery system site (check all that apply):

- [ ] Physician office
- [ ] Solo practice
- [ ] Group practice
- [ ] Hospital outpatient clinic
- [ ] Academic practice
- [ ] Community health center
- [ ] Employee health clinic
- [ ] VA/other US DOD
- [ ] National health service clinic
- [ ] Family medicine practice
- [ ] Internal medicine practice
- [ ] Ob/gyn practice
- [ ] Specialty practice
- [ ] Housestaff clinic
- [ ] Other health care site _____
- [ ] Not specified
- [ ] Not applicable

8. Non-health care site (check all that apply):

- [ ] Worksite
- [ ] Non-worksite community setting
- [ ] Health fair
- [ ] Public place (i.e., supermarket), specify: _____
- [ ] Other _____

9. Health Plan (check all that apply):

- [ ] Commercial insurance
- [ ] Medicare
- [ ] Medicaid
- [ ] VA/ other DOD

- [ ] National health plan
- [ ] Staff model HMO
- [ ] Other managed care plan
- [ ] Employer health plan
- [ ] Other
- [ ] Not specified
- [ ] Not applicable

10. Who are the subjects?

- ( ) Patients
- ( ) How many patient comparison groups?
- ( ) Health providers
- (•) How many provider comparison groups?
- ( ) Both (when choosing this option fill out the number of comparison groups for providers and patients, but do not choose

Clear Selection

STUDY ELIGIBILITY CRITERIA for PATIENTS

11. Age range

Minimum

Maximum

Average

- [ ] Unclear

12. Gender

- ( ) Male
- ( ) Female
- ( ) Both

Clear Selection

13. Select one or more racial or ethnic groups

- [ ] American Indian or Alaska Native
- [ ] Asian
- [ ] Black or African American
- [ ] Native Hawaiian or Other Pacific Islander
- [ ] Latino/Hispanic
- [ ] White
- [ ] Not Specified
- [ ] Other
- [ ] Other

14. Is the patient an employee?

- ○ Yes
- ○ No
- ○ Not apllicable

Clear Selection

15. Is the patient an executive?

- ○ Yes
- ○ No
- ○ Not Applicable

Clear Selection

16. Is the patient a dependant?

- ○ Yes
- ○ No
- ○ Not applicable

Clear Selection

17. Health insurance plan type (check all that apply)

- ☐ Commercial insurance
- ☐ Medicare
- ☐ Medicaid
- ☐ VA/other US DOD
- ☐ National Health Insurance
- ☑ Managed Care Plan
- ☐ Staff Model HMO
- ☐ Other managed care plan
- ☐ Employer health plan
- ☐ Not Specified
- ☐ Other (specify)

18. Visit to practice required?

- ○ Yes
- ○ No
- ○ Not Specified

Clear Selection

19. Initial visit only?

- ○ Yes
- ○ No
- ○ Not applicable

Clear Selection

20. Number of visits:

Enlarge Shrink

21. Over what time period:

Enlarge Shrink

22. Specific health conditions (check all that apply):

- [ ] Hypertension
- [ ] Diabetes mellitus
- [ ] Tobacco smoking
- [ ] Hyperlipidemia
- [ ] Obesity
- [ ] Renal disease
- [ ] COPD
- [ ] Coronary artery disease
- [ ] Cancer
- [ ] Not Specified
- [ ] Other
- [ ] Other
- [ ] Other
- [ ] Other
- [ ] Other
- [ ] Other
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- [ ] Other
- [ ] Other
- [ ] Other
- [ ] Other
- [ ] Other
- [ ] Other

STUDY ELIGIBILITY CRITERIA for PROVIDERS

23. Were there provider eligibility criteria?

- ( ) Yes
- ( ) No

Clear Selection

24. Provider Type (check all that apply):

- [ ] Internists
- [ ] General Internists
- [ ] Ostetricians/Gynecologists
- [ ] Family Practitioners
- [ ] General Practitioners
- [ ] Medical sub-specialist (physician)
- [ ] Other specialist
- [ ] Housestaff
- [ ] Fellows
- [ ] Medical students
- [ ] Physicians NOS
- [ ] Other physicians
- [ ] Nurses
- [ ] Nurse practitioners
- [ ] Physician assistants
- [ ] Health provider NOS
- [ ] Other health provider
- [ ] Office Staff
- [ ] Not specified
- [ ] Not Applicable

Health Care Delivery Structure (includes health care delivery system site, non-health care site, and health plan). Click all that apply to PROVIDER ELIGIBILITY CRITERIA

25. Health care delivery system site (check all that apply):

- ☐ Physician office
- ☐ Solo practice
- ☐ Group practice
- ☐ Hospital outpatient clinic
- ☐ Academic practice
- ☐ Community health center
- ☐ Employee health clinic
- ☐ VA/other US DOD
- ☐ National health service clinic
- ☐ Family medicine practice
- ☐ Internal medicine practice
- ☐ Ob/gyn practice
- ☐ Specialty practice
- ☐ Other health care site _____
- ☐ Not specified
- ☐ Not applicable

26. Non-health care site (check all that apply):

- ☐ Worksite
- ☐ Non-worksite community setting
- ☐ Health fair
- ☐ Public place (i.e., supermarket), specify: _____
- ☐ Other _____
- ☐ Not specified
- ☐ Not Applicable

27. Health Plan (check all that apply):

- ☐ Commercial insurance
- ☐ Medicare
- ☐ Medicaid
- ☐ VA/ other DOD
- ☐ National health plan
- ☐ Staff model HMO

- [ ] Other managed care plan
- [ ] Employer health plan
- [ ] Other
- [ ] Not Specified
- [ ] Not Applicable

28. Provider experience

Number of years in training

Number of years since training

Number of years in practice

- [ ] Information not provided

TARGET PATIENT POPULATION CHARACTERISTICS

complete for each group of subjects

29.

COMPARISON GROUP 1 (define)

Enlarge Shrink

How is the PHE defined in GROUP 1?

30. Frequency. check all that apply

- [ ] Periodic (define)
- [ ] Annual (define)
- [ ] Initial visit
- [ ] Pre-employment
- [ ] Employment exam
- [ ] Scheduled
- [ ] Unclear
- [ ] not applicable
- [ ] Usual care

WHAT COMPONENTS WERE PART OF THE PHE FOR GROUP 1?

Minimum included: part of the defined PHE in the study.

May have included: defined in the articles as "may have occured"

31. Visit

- [ ] Minimum included
- [ ] May have included

History and risk assessment including:

	Minimum included	May have included
32. Diet	☐	☐
33. Physical activity	☐	☐
34. Alcohol/Substance abuse	☐	☐
35. Injury prevention	☐	☐
36. Safe sexual practices	☐	☐
37. Tobacco smoking	☐	☐
38. Calcium intake	☐	☐
39. Folic acid	☐	☐
40. Sun exposure	☐	☐
41. Oral health	☐	☐
42. Polypharmacy	☐	☐

Physical exam including:

	Minimum included	May have included
43. Blood pressure	☐	☐
44. Height	☐	☐
45. Weight	☐	☐
46. Pulse	☐	☐
47. Cardiac exam	☐	☐
48. Pulmonary	☐	☐
49. Abdominal	☐	☐
50. Neurologic	☐	☐
51. Breast	☐	☐
52. Gynecologic	☐	☐
53. Rectal	☐	☐
54. Prostate	☐	☐
55. Foot Exam	☐	☐
56. Eye exam (fundoscopic)	☐	☐

57. Physical excam not otherwise specified	☐	☐
58. Other 1 (define below)	☐	☐
59. Other 2 (define below)	☐	☐
60. Other 3 (define below)	☐	☐

61. Define: Other 1

Enlarge Shrink

62. Define: Other 2

Enlarge Shrink

63. Define: Other

Enlarge Shrink

Was any counseling given as a part of or as a result of the PHE for GROUP 1?

	Part of PHE	Result of PHE	
64. Diet	○	○	Clear
65. Physical activity	○	○	Clear
66. Alcohol/substance abuse	○	○	Clear
67. Injury prevention	○	○	Clear
68. Safe sexual practices	○	○	Clear
69. Smoking	○	○	Clear
70. Folic Acid	○	○	Clear
71. Sun exposure	○	○	Clear
72. Oral health	○	○	Clear
73. Polypharmacy	○	○	Clear
74. Unspecified counseling	○	○	Clear

75. Were any immunizations ordered or performed as part of the PHE for GROUP 1?

○ Yes

○ No or not applicable

Clear Selection

Specify	Performed	Ordered

76. Immunization 1
77. Immunization 2
78. Immunization 3

Was any testing performed or ordered as a result of the PHE for GROUP 1?

	Performed	Ordered	
79. Pap smear			Clear
80. GC/chyl screen			Clear
81. Audiometry			Clear
82. Vision testing			Clear
83. EKG			Clear
84. CXR			Clear
85. Mammography			Clear
86. Colon cancer screening			Clear
87. Sigmoidoscopy			Clear
88. Colonoscopy			Clear
89. Fecal occult blood			Clear
90. Bone mineral density testing			Clear
91. Glucose (lab)			Clear
92. Lipids (lab)			Clear
93. HgbA1C			Clear
94. CBC			Clear
95. Chem-7			Clear
96. PSA			Clear
97. U/A			Clear
98. TB			Clear
99. Other 1			Clear
100. Other 2			Clear
101. Other 3			Clear

102. Define Other 1 for labs

Enlarge Shrink

103. Define other 2 for labs

Enlarge Shrink

104. Define Other 3 for labs

Enlarge Shrink

105.

Is the exposure to the PHE defined in the same way across groups?

- Yes
- No

Clear Selection

DESCRIPTION OF THE INTERVENTION for GROUP 1

106. Was there an intervention outside of the PHE in the study?

- Yes
- No

Clear Selection

107. Who was the target of the intervention?

- Providers/office staff
- Office Staff/administration
- Patients

108. Who was the outcome measured on?

- Providers/office staff
- Office staff/administration
- Patients

109. Interventions targeting providers/office staff, check all that apply.

- Chart-based reminder
- Computer-based reminder
- Provider detailing
- Financial incentives
- CME incentives
- Other

110. Interventions targeting patients, check all that apply.

- Written material (e.g., letter, invitation)
- Reminder
- Phone call
- Incentive (gift)
- Financial incentive (change in co-pay/deductible)

- [ ] Financial incentive (offer free health care)
- [ ] Patient-held medical record
- [ ] Other

111. Is the intervention the same across groups?

- ( ) Yes
- ( ) No

Clear Selection

GENERAL CHARACTERISTICS FOR GROUP 1

	N	%
112. Female		
113. American Indian or Alaska Native		
114. Asian		
115. Black or African American		
116. Native Hawaiian or other Pacific Islander		
117. Latino/Hispanic		
118. White		
119. Other		
120. Low socioeconoimic status		
121. Rural		

122. Income (describe)

Enlarge Shrink

123. Define "Other" for Comparison Group 1

Enlarge Shrink

124. Define "low socioeconomic status" for Comparison Group 1

Enlarge Shrink

125. Define "rural" for Comparison Group 1

Enlarge Shrink

CLINICAL CHARACTERISTICS FOR GROUP 1

	N	%
126. Age		
127. Hypertension		
128. Diabetes mellitus		
129. Tobacco smoking		
130. Hyperlipidemia		
131. Obesity		
132. Renal disease		
133. COPD		
134. Coronary artery disease		
135. Cancer		
136. Other		

137. Define "other" clinical condition for Comparison Group 1.

Enlarge Shrink

EMPLOYMENT/INSURANCE CHARACTERISTICS FOR GROUP 1

	N	%
138. Executive employee		
139. Non-executive employee		
140. Employee dependant		
141. Commercial insurance		
142. Medicare		
143. Medicaid		
144. VA/ other US DOD		
145. National health insurance		
146. Managed care plan		
147. Staff model HMO		

148. Other managed care plan

149. Employer health plan

150. Other health plan

151. Define other managed care plan for comparison group 1

Enlarge Shrink

152. Define other health plan for comparison group 1

Enlarge Shrink

153. Other information not captured in previous questions.

Enlarge Shrink

154. **********

COMPARISON GROUP 2 (define)

Enlarge Shrink

How is the PHE defined in this study for GROUP 2?

155. Frequency. check all that apply

- [ ] Periodic (define)
- [ ] Annual (define)
- [ ] Initial visit
- [ ] Pre-employment
- [ ] Employment exam
- [ ] Scheduled
- [ ] Unclear
- [ ] Not applicable
- [ ] Usual care

WHAT COMPONENTS WERE PART OF THE PHE FOR GROUP 2?

Minimum included: part of the defined PHE in the study.

May have included: defined in the articles as "may have occured"

156. Visit

- [ ] Minimum included
- [ ] May have included

History and risk assessment including:

	Minimum included	May have included
157. Diet	☐	☐
158. Physical activity	☐	☐
159. Alcohol/Substance abuse	☐	☐
160. Injury prevention	☐	☐
161. Safe sexual practices	☐	☐
162. Tobacco smoking	☐	☐
163. Calcium intake	☐	☐
164. Folic acid	☐	☐
165. Sun exposure	☐	☐
166. Oral health	☐	☐
167. Polypharmacy	☐	☐

Physical exam including:

	Minimum included	May have included
168. Blood pressure	☐	☐
169. Height	☐	☐
170. Weight	☐	☐
171. Pulse	☐	☐
172. Cardiac exam	☐	☐
173. Pulmonary	☐	☐
174. Abdominal	☐	☐
175. Neurologic	☐	☐
176. Breast	☐	☐
177. Gynecologic	☐	☐
178. Rectal	☐	☐
179. Prostate	☐	☐
180. Foot Exam	☐	☐
181. Eye exam (fundoscopic)	☐	☐
182. Physical exam not otherwise specified	☐	☐
183. Other 1 (define below)	☐	☐
184. Other 2 (define below)	☐	☐

185. Other 3 (define below)

186. Define: Other 1

Enlarge Shrink

187. Define: Other 2

Enlarge Shrink

188. Define: Other 3

Enlarge Shrink

Was any counseling given as a part of or as a result of the PHE for GROUP 2?

	Part of PHE	Result of PHE	
189. Diet			Clear
190. Physical activity			Clear
191. Alcohol/substance abuse			Clear
192. Injury prevention			Clear
193. Safe sexual practices			Clear
194. Smoking			Clear
195. Folic Acid			Clear
196. Sun exposure			Clear
197. Oral health			Clear
198. Polypharmacy			Clear
199. Unspecified counseling			Clear

200. **Were any immunizations ordered or performed as part of the PHE for GROUP 2?**

Yes

No or not applicable

Clear Selection

	Specify	Performed	Ordered
201. Immunization 1			
202. Immunization 2			
203. Immunization 3			

Was any testing performed or ordered as a result of the PHE for GROUP 2?

	Performed	Ordered	
204. Pap smear	○	○	Clear
205. GC/chyl screen	○	○	Clear
206. Audiometry	○	○	Clear
207. Vision testing	○	○	Clear
208. EKG	○	○	Clear
209. CXR	○	○	Clear
210. Mammography	○	○	Clear
211. Colon cancer screening	○	○	Clear
212. Sigmoidoscopy	○	○	Clear
213. Colonoscopy	○	○	Clear
214. Fecal occult blood	○	○	Clear
215. Bone mineral density testing	○	○	Clear
216. Glucose (lab)	○	○	Clear
217. Lipids (lab)	○	○	Clear
218. HgbA1C	○	○	Clear
219. CBC	○	○	Clear
220. Chem-7	○	○	Clear
221. PSA	○	○	Clear
222. U/A	○	○	Clear
223. TB	○	○	Clear
224. Other 1	○	○	Clear
225. Other 2	○	○	Clear
226. Other 3	○	○	Clear

227. Define Other 1 for labs

Enlarge Shrink

228. Define other 2 for labs

Enlarge Shrink

229. Define Other 3 for labs

Enlarge Shrink

DESCRIPTION OF THE INTERVENTION for GROUP 2

230. Was there an intervention outside of the PHE in the study?

- ○ Yes
- ○ No

Clear Selection

231. Who was the target of the intervention?

- ☐ Providers/office staff
- ☐ Office Staff/administration
- ☐ Patients

232. Who was the outcome measured on?

- ☐ Providers/office staff
- ☐ Office staff/administration
- ☐ Patients

233. Interventions targeting providers/office staff, check all that apply.

- ☐ Chart-based reminder
- ☐ Computer-based reminder
- ☐ Provider detailing
- ☐ Financial incentives
- ☐ CME incentives
- ☐ Other _____

234. Interventions targeting patients, check all that apply.

- ☐ Written material (e.g., letter, invitation)
- ☐ Reminder
- ☐ Phone call
- ☐ Incentive (gift)
- ☐ Financial incentive (change in co-pay/deductible)
- ☐ Financial incentive (offer free health care)
- ☐ Patient-held medical record
- ☐ Other _____

GENERAL CHARACTERISTICS FOR GROUP 2

	N	%
235. Female		
236. American Indian or Alaska Native		
237. Asian		
238. Black or African American		
239. Native Hawaiian or other Pacific Islander		
240. Latino/Hispanic		

241. White		
242. Other		
243. Low socioeconoimic status		
244. Rural		

245. Income (describe)

Enlarge Shrink

246. Define "Other" for Comparison Group 2

Enlarge Shrink

247. Define "low socioeconomic status" for Comparison Group 2

Enlarge Shrink

248. Define "rural" for Comparison Group 2

Enlarge Shrink

CLINICAL CHARACTERISTICS FOR GROUP 2

	N	%
249. Age		
250. Hypertension		
251. Diabetes mellitus		
252. Tobacco smoking		
253. Hyperlipidemia		
254. Obesity		
255. Renal disease		
256. COPD		
257. Coronary artery disease		
258. Cancer		
259. Other		

260. Define "other" clinical condition for Comparison Group 2.

Enlarge Shrink

EMPLOYMENT/INSURANCE CHARACTERISTICS FOR GROUP 2

	N	%
261. Executive employee		
262. Non-executive employee		
263. Employee dependant		
264. Commercial insurance		
265. Medicare		
266. Medicaid		
267. VA/ other US DOD		
268. National health insurance		
269. Managed care plan		
270. Staff model HMO		
271. Other managed care plan		
272. Employer health plan		
273. Other health plan		

274. Define other managed care plan for comparison group 2

Enlarge Shrink

275. Define other health plan for comparison group 2.

Enlarge Shrink

276. Other information not captured in previous questions.

Enlarge Shrink

277. **********

COMPARISON GROUP 3 (define)

Enlarge Shrink

How is the PHE defined in this study for GROUP 3?

278. Frequency. check all that apply

- [ ] Periodic (define)
- [ ] Annual (define)
- [ ] Initial visit
- [ ] Pre-employment
- [ ] Employment exam
- [ ] Scheduled
- [ ] Unclear
- [ ] Not applicable
- [ ] Usual care

WHAT COMPONENTS WERE PART OF THE PHE FOR GROUP 3?

Minimum included: part of the defined PHE in the study.

May have included: defined in the articles as "may have occured"

279. Visit

- [ ] Minimum included
- [ ] May have included

History and risk assessment including:

	Minimum included	May have included
280. Diet	☐	☐
281. Physical activity	☐	☐
282. Alcohol/Substance abuse	☐	☐
283. Injury prevention	☐	☐
284. Safe sexual practices	☐	☐
285. Tobacco smoking	☐	☐
286. Calcium intake	☐	☐
287. Folic acid	☐	☐
288. Sun exposure	☐	☐
289. Oral health	☐	☐
290. Polypharmacy	☐	☐

Physical exam including:

	Minimum included	May have included
291. Blood pressure	☐	☐

292. Height	☐	☐
293. Weight	☐	☐
294. Pulse	☐	☐
295. Cardiac exam	☐	☐
296. Pulmonary	☐	☐
297. Abdominal	☐	☐
298. Neurologic	☐	☐
299. Breast	☐	☐
300. Gynecologic	☐	☐
301. Rectal	☐	☐
302. Prostate	☐	☐
303. Foot Exam	☐	☐
304. Eye exam (fundoscopic)	☐	☐
305. Physical exam not otherwise specified	☐	☐
306. Other 1 (define below)	☐	☐
307. Other 2 (define below)	☐	☐
308. Other 3 (define below)	☐	☐

309. Define: Other 1

Enlarge Shrink

310. Define: Other 2

Enlarge Shrink

311. Define: Other 3

Enlarge Shrink

Was any counseling given as a part of or as a result of the PHE for GROUP 3?

	Part of PHE	Result of PHE	
312. Diet	◯	◯	Clear
313. Physical activity	◯	◯	Clear
314. Alcohol/substance abuse	◯	◯	Clear
315. Injury prevention	◯	◯	Clear
316. Safe sexual practices	◯	◯	Clear

317. Smoking	◯	◯	Clear
318. Folic Acid	◯	◯	Clear
319. Sun exposure	◯	◯	Clear
320. Oral health	◯	◯	Clear
321. Polypharmacy	◯	◯	Clear
322. Unspecified counseling	◯	◯	Clear

323. **Were any immunizations ordered or performed as part of the PHE for GROUP 3?**

◯ Yes

◯ No or not applicable

Clear Selection

	Specify	Performed	Ordered
324. Immunization 1		☐	☐
325. Immunization 2		☐	☐
326. Immunization 3		☐	☐

Was any testing performed or ordered as a result of the PHE for GROUP 3?

	Performed	Ordered	
327. Pap smear	◯	◯	Clear
328. GC/chyl screen	◯	◯	Clear
329. Audiometry	◯	◯	Clear
330. Vision testing	◯	◯	Clear
331. EKG	◯	◯	Clear
332. CXR	◯	◯	Clear
333. Mammography	◯	◯	Clear
334. Colon cancer screening	◯	◯	Clear
335. Sigmoidoscopy	◯	◯	Clear
336. Colonoscopy	◯	◯	Clear
337. Fecal occult blood	◯	◯	Clear
338. Bone mineral density testing	◯	◯	Clear
339. Glucose (lab)	◯	◯	Clear
340. Lipids (lab)	◯	◯	Clear
341. HgbA1C	◯	◯	Clear
342. CBC	◯	◯	Clear
343. Chem-7	◯	◯	Clear
344. PSA	◯	◯	Clear
345. U/A	◯	◯	Clear

346. TB Clear

347. Other 1 Clear

348. Other 2 Clear

349. Other 3 Clear

350. Define Other 1 for labs

Enlarge Shrink

351. Define other 2 for labs

Enlarge Shrink

352. Define Other 3 for labs

Enlarge Shrink

DESCRIPTION OF THE INTERVENTION FOR GROUP 3

353. Was there an intervention outside of the PHE in the study?

- Yes
- No

Clear Selection

354. Who was the target of the intervention?

- Providers/office staff
- Office Staff/administration
- Patients

355. Who was the outcome measured on?

- Providers/office staff
- Office staff/administration
- Patients

356. Interventions targeting providers/office staff, check all that apply.

- Chart-based reminder
- Computer-based reminder
- Provider detailing
- Financial incentives
- CME incentives
- Other

357. Interventions targeting patients, check all that apply.

- Written material (e.g., letter, invitation)

- [ ] Reminder
- [ ] Phone call
- [ ] Incentive (gift)
- [ ] Financial incentive (change in co-pay/deductible)
- [ ] Financial incentive (offer free health care)
- [ ] Patient-held medical record
- [ ] Other

GENERAL CHARACTERISTICS FOR GROUP 3

	N	%
358. Female		
359. American Indian or Alaska Native		
360. Asian		
361. Black or African American		
362. Native Hawaiian or other Pacific Islander		
363. Latino/Hispanic		
364. White		
365. Other		
366. Low socioeconoimic status		
367. Rural		

368. Income (describe)

Enlarge Shrink

369. Define "Other" for Comparison Group 3

Enlarge Shrink

370. Define "low socioeconomic status" for Comparison Group 3

Enlarge Shrink

371. Define "rural" for Comparison Group 3

Enlarge Shrink

CLINICAL CHARACTERISTICS FOR GROUP 3

	N	%
372. Age		

373. Hypertension		
374. Diabetes mellitus		
375. Tobacco smoking		
376. Hyperlipidemia		
377. Obesity		
378. Renal disease		
379. COPD		
380. Coronary artery disease		
381. Cancer		
382. Other		

383. Define "other" clinical condition for Comparison Group 3.

Enlarge Shrink

EMPLOYMENT/INSURANCE CHARACTERISTICS FOR GROUP 3

	N	%
384. Executive employee		
385. Non-executive employee		
386. Employee dependant		
387. Commercial insurance		
388. Medicare		
389. Medicaid		
390. VA/ other US DOD		
391. National health insurance		
392. Managed care plan		
393. Staff model HMO		
394. Other managed care plan		
395. Employer health plan		
396. Other health plan		

397. Define other managed care plan for comparison group 3

Enlarge Shrink

398. Define other health plan for comparison group 3.

Enlarge Shrink

399. Other information not captured in previous questions.

Enlarge Shrink

400. **********

COMPARISON GROUP 4 (define)

Enlarge Shrink

How is the PHE defined in this study for GROUP 4?

401. Frequency. check all that apply

- [ ] Periodic (define) _____
- [ ] Annual (define) _____
- [ ] Initial visit
- [ ] Pre-employment
- [ ] Employment exam
- [ ] Scheduled
- [ ] Unclear
- [ ] Not applicable
- [ ] Usual care

WHAT COMPONENTS WERE PART OF THE PHE FOR GROUP 4?

Minimum included: part of the defined PHE in the study.

May have included: defined in the articles as "may have occured"

402. Visit

- [ ] Minimum included
- [ ] May have included

History and risk assessment including:

	Minimum included	May have included
403. Diet	☐	☐
404. Physical activity	☐	☐
405. Alcohol/Substance abuse	☐	☐
406. Injury prevention	☐	☐
407. Safe sexual practices	☐	☐
408. Tobacco smoking	☐	☐
409. Calcium intake	☐	☐
410. Folic acid	☐	☐
411. Sun exposure	☐	☐
412. Oral health	☐	☐
413. Polypharmacy	☐	☐

Physical exam including:

	Minimum included	May have included
414. Blood pressure	☐	☐
415. Height	☐	☐
416. Weight	☐	☐
417. Pulse	☐	☐
418. Cardiac exam	☐	☐
419. Pulmonary	☐	☐
420. Abdominal	☐	☐
421. Neurologic	☐	☐
422. Breast	☐	☐
423. Gynecologic	☐	☐
424. Rectal	☐	☐
425. Prostate	☐	☐
426. Foot Exam	☐	☐
427. Eye exam (fundoscopic)	☐	☐
428. Physical exam not otherwise specified	☐	☐
429. Other 1 (define below)	☐	☐
430. Other 2 (define below)	☐	☐
431. Other 3 (define below)	☐	☐

432. Define: Other 1

Enlarge Shrink

433. Define: Other 2

Enlarge Shrink

434. Define: Other 3

Enlarge Shrink

Was any counseling given as a part of or as a result of the PHE for GROUP 4?

	Part of PHE	Result of PHE	
435. Diet	○	○	Clear
436. Physical activity	○	○	Clear
437. Alcohol/substance abuse	○	○	Clear
438. Injury prevention	○	○	Clear
439. Safe sexual practices	○	○	Clear
440. Smoking	○	○	Clear
441. Folic Acid	○	○	Clear
442. Sun exposure	○	○	Clear
443. Oral health	○	○	Clear
444. Polypharmacy	○	○	Clear
445. Unspecified counseling	○	○	Clear

446. **Were any immunizations ordered or performed as part of the PHE for GROUP 4?**

○ Yes

○ No or not applicable

Clear Selection

	Specify	Performed	Ordered
447. Immunization 1		☐	☐
448. Immunization 2		☐	☐
449. Immunization 3		☐	☐

Was any testing performed or ordered as a result of the PHE for GROUP 4?

	Performed	Ordered	
450. Pap smear	○	○	Clear
451. GC/chyl screen	○	○	Clear
452. Audiometry	○	○	Clear
453. Vision testing	○	○	Clear
454. EKG	○	○	Clear
455. CXR	○	○	Clear

456. Mammography	○	○	Clear
457. Colon cancer screening	○	○	Clear
458. Sigmoidoscopy	○	○	Clear
459. Colonoscopy	○	○	Clear
460. Fecal occult blood	○	○	Clear
461. Bone mineral density testing	○	○	Clear
462. Glucose (lab)	○	○	Clear
463. Lipids (lab)	○	○	Clear
464. HgbA1C	○	○	Clear
465. CBC	○	○	Clear
466. Chem-7	○	○	Clear
467. PSA	○	○	Clear
468. U/A	○	○	Clear
469. TB	○	○	Clear
470. Other 1	○	○	Clear
471. Other 2	○	○	Clear
472. Other 3	○	○	Clear

473. Define Other 1 for labs

Enlarge Shrink

474. Define other 2 for labs

Enlarge Shrink

475. Define Other 3 for labs

Enlarge Shrink

DESCRIPTION OF THE INTERVENTION FOR GROUP 4

476. Was there an intervention outside of the PHE in the study?

○ Yes

○ No

Clear Selection

477. Who was the target of the intervention?

☐ Providers/office staff

☐ Office Staff/administration

- [ ] Patients

478. Who was the outcome measured on?

- [ ] Providers/office staff
- [ ] Office staff/administration
- [ ] Patients

479. Interventions targeting providers/office staff, check all that apply.

- [ ] Chart-based reminder
- [ ] Computer-based reminder
- [ ] Provider detailing
- [ ] Financial incentives
- [ ] CME incentives
- [ ] Other

480. Interventions targeting patients, check all that apply.

- [ ] Written material (e.g., letter, invitation)
- [ ] Reminder
- [ ] Phone call
- [ ] Incentive (gift)
- [ ] Financial incentive (change in co-pay/deductible)
- [ ] Financial incentive (offer free health care)
- [ ] Patient-held medical record
- [ ] Other

GENERAL CHARACTERISTICS FOR GROUP 4

	N	%
481. Female		
482. American Indian or Alaska Native		
483. Asian		
484. Black or African American		
485. Native Hawaiian or other Pacific Islander		
486. Latino/Hispanic		
487. White		
488. Other		
489. Low socioeconoimic status		
490. Rural		

491. Income (describe)

Enlarge Shrink

492. Define "Other" for Comparison Group 4

Enlarge Shrink

493. Define "low socioeconomic status" for Comparison Group 4

Enlarge Shrink

494. Define "rural" for Comparison Group 4

Enlarge Shrink

CLINICAL CHARACTERISTICS FOR GROUP 4

	N	%
495. Age		
496. Hypertension		
497. Diabetes mellitus		
498. Tobacco smoking		
499. Hyperlipidemia		
500. Obesity		
501. Renal disease		
502. COPD		
503. Coronary artery disease		
504. Cancer		
505. Other		

506. Define "other" clinical condition for Comparison Group 3.

Enlarge Shrink

EMPLOYMENT/INSURANCE CHARACTERISTICS FOR GROUP 4

	N	%
507. Executive employee		
508. Non-executive employee		
509. Employee dependant		
510. Commercial insurance		

511. Medicare
512. Medicaid
513. VA/ other US DOD
514. National health insurance
515. Managed care plan
516. Staff model HMO
517. Other managed care plan
518. Employer health plan
519. Other health plan

520. Define other managed care plan for comparison group 4

Enlarge Shrink

521. Define other health plan for comparison group 4.

Enlarge Shrink

522. Other information not captured in previous questions.

Enlarge Shrink

523. **********

COMPARISON GROUP 5 (define)

Enlarge Shrink

How is the PHE defined in this study for GROUP 5?

524. Frequency. check all that apply

- [ ] Periodic (define)
- [ ] Annual (define)
- [ ] Initial visit
- [ ] Pre-employment
- [ ] Employment exam

- [ ] Scheduled
- [ ] Unclear
- [ ] Not applicable
- [ ] Usual care

WHAT COMPONENTS WERE PART OF THE PHE FOR GROUP 5?

Minimum included: part of the defined PHE in the study.

May have included: defined in the articles as "may have occured"

525. Visit

- [ ] Minimum included
- [ ] May have included

History and risk assessment including:

	Minimum included	May have included
526. Diet	☐	☐
527. Physical activity	☐	☐
528. Alcohol/Substance abuse	☐	☐
529. Injury prevention	☐	☐
530. Safe sexual practices	☐	☐
531. Tobacco smoking	☐	☐
532. Calcium intake	☐	☐
533. Folic acid	☐	☐
534. Sun exposure	☐	☐
535. Oral health	☐	☐
536. Polypharmacy	☐	☐

Physical exam including:

	Minimum included	May have included
537. Blood pressure	☐	☐
538. Height	☐	☐
539. Weight	☐	☐
540. Pulse	☐	☐
541. Cardiac exam	☐	☐
542. Pulmonary	☐	☐
543. Abdominal	☐	☐
544. Neurologic	☐	☐

545. Breast	☐	☐
546. Gynecologic	☐	☐
547. Rectal	☐	☐
548. Prostate	☐	☐
549. Foot Exam	☐	☐
550. Eye exam (fundoscopic)	☐	☐
551. Physical exam not otherwise specified	☐	☐
552. Other 1 (define below)	☐	☐
553. Other 2 (define below)	☐	☐
554. Other 3 (define below)	☐	☐

555. Define: Other 1

Enlarge Shrink

556. Define: Other 2

Enlarge Shrink

557. Define: Other 3

Enlarge Shrink

Was any counseling given as a part of or as a result of the PHE for GROUP 5?

	Part of PHE	Result of PHE	
558. Diet	◯	◯	Clear
559. Physical activity	◯	◯	Clear
560. Alcohol/substance abuse	◯	◯	Clear
561. Injury prevention	◯	◯	Clear
562. Safe sexual practices	◯	◯	Clear
563. Smoking	◯	◯	Clear
564. Folic Acid	◯	◯	Clear
565. Sun exposure	◯	◯	Clear
566. Oral health	◯	◯	Clear
567. Polypharmacy	◯	◯	Clear
568. Unspecified counseling	◯	◯	Clear

569. **Were any immunizations ordered or performed as part of the PHE for GROUP 5?**

Yes

No or not applicable

Clear Selection

	Specify	Performed	Ordered
570. Immunization 1			
571. Immunization 2			
572. Immunization 3			

Was any testing performed or ordered as a result of the PHE for GROUP 5?

	Performed	Ordered	
573. Pap smear			Clear
574. GC/chyl screen			Clear
575. Audiometry			Clear
576. Vision testing			Clear
577. EKG			Clear
578. CXR			Clear
579. Mammography			Clear
580. Colon cancer screening			Clear
581. Sigmoidoscopy			Clear
582. Colonoscopy			Clear
583. Fecal occult blood			Clear
584. Bone mineral density testing			Clear
585. Glucose (lab)			Clear
586. Lipids (lab)			Clear
587. HgbA1C			Clear
588. CBC			Clear
589. Chem-7			Clear
590. PSA			Clear
591. U/A			Clear
592. TB			Clear
593. Other 1			Clear
594. Other 2			Clear
595. Other 3			Clear

596. Define Other 1 for labs

Enlarge Shrink

597. Define other 2 for labs

Enlarge Shrink

598. Define Other 3 for labs

Enlarge Shrink

DESCRIPTION OF THE INTERVENTION FOR GROUP 5

599. Was there an intervention outside of the PHE in the study?

- Yes
- No

Clear Selection

600. Who was the target of the intervention?

- Providers/office staff
- Office Staff/administration
- Patients

601. Who was the outcome measured on?

- Providers/office staff
- Office staff/administration
- Patients

602. Interventions targeting providers/office staff, check all that apply.

- Chart-based reminder
- Computer-based reminder
- Provider detailing
- Financial incentives
- CME incentives
- Other

603. Interventions targeting patients, check all that apply.

- Written material (e.g., letter, invitation)
- Reminder
- Phone call
- Incentive (gift)
- Financial incentive (change in co-pay/deductible)
- Financial incentive (offer free health care)
- Patient-held medical record
- Other

GENERAL CHARACTERISTICS FOR GROUP 5

	N	%
604. Female		
605. American Indian or Alaska Native		
606. Asian		
607. Black or African American		
608. Native Hawaiian or other Pacific Islander		
609. Latino/Hispanic		
610. White		
611. Other		
612. Low socioeconoimic status		
613. Rural		

614. Income (describe)

Enlarge Shrink

615. Define "Other" for Comparison Group 5

Enlarge Shrink

616. Define "low socioeconomic status" for Comparison Group 5

Enlarge Shrink

617. Define "rural" for Comparison Group 5

Enlarge Shrink

CLINICAL CHARACTERISTICS FOR GROUP 5

	N	%
618. Age		
619. Hypertension		
620. Diabetes mellitus		
621. Tobacco smoking		
622. Hyperlipidemia		
623. Obesity		
624. Renal disease		
625. COPD		

626. Coronary artery disease		
627. Cancer		
628. Other		

629. Define "other" clinical condition for Comparison Group 5.

Enlarge Shrink

EMPLOYMENT/INSURANCE CHARACTERISTICS FOR GROUP 5

	N	%
630. Executive employee		
631. Non-executive employee		
632. Employee dependant		
633. Commercial insurance		
634. Medicare		
635. Medicaid		
636. VA/ other US DOD		
637. National health insurance		
638. Managed care plan		
639. Staff model HMO		
640. Other managed care plan		
641. Employer health plan		
642. Other health plan		

643. Define other managed care plan for comparison group 5

Enlarge Shrink

644. Define other health plan for comparison group 5.

Enlarge Shrink

645. Other information not captured in previous questions.

Enlarge Shrink

TARGET *PROVIDER* POPULATION CHARACTERISTICS

646.

COMPARISON GROUP 1 (define)

Enlarge Shrink

GENERAL CHARACTERISTICS FOR PROVIDER GROUP 1

	N	%
647. Female		
648. American Indian or Alaska Native		
649. Asian		
650. Black or African American		
651. Native Hawaiian or other Pacific Islander		
652. Latino/Hispanic		
653. White		
654. Other		
655. Not specified		

656. Define "Other" for Comparison goup 1

Enlarge Shrink

GENERAL PHYSICIAN EXPERIENCE FOR GROUP 1

	Mean	Median	Range
657. Age			
658. Number of years in training (housestaff and fellows)			
659. Years since training			
660. Number of years in practice.			

661. Practice setting; where was PHE delivered? Click all that apply

- [ ] Physician office

- [ ] Solo practice
- [ ] Group practice
- [ ] Hospital outpatient clinic
- [ ] Academic practice
- [ ] Community health center
- [ ] Employee health clinic
- [ ] VA/other US DOD
- [ ] National health service clinic
- [ ] Family medicine practice
- [ ] Internal medicine practice
- [ ] Ob/gyn practice
- [ ] Specialty practice
- [ ] Other health care site
- [ ] Worksite
- [ ] Non-work site community setting
- [ ] Health fair
- [ ] Public Place (specify)
- [ ] Commercial insurance
- [ ] Public insurance: Medicare
- [ ] Public insurance: Medicaid
- [ ] Public insurance: VA/ other US DOD
- [ ] National health insurance
- [ ] Managed care plan
- [ ] Staff model HMO
- [ ] Other managed care plan
- [ ] Employer health plan
- [ ] Other (specify)

662.

****

COMPARISON GROUP 2 (define)

Enlarge Shrink

663.

GENERAL CHARACTERISTICS FOR PROVIDER GROUP 2

- ○ Not specified
- ○ See below

Clear Selection

	N	%
664. Female		
665. American Indian or Alaska Native		
666. Asian		
667. Black or African American		
668. Native Hawaiian or other Pacific Islander		
669. Latino/Hispanic		
670. White		
671. Other		

672. Define "Other" for Comparison group 2

Enlarge Shrink

GENERAL PHYSICIAN EXPERIENCE FOR GROUP 2

	Mean	Median	Range
673. Age			
674. Number of years in training (housestaff and fellows)			
675. Years since training			
676. Number of years in practice.			

677. Practice setting; where was PHE delivered? Click all that apply

- ☐ Physician office
- ☐ Solo practice
- ☐ Group practice
- ☐ Hospital outpatient clinic
- ☐ Academic practice
- ☐ Community health center
- ☐ Employee health clinic
- ☐ VA/other US DOD
- ☐ National health service clinic

- [ ] Family medicine practice
- [ ] Internal medicine practice
- [ ] Ob/gyn practice
- [ ] Specialty practice
- [ ] Other health care site
- [ ] Worksite
- [ ] Non-work site community setting
- [ ] Health fair
- [ ] Public Place (specify)
- [ ] Commercial insurance
- [ ] Public insurance: Medicare
- [ ] Public insurance: Medicaid
- [ ] Public insurance: VA/ other US DOD
- [ ] National health insurance
- [ ] Managed care plan
- [ ] Staff model HMO
- [ ] Other managed care plan
- [ ] Employer health plan
- [ ] Other (specify)

678.

****

COMPARISON GROUP 3 (define)

Enlarge Shrink

679.

GENERAL CHARACTERISTICS FOR PROVIDER GROUP 3

- ( ) Not specified
- ( ) See below

Clear Selection

	N	%
680. Female		
681. American Indian or Alaska Native		

682. Asian		
683. Black or African American		
684. Native Hawaiian or other Pacific Islander		
685. Latino/Hispanic		
686. White		
687. Other		

688. Define "Other" for Comparison group 3

Enlarge Shrink

GENERAL PHYSICIAN EXPERIENCE FOR GROUP 3

	Mean	Median	Range
689. Age			
690. Number of years in training (housestaff and fellows)			
691. Years since training			
692. Number of years in practice.			

693. Practice setting; where was PHE delivered? Click all that apply

- ☐ Physician office
- ☐ Solo practice
- ☐ Group practice
- ☐ Hospital outpatient clinic
- ☐ Academic practice
- ☐ Community health center
- ☐ Employee health clinic
- ☐ VA/other US DOD
- ☐ National health service clinic
- ☐ Family medicine practice
- ☐ Internal medicine practice
- ☐ Ob/gyn practice
- ☐ Specialty practice
- ☐ Other health care site
- ☐ Worksite
- ☐ Non-work site community setting

- [ ] Health fair
- [ ] Public Place (specify)
- [ ] Commercial insurance
- [ ] Public insurance: Medicare
- [ ] Public insurance: Medicaid
- [ ] Public insurance: VA/ other US DOD
- [ ] National health insurance
- [ ] Managed care plan
- [ ] Staff model HMO
- [ ] Other managed care plan
- [ ] Employer health plan
- [ ] Other (specify)

694.

****

COMPARISON GROUP 4 (define)

Enlarge Shrink

695.

GENERAL CHARACTERISTICS FOR PROVIDER GROUP 4

- ( ) Not specified
- ( ) See below

Clear Selection

	N	%
696. Female		
697. American Indian or Alaska Native		
698. Asian		
699. Black or African American		
700. Native Hawaiian or other Pacific Islander		
701. Latino/Hispanic		
702. White		
703. Other		

704. Define "Other" for Comparison group 4

Enlarge Shrink

GENERAL PHYSICIAN EXPERIENCE FOR GROUP 4

	Mean	Median	Range
705. Age			
706. Number of years in training (housestaff and fellows)			
707. Years since training			
708. Number of years in practice.			

709. Practice setting; where was PHE delivered? Click all that apply

- Physician office
- Solo practice
- Group practice
- Hospital outpatient clinic
- Academic practice
- Community health center
- Employee health clinic
- VA/other US DOD
- National health service clinic
- Family medicine practice
- Internal medicine practice
- Ob/gyn practice
- Specialty practice
- Other health care site
- Worksite
- Non-work site community setting
- Health fair
- Public Place (specify)
- Commercial insurance
- Public insurance: Medicare
- Public insurance: Medicaid
- Public insurance: VA/ other US DOD
- National health insurance

- [ ] Managed care plan
- [ ] Staff model HMO
- [ ] Other managed care plan
- [ ] Employer health plan
- [ ] Other (specify)

710.

****

COMPARISON GROUP 5 (define)

Enlarge Shrink

711.

GENERAL CHARACTERISTICS FOR PROVIDER GROUP 5

- ( ) Not specified
- ( ) See below

Clear Selection

	N	%
712. Female		
713. American Indian or Alaska Native		
714. Asian		
715. Black or African American		
716. Native Hawaiian or other Pacific Islander		
717. Latino/Hispanic		
718. White		
719. Other		

720. Define "Other" for Comparison goup 5

Enlarge Shrink

GENERAL PHYSICIAN EXPERIENCE FOR GROUP 5

	Mean	Median	Range
721. Age			
722. Number of years in training (housestaff and fellows)			
723. Years since training			
724. Number of years in practice.			

725. Practice setting; where was PHE delivered? Click all that apply

- [ ] Physician office
- [ ] Solo practice
- [ ] Group practice
- [ ] Hospital outpatient clinic
- [ ] Academic practice
- [ ] Community health center
- [ ] Employee health clinic
- [ ] VA/other US DOD
- [ ] National health service clinic
- [ ] Family medicine practice
- [ ] Internal medicine practice
- [ ] Ob/gyn practice
- [ ] Specialty practice
- [ ] Other health care site
- [ ] Worksite
- [ ] Non-work site community setting
- [ ] Health fair
- [ ] Public Place (specify)
- [ ] Commercial insurance
- [ ] Public insurance: Medicare
- [ ] Public insurance: Medicaid
- [ ] Public insurance: VA/ other US DOD
- [ ] National health insurance
- [ ] Managed care plan
- [ ] Staff model HMO
- [ ] Other managed care plan
- [ ] Employer health plan
- [ ] Other (specify)

AUDITOR INFORMATION

this section IS NOT to be completed by reviewer #1

726. Auditor information

Auditor Name

Auditor review completion date

727. Auditor Notes

Enlarge Shrink

Save to finish later Submit Data

Form took 69.25 seconds to render

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Previewing at Level 5

Refid: 1, Cole, R. C., Morandi, F., Avenell, J., and Daniel, G. B., Trans-splenic portal scintigraphy in normal dogs, *Vet Radiol Ultrasound*, 46(2), 2005, p.146-52
State: Excluded, Level: 2

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STUDY DESIGN

1. What is the design of the study?

- Randomized controlled trial.
- Nonrandomized controlled trial
- Prospective cohort study with comparison group
- Retospective cohort study with comparison group
- Mixed prospective/retrospective cohort study with comparison group
- Case-control study
- Pre-post comparison study with comparison group
- Other

Clear Selection

STUDY POPULATION SELECTION

2. How good was the randomization to treatment groups and how difficult would it have been to manipulate the randomization?

- Excellent ((centralized randomization scheme [randomized in different location than treatment] and study monitor)
- Good (centralized randomization scheme or study monitor but not both)
- Fair (neither centralized randomization scheme or study monitor)
- Poor (insufficient documentation of randomization scheme or highly questionable methods)
- Does not apply

Clear Selection

3. How appropriate was the control group?

- Excellent (chosen from an appropriate concurrent population of subjects)
- Good (chosen from a concurrent but not ideal population of subjects)
- Fair (chosen from a historical population of subjects)
- Poor (no information given on origin of control group)
- Can't tell
- Does not apply

Clear Selection

4. Were the control and treatment groups of enrolled subjects comparable at the beginning of the study?

- Excellent (No significant difference in any characteristic likely to affect success of intervention or other outcome)
- Good (Minor differences in one or more characteristics unlikely to affect success of intervention or other outcome)

- Fair (Moderate differences in one or more characteristics which may affect success of intervention or other outcome)
- Poor (Major differences in one or more characteristics likely to affect success of intervention or other outcome)
- Can't tell
- Does not apply

Clear Selection

5. How well were the inclusion and exclusion criteria for subjects described in the study?

- Excellent The inclusion and exclusion criteria were specifically and clearly stated or it was specified that all consecutive subjects were enrolled)
- Good (The inclusion and exclusion criteria were stated reasonably completely and clearly, but could have been improved on one or two items)
- Fair (The inclusion and exclusion criteria appeared to be lacking in a few items)
- Poor (No description of specific inclusion and exclusion criteria)
- Can't tell

Clear Selection

6. How well were the characteristics of the study population described?

- Excellent (All important subject characteristics are reported, including age, gender, race. For patients, at least one other aspect of socioeconomic status or comorbidities. For providers, specialty and type of practice.)
- Good (Most of the important subject characteristics are reported, 1-2 missing or characteristics are not classified by subgroup)
- Fair (Some of the important subject characteristics are reported, >2 missing. Characteristics may not be classified by subgroup.)
- Poor (Few or none of the important subject characteristics are reported. Characteristics may not be classified by subgroup.)
- Can't tell

Clear Selection

7. How similar were the sociodemographic and/or clinical characteristics of the subjects who enrolled and the eligible subjects who did not enroll?

- Excellent (No significant difference in any characteristic likely to affect success of intervention or other outcome)
- Good (Minor differences in one or more characteristics unlikely to affect success of intervention or other outcome)
- Fair (Moderate differences in one or more characteristics which may affect success of intervention or other outcome)
- Poor (Major differences in one or more characteristics likely to affect success of intervention or other outcome)
- Can't tell

Clear Selection

8. Dit the authors specify the reasons that eligible subjects did not enroll specified?

- Yes
- No
- Not applicable (less than 10% of patients did not enroll)
- Don't know who didn't enroll

Clear Selection

STUDY PROTOCOL

9. How well did the authors describe the intervention for changing delivery of the PHE?

- Excellent (One could definitely replicate the intervention with the completeness and detail of the description. Or, in the case of a reference description, one could probably replicate the intervention.)

- Good (One could understand, but not necessarily replicate, the intervention with the detail of the description given.)
- Fair Not nearly enough information about the intervention to fully understand it.)
- Poor (Minimal description of the intervention)

Clear Selection

10. How well did the authors describe the PHE?

- Excellent (One could definitely replicate the PHE as described in this study)
- Good (One could understand, but not necessarily replicate, the PHE as described in this study)
- Fair (Not nearly enough information about the PHE was given for the reader to fully understand what was done)
- Poor (Minimal description of the PHE)

Clear Selection

11. Description of intervention referenced?

- Yes
- No

Clear Selection

12. Were the control and treatment groups treated comparably except for the study intervention(s)?

- Excellent (The groups had no visible differences in the way they were treated)
- Good (The groups had minor differences in treatment unlikely to affect the outcome of the study)
- Fair (The groups had moderate differences in treatment which may affect the outcome of the study)
- Poor (The groups had major differences in treatment likely to affect the outcome of the study)
- Can't tell
- Does not apply

Clear Selection

13. Was there adequate blinding of the target(s) of the intervention to group assignment?

- Yes
- No
- Can't tell
- Not possible given study/intervention
- Does not apply

Clear Selection

14. Was there adequate blinding of the provider(s) of the preventive service to intervention group assignment?

- Yes
- No
- Can't tell
- Not possible given study/intervention
- Does not apply

Clear Selection

15. Was there adequate blinding of the assessor(s) of outcomes to group assignments?

- Yes

- No
- Can't tell
- Does not apply

Clear Selection

16. How were withdrawals (drop-outs while the study was ongoing) or crossovers (subjects who changed from control to intervention group, intervention to control group, or from one intervention to another) handled in the study?

- Excellent (Intention to treat and sensitivity analysis are used to examine how results would have differed depending on the inclusion or exclusion of withdrawals or crossovers)
- Good (Intention to treat analysis used without sensitivity analysis)
- Fair (Withdrawals counted as an end-result at the time of withdrawal, or numbers of cross-overs reported but without intention-to-treat or sensitivity analysis)
- Poor (Withdrawals eliminated from study at time of withdrawal or ignored, or cross-overs considered in the new group when they change groups.)
- Can’t tell
- Not applicable (No withdrawals or cross-overs)

Clear Selection

17. How comparable were subjects who withdrew to retained subjects?

- Excellent (No significant difference in any characteristic likely to affect success of intervention or other outcome)
- Good (Minor differences in one or more characteristics unlikely to affect success of intervention or other outcome)
- Fair (Moderate differences in one or more characteristics which may affect success of intervention or other outcome)
- Poor (Major differences in one or more characteristics likely to affect success of intervention or other outcome)
- Can't tell
- Not applicable

Clear Selection

18. Were withdrawals comparable across intervention groups and across treatment and control arms?

- Yes
- No
- Can't tell
- Not applicable or no withdrawals

Clear Selection

19. Were reasons for withdrawal specified?

- Yes
- No
- Can't tell
- Not applicable (no withdrawals)

Clear Selection

20. Were relevant and appropriate outcomes measured in this study?

- Excellent (The outcomes measured were relevant and were appropriate for the intervention studied. Important, feasible outcomes were measured.)
- Good (The outcomes measured were relevant to the preventable condition or to behavior change and were generally appropriate for the intervention studied. Many important, feasible outcomes were measured, but some were clearly lacking.)

Fair (The outcomes measured were relevant to the preventable condition or to behavior change, but lacked appropriateness for the intervention studied.)

Poor (The outcomes measured were only somewhat relevant to the preventable condition or to behavior change.)

Can't tell

Clear Selection

21. Did the length of follow-up for the intervention and frequency of outcome assessments seem appropriate for the outcomes measured?

Excellent (The length of follow-up and frequency of outcome measurements seemed appropriate.)

Good (Either the length of follow-up or the frequency of outcome measurements could have been improved, but both were adequate)

Fair (Either the length of follow-up or the frequency of outcome measurements was not appropriate)

Poor (Both the length of follow-up and the frequency of outcome measurements were not appropriate)

Can't tell

Clear Selection

22. Did the percentage of subjects completing the intervention and evaluation seem appropriate for the main outcomes measured?

Excellent (The percentage of subjects was desirable for the outcomes measured. Likely >=85%.)

Good (The percentage of subjects was acceptable for the outcomes measured. Likely 70-84%.)

Fair (The percentage of subjects is likely lower than needed for at least one of the outcomes measured. Likely 50-69%.)

Poor (The percentage of subjects is clearly too low for the outcomes measured. Likely less than 50%.)

Can't tell

Clear Selection

23. Were the outcomes described so that they were understood easily?

Yes

No

Clear Selection

24. Was assessment of the outcomes standardized and valid?

Excellent/Good (Both standardized and valid)

Fair (Standardized or valid, but not both)

Poor (Neither standardized nor valid)

Can't tell

Clear Selection

STATISTICAL ANALYSES

25. Were power calculations reported in the study?

A priori estimate (The number of subjects needed to detect a statistically significant difference in the study's outcomes was calculated before the study was conducted.)

Post-hoc estimate (The number of subjects needed was calculated after the study was conducted or at an unspecified time)

No power calculations

Can't tell

Not applicable

Clear Selection

26. How appropriate was the choice of statistical test(s)?

- Excellent (All tests were appropriate for the variables examined and the data distribution.Tests were named for all of the analyses.)
- Good (Most tests were appropriate for the variables examined and the data distribution. Tests were named for most of the analyses.)
- Fair (Some tests were appropriate for the variables examined and the data distribution)
- Poor (Inappropriate statistical tests for the data or no statistical analysis done)
- Can't tell

Clear Selection

27. How was statistical significance presented?

- Confidence limits with or without p-values
- P-values, but not confidence limits
- Neither p-values nor confidence limits
- Other _____
- Can't tell

Clear Selection

28. Were adjustments made for potential confounders or differences between comparison groups in the study? If potential confounding was present, were adjustments made?

- (Multivariate analysis performed and adequately accounted for potential confounding)
- (Multivariate analysis performed that probably accounted for potential confounding)
- Fair (Multivariate analysis performed that probably did not adequately account for potential confounding)
- Poor (No adjustment made for potential confounding)
- Can't tell
- No confounding present

Clear Selection

29. Were there potential problems with unit of analysis where a prominent outcome of the study involved an endpoint for which providers could not be assumed to be interchangeable, and patients were used as the unit of analysis when physicians should have been used? Were there potential problems with whether the intervention was targeting patients or providers?

- Yes, and the authors accounted for this in their analysis.
- Yes, and the authors acknowledge this in the discussion but not the analysis.
- Yes, and the authors did not account for this in their analysis or discussion.
- No
- Can't tell
- Does not apply

Clear Selection

Save to finish later | Submit Data

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REF ID1Cole, R. C., Morandi, F., Avenell, J., and Daniel, G. B.Trans-splenic portal scintigraphy in normal dogsVet Radiol Ultrasound2005462146-52
State: Excluded, Level: Abstract Review

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CHECK ALL OUTCOMES THAT WERE MEASURED IN THIS STUDY

CLINICAL PREVENTIVE SERVICES

Physical Exam

	Delivered	Not delivered	
1. Abdominal	○	○	Clear
2. Blood pressure	○	○	Clear
3. Breast exam	○	○	Clear
4. Cardiac Exam	○	○	Clear
5. Eye exam, general	○	○	Clear
6. Eye exam, fundiscopic	○	○	Clear
7. Gynecologic	○	○	Clear
8. Gynecologic, PAP smear	○	○	Clear
9. Gynecologic, Pap smear	○	○	Clear
10. Height	○	○	Clear
11. Neurologic	○	○	Clear
12. Prostate	○	○	Clear
13. Pulmonary	○	○	Clear
14. Pulse	○	○	Clear
15. Rectal	○	○	Clear
16. Weight	○	○	Clear
17. Physical exam not otherwise specified	○	○	Clear

	Delivered	Not delivered	Define
18. Other 1	☐	☐	
19. Other 2	☐	☐	
20. Other 3	☐	☐	

Counseling

	Delivered	Not delivered	
21. Alcohol abuse	○	○	Clear

	Delivered	Not delivered	
22. Substance abuse	○	○	Clear

23. Calcium intake	○	○	Clear
24. Diet	○	○	Clear
25. Firearms	○	○	Clear
26. Folic acid	○	○	Clear
27. Injury prevention	○	○	Clear
28. Oral health	○	○	Clear
29. Physical activity	○	○	Clear
30. Polypharmacy	○	○	Clear
31. Safe sexual practices (my include STD/HIV counseling)	○	○	Clear
32. Smoking cessation	○	○	Clear
33. Sun exposure	○	○	Clear
34. Counseling not otherwise specified	○	○	Clear

	Delivered	Not delivered	Define
35. Other 1	☐	☐	
36. Other 2	☐	☐	
37. Other 3	☐	☐	

Immunization

	Delivered	Not Delivered	
38. Hepatitis B	○	○	Clear
39. Influenza	○	○	Clear
40. Measles	○	○	Clear
41. Mumps	○	○	Clear
42. Pneumovax	○	○	Clear
43. Rubella	○	○	Clear
44. Tetanus	○	○	Clear
45. Immunization not otherwise specified	○	○	Clear

	Delivered	Not delivered	Define
46. Other 1	☐	☐	
47. Other 2	☐	☐	
48. Other 3	☐	☐	

Testing

	Delivered	Not delivered	
49. Bone mineral density	○	○	Clear
50. Cholesterol	○	○	Clear
51. Colon cancer screening, sigmoidoscopy			Clear

52. Colon cancer screening, colonoscopy	○	○	Clear
53. Colon cancer screening, fecal occult blood test	○	○	Clear
54. GC/chlamydia	○	○	Clear
55. Glucose	○	○	Clear
56. Hemoglobin A1c	○	○	Clear
57. Mammography	○	○	Clear
58. PSA	○	○	Clear
59. Tuberculosis skin test	○	○	Clear
60. Testing not otherwise specified	○	○	Clear

	Delivered	Not delivered	Define
61. Other 1	☐	☐	
62. Other 2	☐	☐	
63. Other 3	☐	☐	

DISTAL CLINICAL OUTCOMES, general

	Applies	Does not apply	
64. Death	○	○	Clear
65. Hospitalization	○	○	Clear

	Applies	Does not apply	Define
66. Other 1	☐	☐	
67. Other 2	☐	☐	
68. Other 3	☐	☐	

DISTAL CLINICAL OUTCOMES, Major diagnostic category

	Applies	Does not apply	IDC-9 code
69. Accident	☐	☐	
70. Cardiovascular	☐	☐	
71. Central nervous system	☐	☐	
72. Digestive	☐	☐	
73. Endocrine and metabolic	☐	☐	
74. Mental	☐	☐	
75. Musculoskeletal	☐	☐	
76. Neoplasm	☐	☐	
77. Respiratory	☐	☐	

	Applies	Does not apply	Define	ICD-9 code

78. Other 1	☐	☐		
79. Other 2	☐	☐		
80. Other 3	☐	☐		

DISTAL ECONOMIC OUTCOMES

	Applies	Does not apply	
81. Charges	◯	◯	Clear
82. Cost	◯	◯	Clear
83. Disability days	◯	◯	Clear
84. Disease-specific disability days	◯	◯	Clear
85. Work days	◯	◯	Clear

	Applies	Does not apply	Define
86. Other 1	☐	☐	
87. Other 2	☐	☐	
88. Other 3	☐	☐	

DISEASE DETECTION

	Applies	Does not apply	
89. Accident	◯	◯	Clear
90. Cardiovascular	◯	◯	Clear
91. Central nervous system	◯	◯	Clear
92. Digestive	◯	◯	Clear
93. Endocrine and metabolic	◯	◯	Clear
94. Mental	◯	◯	Clear
95. Musculoskeletal	◯	◯	Clear
96. Neoplasm	◯	◯	Clear
97. Respiratory	◯	◯	Clear

	Applies	Does not apply	Define
98. Other 1	☐	☐	
99. Other 2	☐	☐	
100. Other 3	☐	☐	

PROXIMAL CLINICAL OUTCOMES

	Applies	Does not apply	
101. Blood pressure, diastolic or change in DBP	◯	◯	Clear
102. Blood pressure, systolic or change in SBP	◯	◯	Clear
103. Cholesterol, total	◯	◯	Clear

104. Cholesterol, LDL and triglycerides	○	○	Clear
105. Cholesterol, HDL	○	○	Clear
106. Health status	○	○	Clear
107. Hemoglobin A1c	○	○	Clear
108. Hypertension	○	○	Clear
109. Weight change	○	○	Clear

	Applies	Does not apply	Define
110. Other 1	☐	☐	
111. Other 2	☐	☐	
112. Other 3	☐	☐	

BEHAVIORAL OUTCOMES

	Applies	Does not apply	
113. Adherence to recommendations	○	○	Clear
114. Change in health habits	○	○	Clear
115. Continuity of medical care	○	○	Clear
116. Smoking cessation	○	○	Clear

	Applies	Does not apply	Define
117. Other 1	☐	☐	
118. Other 2	☐	☐	
119. Other 3	☐	☐	

PATIENT ATTITUDES

	Applies	Does not apply	
120. Knowledge	○	○	Clear
121. Respect	○	○	Clear
122. Satisfaction	○	○	Clear

	Applies	Does not apply	Define
123. Other 1	☐	☐	
124. Other 2	☐	☐	
125. Other 3	☐	☐	

PUBLIC HEALTH

	Applies	Does not apply	Define
126. Other 1	☐	☐	
127. Other 2	☐	☐	
128. Other 3	☐	☐	

****

If outcomes for any of the following categories have been identifed please proceed to the outcome specific forms for THIS article: Delivery of Preventive Clinical Services, Distal Clinical Outcomes, Distal Economic Outcomes, Disease Detection

****

AUDITOR INFORMATION

this section IS NOT to be completed by reviewer #1

129. Auditor information

Auditor Name

Auditor review completion date

130. Auditor Notes

Enlarge Shrink

Save to finish later | Submit Data

Form took 1.71875 seconds to render

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Refid: 1, Cole, R. C., Morandi, F., Avenell, J., and Daniel, G. B., Trans-splenic portal scintigraphy in normal dogs, *Vet Radiol Ultrasound*, 46(2), 2005, p.146-52
State: Excluded, Level: 2

Save to finish later | Submit Data

1. **OUTCOME #1:**

Define outcomes in order they are identified in previous questions on this form.

Enlarge Shrink

2. Who assessed OUTCOME 1? check all that apply

- [ ] Practicing Health Provider
- [ ] Community health worker

3. Is OUTCOME 1 self-reported?

- ( ) Yes-physician
- ( ) Yes-patient
- ( ) No
- ( ) Not applicable

Clear Selection

4. Are the results for OUTCOME 1 adjusted for potential confounding factors?

- ( ) Yes
- ( ) No
- ( ) Not applicable

Clear Selection

5. OUTCOME 1 Adjusted for (check all that apply)

- [ ] Age
- [ ] Sex
- [ ] Race
- [ ] Insurance
- [ ] Education
- [ ] Comorbid disease
- [ ] Medication use
- [ ] Practice mix
- [ ] Provider experience
- [ ] Body mass index
- [ ] Weight
- [ ] Smoking
- [ ] Lipids
- [ ] Blood pressure
- [ ] Diabetes
- [ ] Not Specified
- [ ] Other
- [ ] Other
- [ ] Other
- [ ] Not applicable

6. Does OUTCOME 1 apply to the target patient population or providers?

- ◯ Patient
- ◯ Physician
- ◯ Both

Clear Selection

7. **OUTCOME 1**

Target PATIENT Population GROUP number (use group # as assigned in the General Abstraction form)

- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5
- ☐ Does not apply

8. **OUTCOME 1**

Target PROVIDER Population GROUP number (use group # as assigned in the General Abstraction form)

- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5
- ☐ Does not apply

9.

Specify units for OUTCOME 1

- ☐ Absolute number
- ☐ Diagnoses
- ☐ mmHg
- ☐ mg/dl
- ☐ pounds
- ☐ kilograms
- ☐ percentage
- ☐ dollars
- ☐ cost effectiveness ratio
- ☐ Other
- ☐ Other
- ☐ Other
- ☐ no units specified
- ☐ no applicable

10. Was there a reference/comparision group for this study?

- ◯ Yes
- ◯ No

Clear Selection

For each PATIENT group complete all that apply for OUTCOME 1

Sample size

	Patient group 1	Patient group 2	Patient group 3	Patient group 4	Patient group 5
11. Baseline *n*					
12. Follow-up *n*					

Absolute result

	Patient group 1	Patient group 2	Patient group 3	Patient group 4	Patient group 5
13. Baseline					
14. Follow-up					
15. Change					

Mean, baseline

	Patient group 1	Patient group 2	Patient group 3	Patient group 4	Patient group 5
16. Mean					

	Patient group 1	Patient group 2	Patient group 3	Patient group 4	Patient group 5
17. Standard error of mean					
18. Standard deviation					
19. Variance					

Mean, follow-up

	Patient group 1	Patient group 2	Patient group 3	Patient group 4	Patient group 5
20. Mean					

	Patient group 1	Patient group 2	Patient group 3	Patient group 4	Patient group 5
21. Standard error of mean					
22. Standard deviation					
23. Variance					

Mean, change

	Patient group 1	Patient group 2	Patient group 3	Patient group 4	Patient group 5
24. Mean					

	Patient group 1	Patient group 2	Patient group 3	Patient group 4	Patient group 5
25. Standard error of mean					
26. Standard deviation					
27. Variance					

Median, baseline

	Patient group 1	Patient group 2	Patient group 3	Patient group 4	Patient group 5
28. Median					

	Patient group 1	Patient group 2	Patient group 3	Patient group 4	Patient group 5
29. Standard error					
30. Standard deviation					
31. Variance					

Median, follow-up

	Patient group 1	Patient group 2	Patient group 3	Patient group 4	Patient group 5
32. Median					

	Patient group 1	Patient group 2	Patient group 3	Patient group 4	Patient group 5
33. Standard error					
34. Standard deviation					
35. Variance					

Median, change

	Patient group 1	Patient group 2	Patient group 3	Patient group 4	Patient group 5
36. Median					

	Patient group 1	Patient group 2	Patient group 3	Patient group 4	Patient group 5
37. Standard error					

38. Standard deviation					
39. Variance					

Correlation coefficient

	Patient group 1	Patient group 2	Patient group 3	Patient group 4	Patient group 5
40. Measured coefficient					

Odds Ratio

	Patient group 1	Patient group 2	Patient group 3	Patient group 4	Patient group 5
41. Odds ratio					

	Patient group 1	Patient group 2	Patient group 3	Patient group 4	Patient group 5
42. Mark reference group					
43. 95% CI upper/lower					

Relative Risk

	Patient group 1	Patient group 2	Patient group 3	Patient group 4	Patient group 5
44. Relative risk					

	Patient group 1	Patient group 2	Patient group 3	Patient group 4	Patient group 5
45. Mark reference group					
46. 95% CI upper/lower					

Hazard Ratio

	Patient group 1	Patient group 2	Patient group 3	Patient group 4	Patient group 5
47. Hazard ratio					

	Patient group 1	Patient group 2	Patient group 3	Patient group 4	Patient group 5
48. Mark reference group					
49. 95% CI upper/lower					

For each PROVIDER group complete all that apply for OUTCOME 1

Sample size

	Provider group 1	Provider group 2	Provider group 3	Provider group 4	Provider group 5
50. *n*					

Absolute result

	Provider group 1	Provider group 2	Provider group 3	Provider group 4	Provider group 5
51. Baseline					
52. Follow-up					
53. Change					

Mean, baseline

	Provider group 1	Provider group 2	Provider group 3	Provider group 4	Provider group 5
54. Mean					

	Provider group 1	Provider group 2	Provider group 3	Provider group 4	Provider group 5
55. Standard error of mean					
56. Standard deviation					
57. Variance					

Mean, follow-up

	Provider group 1	Provider group 2	Provider group 3	Provider group 4	Provider group 5
58. Mean					

	Provider group 1	Provider group 2	Provider group 3	Provider group 4	Provider group 5
59. Standard error of mean					
60. Standard deviation					
61. Variance					

Mean, change

	Provider group 1	Provider group 2	Provider group 3	Provider group 4	Provider group 5
62. Mean					

	Provider group 1	Provider group 2	Provider group 3	Provider group 4	Provider group 5
63. Standard error of mean					
64. Standard deviation					
65. Variance					

Median, baseline

	Provider group 1	Provider group 2	Provider group 3	Provider group 4	Provider group 5
66. Median					

	Provider group 1	Provider group 2	Provider group 3	Provider group 4	Provider group 5
67. Standard error of mean					
68. Standard deviation					
69. Variance					

Median, follow-up

	Provider group 1	Provider group 2	Provider group 3	Provider group 4	Provider group 5
70. Median					

	Provider group 1	Provider group 2	Provider group 3	Provider group 4	Provider group 5
71. Standard error of mean					
72. Standard deviation					
73. Variance					

Median, change

	Provider group 1	Provider group 2	Provider group 3	Provider group 4	Provider group 5
74. Median					

	Provider group 1	Provider group 2	Provider group 3	Provider group 4	Provider group 5
75. Standard error of mean					
76. Standard deviation					
77. Variance					

Correlation coefficient

	Provider group 1	Provider group 2	Provider group 3	Provider group 4	Provider group 5
78. Measured coefficient					

Odds Ratio

	Provider group 1	Provider group 2	Provider group 3	Provider group 4	Provider group 5
79. Odds ratio					

	Provider group 1	Provider group 2	Provider group 3	Provider group 4	Provider group 5
80. Mark reference group					
81. 95% CI upper/lower					

Relative Risk

	Provider group 1	Provider group 2	Provider group 3	Provider group 4	Provider group 5
82. Relative risk					

	Provider group 1	Provider group 2	Provider group 3	Provider group 4	Provider group 5
83. Mark reference group					
84. 95% CI upper/lower					

Hazard Ratio

	Provider group 1	Provider group 2	Provider group 3	Provider group 4	Provider group 5
85. Hazard ratio					

	Provider group 1	Provider group 2	Provider group 3	Provider group 4	Provider group 5
86. Mark reference group					
87. 95% CI upper/lower					

AUDITOR INFORMATION

this section IS NOT to be completed by reviewer #1

88. Auditor information

Auditor Name	
Auditor review completion date	

89. Auditor Notes

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Goebel LJ A peer review feedback method of promoting compliance with preventive care guidelines in a resident ambulatory care clinic.. **Exposure not the PHE**

Goetzel R Z The financial impact of health promotion and disease prevention programs--why is it so hard to prove value?. **Exposure not the PHE**

Goins, K. V., Zapka, J. G., Geiger, A. M., Solberg, L. I., Taplin, S., Yood, M. U., Gilbert, J., Mouchawar, J., Somkin, C. P., and Weinmann, S. Implementation of systems strategies for breast and cervical cancer screening services in health maintenance organizations. Am J Manag Care. 2003. 9(11):745-55 **Exposure not the PHE**

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86. 28(3):217-25 **No eligible comparison group**

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Harvey P Preventive social health programs: are they Australia"s answer to rising health care costs in rural communities?. **No original data**

HARVEY, J. C., REED, J. W., and THAMER, M. A. Development of a multiphasic screening examination for medical care patients-I. Historical review and description of the examination. J Chronic Dis. 62. 15827-33 **Does not apply to any of the key questions**

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Huntley, R. R. Role of automated multiphasic screening in future patterns of health care. Bull N Y Acad Med. 69. 45(12):1383-7 **Does not apply to any of the key questions**

HUNTLEY, R. R. Periodic health examinations in clinical practice. J Med Assoc State Ala. 63. 3320-5 **Does not apply to any of the key questions**

Hutchison, B., Woodward, C. A., Norman, G. R., Abelson, J., and Brown, J. A. Provision of preventive care to unannounced standardized patients. CMAJ. 98. 158(2):185-93 **Exposure not the PHE**

HUTCHISON, G. B. Evaluation of preventive services. J Chronic Dis. 60. 11497-508 **Does not apply to any of the key questions**

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Jackson, P. L. Primary care approaches. A systems approach to delivering clinical preventive services.. **Includes only subjects less than 18 years of age**

Jacobs, E. A., Lauderdale, D. S., Meltzer, D., Shorey, J. M., Levinson, W., and Thisted, R. A. Impact of interpreter services on delivery of health care to limited-English-proficient patients. J Gen Intern Med. 2001. 16(7):468-74 **Exposure not the PHE**

Jamison, H. C. and McMillan, R. S. An index of malocclusion for use in multiphasic screening and epidemiological investigations. Ala J Med Sci. 66. 3(2):154-8 **Does not apply to any of the key questions**

Janes, G. R., Blackman, D. K., Bolen, J. C., Kamimoto, L. A., Rhodes, L., Caplan, L. S., Nadel, M. R., Tomar, S. L., Lando, J. F., Greby, S. M., Singleton, J. A., Strikas, R. A., and Wooten, K. G. Surveillance for use of preventive health-care services by older adults, 1995-1997. MMWR CDC Surveill Summ. 99. 48(8):51-88 **Does not apply to any of the key questions**

Jelley, D. and Madeley, R. J. Preventive health care for mothers and children. A study in Mozambique. J Trop Med Hyg. 83. 86(6):229-36 **Article focuses on specific preventive measures only**

Jenkins, C. N., Le, T., McPhee, S. J., Stewart, S., and Ha, N. T. Health care access and preventive care among Vietnamese immigrants: do traditional beliefs and practices pose barriers?. Soc Sci Med. 96. 43(7):1049-56 **Exposure not the PHE**

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Jha P, Bangoura O Ranson K The cost-effectiveness of forty health interventions in Guinea. **Exposure not the PHE**

Johns MB, Hovell MF Drastal CA Lamke C Patrick K Promoting prevention services in primary care: a controlled trial.. **Exposure not the PHE**

Johns, D. B. Multiphasic screening. Trans Natl Saf Congr. 71. 1818-9 **Does not apply to any of the key questions**

Johns, D. B. Multiphasic screening. Trans Natl Saf Congr. 70. 1818-9 **Does not apply to any of the key questions**

JOHNSTON, J. H. Values of periodic health examinations. Occup Health (Auckl). 53. 13(4):53-4 **Does not apply to any of the key questions**

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JONES, W. T. Doubts on the periodic health examination. Trans Assoc Ind Med Off. 61. 1137-8 **Does not apply to any of the key questions**

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Kaplan, N. M. Hypertension: prevalence, risks, and effect of therapy. Ann Intern Med. 83. 98(5 Pt 2):705-9 **Article focuses on specific preventive measures only**

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Katz, R. Preventive services as insured employee benefits. J Occup Med. 78. 20(4):273-4 **Exposure not the PHE**

Keller, G. C. Cancer detection in the periodic physical examination. Cancer. 83. 51(12 Suppl):2446-7 **No original data**

Kelley, C. R. The utilization of multiphasic screening in an ambulatory medical system. Bull N Y Acad Med. 73. 49(5):406-14 **Exposure not the PHE**

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Kim, C. S., Kristopaitis, R. J., Stone, E., Pelter, M., Sandhu, M., and Weingarten, S. R. Physician education and report cards: do they make the grade? results from a randomized controlled trial. Am J Med. 99. 107(6):556-60 **Exposure not the PHE**

King, W. H., Owens, L. F., and Fadusko, J. A. Coronary risk factors in flying personnel: a progress report. Aviat Space Environ Med. 77. 48(2):162-3 **Does not apply to any of the key questions**

Kinne, S., Thompson, B., Chrisman, N. J., and Hanley, J. R. Community organization to enhance the delivery of

preventive health services. Am J Prev Med. 89. 5(4):225-9 **No original data**

Kirby, J. B. and Kaneda, T. Neighborhood socioeconomic disadvantage and access to health care. J Health Soc Behav. 2005. 46(1):15-31 **Exposure not the PHE**

Klatsky, A. L., Friedman, G. D., Siegelaub, A. B., and Gerard, M. J. Alcohol consumption and blood pressure Kaiser-Permanente Multiphasic Health Examination data. N Engl J Med. 77. 296(21):1194-200 **Does not apply to any of the key questions**

Klatsky, A. L., Friedman, G. D., Siegelaub, A. B., and Gerard, M. J. Alcohol consumption among white, black, or oriental men and women: Kaiser-Permanente multiphasic health examination data. Am J Epidemiol. 77. 105(4):311-23 **Does not apply to any of the key questions**

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Koch, M. W. Taking care of ourselves: healthy communities.. **No original data**

Koepsell, T., Reiber, G., and Simmons, K. W. Behavioral risk factors and use of preventive services among veterans in Washington State. Prev Med. 2002. 35(6):557-62 **Does not apply to any of the key question**

Kondo, H., Hashida, M., and Momotani, H. Serum gamma-glutamyl transpeptidase as a diagnostic aid in the periodic health examination. Sangyo Igaku. 76. 18(2):95-101 **Does not apply to any of the key questions**

Koroukian, S. M., Litaker, D., Dor, A., and Cooper, G. S. Use of Preventive Services by Medicare Fee-For-Service Beneficiaries: Does Spillover From Managed Care Matter?. Med Care. 2005. 43(5):445-452 **Exposure not the PHE**

Kottke, T. E. Clinical preventive services: how should we define the indications?. Mayo Clin Proc. 90. 65(6):899-902 **Does not apply to any of the key questions**

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Kristofic, J. D. Impact of multiphasic health testing on the future of traditional medical practice. Pa Med. 74. 77(3):51-5 **Does not apply to any of the key questions**

Krumholz H M, Weintraub W S Bradford W D Heidenreich P A Mark D B Paltiel AD Task force #2 - The cost of prevention: Can we afford it? Can we afford not to do it?. **Article focuses on specific preventive measures only**

KUH, C. Lifelong adjustment of man and job; the possible role of multiphasic screening. Perm Found Med Bull. 52. 10(1-4):301-5 **No original data**

LaDou, J. Multiphasic health testing in the clinic setting. Calif Med. 71. 115(1):34-7 **Exposure not the PHE**

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Lafata, J. E., Martin, S., Morlock, R., Divine, G., and Xi, H. Provider type and the receipt of general and diabetes-related preventive health services among patients with diabetes. Med Care. 2001. 39(5):491-9 **Exposure not the PHE**

LAMAR, C. P. Search for cancer as a routine part of periodic physical examinations. Med Times. 60. 88285-9 **No original data**

Landon, B. E., Zaslavsky, A. M., Bernard, S. L., Cioffi, M. J., and Cleary, P. D. Comparison of performance of traditional Medicare vs Medicare managed care. JAMA. 2004. 291(14):1744-52 **Exposure not the PHE**

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Lave JR, Ives DG Traven ND Kuller LH Evaluation of a health promotion demonstration program for the rural elderly.. **Exposure not the PHE**

Lave, J. R., Ives, D. G., Traven, N. D., and Kuller, L. H. Participation in health promotion programs by the rural elderly. Am J Prev Med. 95. 11(1):46-53 **Exposure not the PHE**

Law, M. Health promotion and preventive services in primary care. Am J Prev Med. 88. 4(4 Suppl):3-5 **Does not apply to any of the key questions**

Lawthers, A. G., Rozanski, B. S., Nizankowski, R., and Rys, A. Using patient surveys to measure the quality of

outpatient care in Krakow, Poland. Int J Qual Health Care. 99. 11(6):497-506 **Exposure not the PHE**

Leatt, P. and Frank, J. Organizational issues related to integrating preventive services into primary care. Am J Prev Med. 88. 4(4 Suppl):127-37; discussion 138-40 **No original data**

Leers, W. D., Kouroupis, G. M., and Dong, A. Feasibility of routine testing for hepatitis B surface antigen in hospital employees and restriction of carriers. Can Med Assoc J. 76. 115(10):995-8 **Exposure not the PHE**

Lefkowitz, A., Snow, D. A., and Cadigan, D. A. Preventive care in a Veterans Administration continuity clinic. J Community Health. 90. 15(1):7-18 **Exposure not the PHE**

Lehman, D. J. Jr Multiphasic health testing. JAMA. 77. 237(20):2193-4 **No original data**

Lemelin J, Hogg W Baskerville N Evidence to action: a tailored multifaceted approach to changing family physician practice patterns and improving preventive care. [see comment]. **Exposure not the PHE**

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Wagner EH, Grothaus LC Sandhu N Galvin MS McGregor M Artz K Coleman EA Chronic care clinics for diabetes in primary care: a system-wide randomized trial.. **Exposure not the PHE**

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Yi, J. K. Acculturation, access to care and use preventive health services by Vietnamese women. Asian Am Pac Isl J Health. 95. 3(1):30-41 **Exposure not the PHE**

Zyzanski, S. J., Stange, K. C., Langa, D., and Flocke, S. A. Trade-offs in high-volume primary care practice. J Fam Pract. 98. 46(5):397-402 **Article focuses on specific**

Nomenclature used by studies.

Study, year	Used Nomenclature
Lin, 2004	Health maintenance visit
Somkin, 2004	Check-up
Flocke, 2004; Eaton, 2002	Health care maintenance visit
Schneider, 2003	Health maintenance examination
Finkelstein, 2002	Health examination or Periodic health examination
Hahn, 1999	Physical examination or Preventive services
Chiou, 2002	Physical examination or Health examination
Burton, 2002	Periodic health examination or Periodic health evaluation
Tao, 2001	General medical examination or Periodic health examination
Parchman, 2001	Check-up
Shannon, 2001	Physical examination or Periodic health examination
Nutting, 2001	Annual examination or Health maintenance visit
Hama, 2001	Preassignment medical examination
Patrick, 1999	Health risk assessment or preventive services
Stange, 2000	Screening service or Preventive services
Freedman, 2000	Periodic health examination
Williams, 1998	Health maintenance examination
Faulkner, 1997	Periodic health exam
Kottke, 1997	Physical examination or check-up
Sox, 1997	Periodic health examination
Elder, 1995; Cacciatore, 1994	Health risk appraisal
Christensen, 1995	Preventive health examination
Morrisey, 1995	Preventive care visit or Health promotion service package
Holl, 1995; German, 1995; Burton, 1997; Burton, 1995	Physical examination
Giger, 1993	Health check or Physical examination
Norman, 1992	Health check
Belcher, 1990	Physical examination
Bernacki, 1988	Periodic physical examination
Stone, 1981; Stone, 1978; no author, 1977; no author, 2001;Tevelyan, 1973; Stone, 1978	Multiphasic screening
Fletcher, 1977	Multiphasic screening
Collen, 1977	Health examination or Multiphasic health check
Slesinger, 1976	General physical check-up Physical examination
Cutler, 1973; Collen, 1973; Dales, 1973; Ramcharan, 1973; Friedman, 1986; Dales, 1979; Norinder, 2002	Periodic health examination or Multiphasic health check-up
Robert, 1969	Periodic health examination
Grimaldi, 1965	Periodic physical examination or Periodic health examination
Theobald, 1998	General health examination
OXCHECK, 1995	Health check
Belcher, 1990	Physical examination or Preventive services
Nakanishi, 1996	Health check-up Periodic health examination

Evidence Table 1a. Delivery of Preventive Health Care Services, Pap Smear Delivered: Randomized Controlled Trials.

Author, year	Description of study groups	Target of interven-tion	Length of F/U	Outcome	Outcome self-reported by patients or providers	N	Baseline	F/U	Change	Ad-justed	Qual. score tertile
Morrissey, 1995	Full Medicare reimbursement and office reminders (intervention group)	Providers and patients	12-26 months	Delivery of Pap smear	Not self-reported	231§	46%	85%	NR	No	87 High
	Control group					224§	57%	31%			
Burton, 1995; German, 1995; Burton, 1997; Burton, 1995	Received coverage for an annual preventive visit and tests (Medicare vouchers for 2 free preventive visits)	Patients	2 years	Percentage change in use of Pap smear within last year[80]	Not self-reported	Baseline: 2105 F/U: 1573	NR	NR	+16.5%‡	No	76 High
	No coverage for an annual preventive visit and tests					Baseline: 2090 F/U: 1524			+13.1%		

*Physicians were unit of randomization and outcomes are reported at patient level; group 1 = patients in CART.
† Randomly selected new patient charts
‡ $p<0.001$.
§ Sample size includes men and women; gender breakdown not provided.
F/U = follow-up; HME = health maintenance exam; NR = not reported; CART = comprehensive annotated reminder tool.
Qual. Score = quality score (for assessments of study quality, each reviewer independently judged study quality and rated items on quality assessment forms, scores were calculated by adding quality scores and dividing them by the maximum score for any given category)

Evidence Table 1b. Delivery of Preventive Health Care Services, Pap Smear Delivered: Retrospective Cohort Study.

Author, year	Description of study groups	Target of interven-tion	Length of F/U	Outcome	Outcome self-reported by patients or providers	N	Baseline	F/U	Change	Ad-justed	Qual. score / tertile
Williams, 1998	Intervention: (touch-sensitive computer system) with HME	Patients and providers*	12 months	Delivery of Pap smear	Not self-reported	507	58.2%	57%	-1.2%	No	76 / High
	Intervention: (touch-sensitive computer system) not receiving HME					507	8.3%	8.1%	-0.2%		
	Control (no computer system) with HME					50	71.4%	65.5%	-5.9%		
	Control (no computer system)not receiving HME					50	9.8%	10.3%	0.5%		

* For control groups only.

Evidence Table 1c. Delivery of Preventive Health Care Services, Pap Smear Delivered: Cross-sectional Studies.

Author, year	Description of study groups	Target of interven-tion	Outcome	Outcome self-reported by patients or providers	N	F/U	Ad-justed	Qual. score / tertile
Somkin, 2004	Checkup in last 12 months	Patients	Received Pap smear	Patients	1463	OR: 4.38; 95% CI: (2.95-6.50)	Yes*	77 / High
	No checkup in last 12 months					1.0 (Reference)		
Finkelstein, 2002	Receive annual health examination or preventive screening	Patients	Received Pap smear	NA	2232	OR: 6.69; 95% CI: (4.6-9.8)	Yes†	70 / Med.
	No annual health examination or preventive screening					1.0 (Reference)		
Hahn, 1999	Received preventive services with HMO insurance	Patients	Received Pap smear	NA	17032	97%	No	50 / Low
	Did not receive preventive services with HMO insurance				16629	62%		
	Received preventive services with FFS insurance				9199	95%		
	Did not receive preventive services with FFS insurance				13425	47%		

Evidence Table 1c. Delivery of Preventive Health Care Services, Pap Smear Delivered: Cross-sectional Studies. (continued)

Author, year	Description of study groups	Target of interven-tion	Outcome	Outcome self-reported by patients or providers	N	F/U	Ad-justed	Qual. score tertile
Tao, 2001	Received a general medical examination	Patients	Received Pap smear	Providers	NA	56%	No	53 Low
	Did not receive a general medical examination					44%		
Parchman, 2001	Check-up in past year	Patients	Received Pap smear in the last year	Patients	Total = 1409	68.4% OR: 5.7; 95% CI: (4.0-8.2)	No	55 Low
	No check-up in past year					27.5% OR: 1.0; 95% CI: (Reference)		
Kottke, 1997	Patients with visit for a health risk appraisal	Providers	Rate[‡] Pap smears offered by providers	Patients	Total = 6830	Mean (± SD): 0.55 (± 0.24)[§]		64 Med.
	Patients with visit for urgent problem					Mean (± SD): 0.21 (± 0.26)		
	Patients with visit for continuing condition					Mean (± SD): 0.15 (± 0.25)		
	Patients with visit for F/U					Mean (± SD): 0.19 (± 0.26)		
	Patients with other reason for visit					Mean (± SD): 0.19 (± 0.28)		

Evidence Table 1c. Delivery of Preventive Health Care Services, Pap Smear Delivered: Cross-sectional Studies. (continued)

Author, year	Description of study groups	Target of interven-tion	Outcome	Outcome self-reported by patients or providers	N	F/U	Ad-justed	Qual. score tertile
Sox, 1997	Received a PHE	Patients	Mean proportion of patients receiving Pap smear	Patients	2775	Mean (± SD): 0.782 (± 0.192)‖	Yes¶	63 Med.
	Usual care					Mean (SD): 0.38 (0.307)		
Sles-inger, 1976	Employees who chose prepaid group insurance plan	Patients	Receipt of Pap smear	Patients	Total N = 506, intervention; 483, control. Outcome: to women only within sample (number of women not reported)	64	No	47 Low
	Random sampling of employees who chose the traditional BC/BS plan					63		

* Age, race, insurance, education, language, years in U.S., annual household income.
† Age, income, residence, patient has regular physician.
‡ Clinic weighted rate across 44 primary care clinics.
§ $p<0.001$ for this group versus all other groups combined.
‖ $p<0.001$.
¶ Sex, education, practice mix, provider sex, number of years with physician; number of visits per year; perceived health status.
F/U = follow-up; OR = odds ratio; CI = confidence interval; PHE = periodic health exam; NA = not applicable; HMO = health maintenance organization; FFS = fee for service; SD = standard deviation; BC/BS = Blue Cross/Blue Shield.
Qual. Score = quality score (for assessments of study quality, each reviewer independently judged study quality and rated items on quality assessment forms, scores were calculated by adding quality scores and dividing them by the maximum score for any given category)

Evidence Table 1d. Delivery of Preventive Health Care Services, Pap Smear Delivered: Pre-post Studies.

Author, year	Description of intervention	Target of interven-tion	Length of F/U	Outcome	Outcome self-reported by patients or providers	N	Baseline	F/U	Ad-justed	Qual. score / tertile
Schnei-der, 2003	Patients: written material, reminder, phone call; Providers: education on prevention measures.	Patients and providers	2 months	Pap smear delivered	NA	Baseline: 220,* F/U: 214	56.9%	69%	N0	69 / Med.
Geiger, 1993	Physicians educated about providing preventive services in the context of a "health check"	Patients	5 months	Pap smear delivered	NA	Baseline: 24, F/U: 37±	16 (67%)	35 (97%)†	N0	72 / High

* Random cross-sectional samples of patients in 1999 and 2000.
† Not statistically significant.
± Chart reviews of new patient physicals
F/U = follow-up; NA = not applicable; PHE = periodic health evaluation.
Qual. Score = quality score (for assessments of study quality, each reviewer independently judged study quality and rated items on quality assessment forms, scores were calculated by adding quality scores and dividing them by the maximum score for any given category)

Evidence Table 2a. Delivery of Preventive Health Care Services, Preventive Counseling Delivered: Randomized ControlledTrial.

Author, year	Description of study groups	Target of interven-tion	Length of F/U	Outcome	Outcome self-reported by patients or providers	N	Baseline	F/U	Change	Ad-justed	Qual. score / tertile
Belcher, 1990	The intervention group was offered self-referral to a health promotion clinic.	Patients	5 years	A: Counseling on alcohol abuse B: Smoking cessation counseling	Not self-reported	400 (baseline); 260 (F/U)	A: 20% B: 21%	A: 70%* B: 71%†	NR	Yes‡	63 / Low
	The comparison group received usual care.					274 (baseline); 192 (F/U)	A: 25% B: 28%	A: 24% B: 30%			

* $p < 0.05$.
†$p = 0.001$.
‡Age, sex, education, practice mix, provider sex, years with physicians and number of visits per year, perceived health status.
F/U = follow-up; CART = comprehensive annotated reminder tool; NR = not reported.
Qual. Score = quality score (for assessments of study quality, each reviewer independently judged study quality and rated items on quality assessment forms, scores were calculated by adding quality scores and dividing them by the maximum score for any given category)

Evidence Table 2b. Delivery of Preventive Health Care Services, Preventive Counseling Delivered: Cross-sectional Studies.

Author, year	Description of study groups	Target of interven-tion	Outcome	Outcome self-reported by patients or providers	N	F/U	Ad-justed	Qual. score / tertile
Lin, 2004	OPD visits involving an NP	Patients	A: Diet counseling B: Injury prevention counseling C: Physical activity counseling D: Safe sexual practices counseling E: Tobacco use counseling	Not self-reported	1929 (baseline)	A: 32.6% OR: 1.7; 95% CI: (1.2-2.5) B: 8.8% OR: 2.2; 95% CI: (1.3-3.5) C: 14.5% OR: 1.8; 95% CI: (1.2-2.8) D: 12.2% OR: 3.2; 95% CI: (1.6-6.3) E: 6.7% OR: 1.7; 95% CI: (1.2-2.5)	Yes*	71 / High
	OPD visits not Involving an NP				19096 (baseline)	Reference groups A: 22.9% B: 4.6% C: 9.3% D: 3.2% E: 4.3%		

Evidence Table 2b. Delivery of Preventive Health Care Services, Preventive Counseling Delivered: Cross-sectional Studies. (continued)

Author, year	Description of study groups	Target of interven-tion	Outcome	Outcome self-reported by patients or providers	N	F/U	Ad-justed	Qual. score / tertile
Flocke, 2004; Eaton, 2002	Well care	Patients	A: Patient diet advice recall[74] B: Patient smoking counseling recall[74] C: Physical activity patient recall[74] D: Nutritional counseling—univariate analysis total n = 3475[98] E: Nutritional counseling—multivariate analysis total n = 3475[98]	Patients		A, B, C: OR[†]:1 (reference) D: 41% E: OR: 2.35; 95% CI: (1.78-3.11)	Yes[‡] (for outcomes A, B, C) No (outcome D) Yes[§] for outcome E	76 High
	Acute care					A: OR: 0.44; 95% CI:[†] (0.25-0.75) B: OR: 0.48; 95% CI: (0.24-0.97) C: OR: 0.35; 95% CI: (0.21-0.57) D: 17% E: OR: 1.00 (reference group)		

Evidence Table 2b. Delivery of Preventive Health Care Services, Preventive Counseling Delivered: Cross-sectional Studies. (continued)

Author, year	Description of study groups	Target of interven-tion	Outcome	Outcome self-reported by patients or providers	N	F/U	Ad-justed	Qual. score / tertile
Flocke, 2004; Eaton, 2002 (cont')	Chronic care					A: OR: 0.47; 95% CI: (0.28-0.81) B: OR: 0.74; 95% CI: (0.31-1.7) C: OR: 0.72; 95% CI: (0.44-1.2) D: 30% E: OR: 1.69; 95% CI: (1.38-2.06)		
	Other visit					A: OR: 0.23; 95% CI: (0.09-0.59) B: OR: 0.5; 95% CI: (0.15-1.7) C: OR: 0.29; 95% CI: (0.12-0.73) D: NR E: OR: 1.45; 95% CI: (1.03-2.02)		

Evidence Table 2b. Delivery of Preventive Health Care Services, Preventive Counseling Delivered: Cross-sectional Studies. (continued)

Author, year	Description of study groups	Target of interven-tion	Outcome	Outcome self-reported by patients or providers	N	F/U	Ad-justed	Qual. score tertile
Tao, 2001	Received a general medical examination	Patients	Percentage of visits in which counseling about family planning or contraception was delivered	Providers	356,868,103 visits	% (SE) =40‖	No	53 Low
	Did not receive a general medical examination				39,265,757 visits	% (SE) = 60% (5)		
Stange, 2000	Well visits	Patients	A: Mean % (SD) receipt of USPTF health habits counseling B: Mean % (SD) receipt of cancer-related health habits counseling	Not self-reported	A and B: 442 (baseline)	A: Mean (SD): 9 (10) B: Mean (SD): 10 (13)	No	74 High
	Illness visits				A and B: 3332 (baseline)	A: Mean (SD): 2 (5) B: Mean (SD): 4 (8)		

Evidence Table 2b. Delivery of Preventive Health Care Services, Preventive Counseling Delivered: Cross-sectional Studies. (continued)

Author, year	Description of study groups	Target of interven-tion	Outcome	Outcome self-reported by patients or providers	N	F/U	Ad-justed	Qual. score tertile
Kottke, 1997	Patients with visit for a health risk appraisal	Providers	Clinic weighted rates at which smoking cessation counseling was offered to patients who were not up-to-date at beginning of visit		All patients =6830 (baseline patients)	Mean (SD): 0.56 (0.26)	No	64 Med.
	Patients with visit for urgent problem					Mean (SD): 0.40 (0.23)		
	Patients with visit for continuing condition			Patients		Mean (SD): 0.50 (0.19)		
	Patients with visit for F/U					Mean (SD): 0.19 (0.27)		
	Patients with other reason for visit					Mean (SD): 0.40 (0.18)		

Evidence Table 2b. Delivery of Preventive Health Care Services, Preventive Counseling Delivered: Cross-sectional Studies. (continued)

Author, year	Description of study groups	Target of interven-tion	Outcome	Outcome self-reported by patients or providers	N	F/U	Ad-justed	Qual. score tertile
Sox, 1997	Received a PHE	Patients	Recommend dietary change	Patients	Both groups = 2775	Mean (SD): 0.604 (0.128)	Yes¶	63 Med.
	Usual care¶					Mean (SD): 0.520 (0.206)		

*Age sex, provider experience, clinic type, metropolitan status, geographic region of hospital.
† p<0.001 for checkup physical examination versus all other groups.
‡ Visit reason, visit duration, mean health status, time discussing targeted behavior.
§ Age, sex, race, diabetes, history of myocardial infarction or stroke; history of depression, length of visit; new vs. established patient; number of chronic illness; number of visits in previous year.
‖ SE not available.
¶ Age, sex, education, practice mix, provider sex, years with physician, number of visits per year, perceived health status.
F/U = follow-up; OPD = outpatient department; NP = nurse practitioner; OR = odds ratio; CI; confidence interval; SD = standard deviation; USPSTF = United States Preventive Services Task Force; SE = standard error; PHE = periodic health exam.
Qual. Score = quality score (for assessments of study quality, each reviewer independently judged study quality and rated items on quality assessment forms, scores were calculated by adding quality scores and dividing them by the maximum score for any given category)

Evidence Table 2c. Delivery of Preventive Health Care Services, Preventive Counseling Delivered: Pre-post Studies.

Author, year	Description of intervention	Target of interven-tion	Length of F/U	Outcome	Outcome self-reported by patients or providers	N	Baseline	F/U	Change	Qual. score / tertile
Schnei-der, 2003	Patients: written material, reminder, phone call; Providers: education on prevention measures.	Patients	2 months	A: Exercise counseling B: Diet counseling C: Alcohol counseling D: Substance abuse counseling E: Tobacco cessation counseling	Not self-reported	Baseline: 321, F/U: 356[∞]	A: 19% B: 29.9% C: 64.2% D: 40.9% E: 67.9%	A: 34.6% B: 38.3% C: 55.3% D: 42.4% E: 63.2%	A: +15.6%* B: +8.4%[†] C: -8.9% [‡] D: +1.5% E: -4.7%	69 / Med.
Geiger, 1993	Physicians educated about providing preventive services in the context of a "health check"	Patients	5 months	A: Substance abuse counseling B: Diet counseling C: Oral health counseling (dental care) D: Physical activity counseling	Not self-reported	Baseline: 50, F/U: 53[a]	A: 4 (8%) B: 12 (24%) C: 2 (9%) D: 6 (12%)	A: 51 (96%) [§] B: 52 (98%)[§] C: 12 (23%)[§] D: 50 (94%)[§]		72 / High

* $p = 0.001$.
[†] $p = 0.013$.
[‡] $p = 0.012$.
[§] $p < 0.05$.
[∞] Chart reviews of new patient physicals
[a] Randomly selected patient charts
F/U = follow-up; Qual. Score = quality score (for assessments of study quality, each reviewer independently judged study quality and rated items on quality assessment forms, scores were calculated by adding quality scores and dividing them by the maximum score for any given category)

Evidence Table 3a. Delivery of Preventive Health Care Services, Immunizations: Randomized Controlled Trials.

Author, year	Description of study groups	Target of interven-tion	Length of F/U	Outcome	Outcome self-reported by patients or providers	N	Baseline	F/U	Change	Ad-justed	Qual. score tertile
Patrick, 1999	Medicare beneficiaries (enrolled in a HMO) randomized to preventive services package and to receive a health risk assessment for 2 years	Patients	48 months	Influenza vaccine within last 24 months	Patients	Baseline: 1282 F/U:1211	62%	79%	17%*	No	62 Low
	Usual care					Baseline: 1276 F/U: 1234	66%	78%	12%		
Morrissey, 1995	Full Medicare reimburseme nt and office reminders (intervention group)	Providers and patients	12-26 months	Delivery of influenza vaccine	Not self-reported	Baseline: 231	48%	72%	NR	No	87 High
	Control group					Baseline: 224	45%	52%			

Evidence Table 3a. Delivery of Preventive Health Care Services, Immunizations: Randomized Controlled Trials. (continued)

Author, year	Description of study groups	Target of interven-tion	Length of F/U	Outcome	Outcome self-reported by patients or providers	N	Baseline	F/U	Change	Ad-justed	Qual. score tertile
Belcher, 1990	The intervention group was offered self-referral to a health promotion clinic.	Patients	5 years	Percentage receiving influenza vaccination	Not self-reported	Baseline: 400 F/U: 260	16%	56%†	NR	No	63 Low
	The comparison group received usual care.					Baseline: 274 F/U: 192	16%	67%†			

* $p < 0.05$ for change from baseline to follow-up.
† Rend test: z-value 2.09, p-value 0.045.
F/U = follow-up; CART = comprehensive annotated reminder tool; NR = not reported; HMO = health maintenance organization.
Qual. Score = quality score (for assessments of study quality, each reviewer independently judged study quality and rated items on quality assessment forms, scores were calculated by adding quality scores and dividing them by the maximum score for any given category)

Evidence Table 3b. Delivery of Preventive Health Care Services, Immunizations: Retrospective Cohort Study.

Author, year	Description of study groups	Target of interven-tion	Length of F/U	Outcome	Outcome self-reported by patients or providers	N	Baseline	F/U	Ad-justed	Qual. score / tertile
Freed-man, 2000	Received a periodic health examination	Patients	18 months	A: Received influenza vaccine B: Received tetanus vaccine	Not self-reported	100	NA	A: N (%) = 70 (70); RR (95% CI) = 1.01 (0.8-1.3) B: N (%) = 62 (62); RR (95% CI) = 1.72 (1.1-2.7)	No	75 / High
	Received no periodic health examination and attended clinic 3 or more times					36	NA	A: N (%) = 25 (69) (reference group) B: N (%) = 13 (36) (reference group)		

F/U = follow-up; NA = not available; RR = risk ratio; CI = confidence interval.
Qual. Score = quality score (for assessments of study quality, each reviewer independently judged study quality and rated items on quality assessment forms, scores were calculated by adding quality scores and dividing them by the maximum score for any given category)

Evidence Table 3c. Delivery of Preventive Health Care Services, Immunizations: Cross-sectional Studies.

Author, year	Description of study groups	Target of interven-tion	Outcome	Outcome self-reported by patients or providers	N	F/U	Ad-justed	Qual. score / tertile
Hahn, 1999	Received preventive services with HMO insurance	Patients	Received tetanus vaccine	Not self-reported	17032	45%	No	50 / Low
	Did not receive preventive services with HMO insurance				16629	36%		
	Received preventive services with FFS insurance				9199	40%		
	Did not receive preventive services with FFS insurance				13425	28%		
Stange, 2000	Well visits	Patients	Mean % receiving USPSTF recommended vaccinations	Not self-reported	355	Mean (± SD): 16% (± 32)	No	74 / High
	Illness visits				3006	Mean (± SD): 2% (± 9)		
Kottke, 1997	Patients with visit for a health risk appraisal	Providers	A: Rate* influenza vaccine offered by providers B: Rate* pneumococcal vaccine offered by providers	Patients	6830	A: Mean (± SD): 0.36 (± 0.37)† B: Mean (± SD): 0.10 (± 0.17)‡	No	64 / Med.

Evidence Table 3c. Delivery of Preventive Health Care Services, Immunizations: cross-sectional studies. (continued)

Author, year	Description of study groups	Target of interven-tion	Outcome	Outcome self-reported by patients or providers	N	F/U	Ad-justed	Qual. score / tertile
Kottke, 1997 (cont')	Patients with visit for urgent problem					A: Mean (± SD): 0.24 (± 0.37) B: Mean (± SD): 0.02 (± 0.09)		
	Patients with visit for continuing condition					A: Mean (± SD) : 0.25 (± 0.29) B: Mean (± SD): 0.03 (± 0.06)		
	Patients with visit for follow-up					A: Mean (± SD) : 0.36 (± 0.33) B: Mean (± SD): 0.04 (± 0.08)		
	Patients with other reason for visit					A: Mean (± SD): 0.20 (± 0.31) B: Mean (± SD): 0.03 (± 0.12)		

Evidence Table 3c. Delivery of Preventive Health Care Services, Immunizations: Cross-sectional Studies. (continued)

*Clinic weighted rate across 44 primary care clinics.
† $p = 0.17$ for this group versus all other groups combined.
‡ $p = 0.009$ for this group versus all other groups combined.
F/U = follow-up; HMO = health maintenance organization; FFS = fee for service; USPSTF = United States Preventive Services Task Force; SD = standard deviation.
Qual. Score = quality score (for assessments of study quality, each reviewer independently judged study quality and rated items on quality assessment forms, scores were calculated by adding quality scores and dividing them by the maximum score for any given category)

Evidence Table 4a: Delivery of Preventive Health Care Services, Cholesterol Screening: Randomized Controlled Trial.

Author, year	Description of study groups	Target of interven-tion	Length of F/U	Outcome	Outcome self-reported by patients or providers	N	Baseline	F/U	Change	Ad-justed	Qual. Score / tertile
Morrissey, 1995	Full Medicare reimbursement and office reminders (intervention group)	Providers and patients	12-26 months	Cholesterol screening performed	Not self-reported	Baseline: 231	62%	60%	NR	No	87 / High
	Control group					Baseline: 224	61%	58%			

F/U = follow-up; CART = comprehensive annotated reminder tool; NR = not reported.
Qual. Score = quality score (for assessments of study quality, each reviewer independently judged study quality and rated items on quality assessment forms, scores were calculated by adding quality scores and dividing them by the maximum score for any given category)

Evidence Table 4b. Delivery of Preventive Health Care Services, Cholesterol Screening: Cross-sectional Studies.

Author, year	Description of study groups	Target of interven-tion	Outcome	Outcome self-reported by patients or providers	N	Baseline	F/U	Ad-justed	Qual. score / tertile
Finkelstein, 2002	Receive annual health examination or preventive screening	Patients	Cholesterol	Not self-reported	NR	NR	OR (95% CI): 3.0 (2.0-4.5)	Yes*	70 / Med.
	No annual health examination or preventive screening						OR (95% CI): 1.0 (Reference)		

Evidence Table 4b. Delivery of Preventive Health Care Services, Cholesterol Screening: Cross-sectional Studies. (continued)

Author, year	Description of study groups	Target of interven-tion	Outcome	Outcome self-reported by patients or providers	N	Baseline	F/U	Ad-justed	Qual. score tertile
Hahn, 1999	Received preventive screening with HMO insurance	Patients	Cholesterol test	NA	Baseline: 17032	NR	74%	No	50 Low
	Did not receive preventive screening with HMO insurance (acute care visit)				Baseline: 16629		68%		
	Received preventive screening with FFS insurance				Baseline: 9199		68%		
	Did not receive preventive screening with FFS insurance (acute care visit)				Baseline: 13425		59%		
Parchman, 2001	Had check-up exam in past year	Patients	Cholesterol check in last 5 years	Patient	NR	NR	71.3% OR (95% CI): 3.7 (2.8-4.8)	No	55 Low
	No check-up in past year						40.4% (Reference)		

Evidence Table 4b. Delivery of Preventive Health Care Services, Cholesterol Screening: Cross-sectional Studies. (continued)

Author, year	Description of study groups	Target of interven-tion	Outcome	Outcome self-reported by patients or providers	N	Baseline	F/U	Ad-justed	Qual. score / tertile
Kottke, 1997	Patients with visit for a health risk appraisal	Providers	Clinic weighted rates at which cholesterol testing was offered to patients who were not up-to-date at beginning of visit	Patients	NR	Mean (SD): 0.21 (0.16)†	NR	No	64 / Med.
	Patients with visit for urgent problem					Mean (SD): 0.05 (0.09)			
	Patients with visit for continuing condition					Mean (SD): 0.04 (0.06)			
	Patients with visit for F/U					Mean (SD): 0.08 (0.14)			
	Patients with other reason for visit					Mean (SD): 0.04 (0.07)			

Evidence Table 4b. Delivery of Preventive Health Care Services, Cholesterol Screening: Cross-sectional Studies. (continued)

[*] Age, education, income, residence, has regular doctor.
[†] Compared to all others (combined) $p < 0.001$.
F/U = follow-up; NR = not reported; OR = odds ratio; CI = confidence interval; HMO = health maintenance organization; FFS = fee for service; SD = standard deviation.
Qual. Score = quality score (for assessments of study quality, each reviewer independently judged study quality and rated items on quality assessment forms, scores were calculated by adding quality scores and dividing them by the maximum score for any given category)

Evidence Table 4c. Delivery of Preventive Health Care Services, Cholesterol Screening: Pre-post Studies.

Author, year	Description of intervention	Target of interven-tion	Length of F/U	Outcome	Outcome self-reported by patients or providers	N	Baseline	F/U	Change	Qual. score / tertile
Schnei-der, 2003	Patients: written material, reminder, phone call; Providers: education on prevention measures.	Patients	NR	Cholesterol screening	Not self-reported	Baseline: 455	77.4%	83.4%	+6.0*	69 / Med.
Geiger, 1993	Physicians educated about providing preventive services in the context of a "health check"	Patients	5 months	Total cholesterol testing	Not self-reported	Baseline: 50 F/U: 53 [ä]	32 (64%)	52 (98%)[†]	NR	72 / High

* $p = 0.068$.
[†] p-value not significant.
[ä] Randomly selected patient charts
F/U = follow-up; NR = not reported.
Qual. Score = quality score (for assessments of study quality, each reviewer independently judged study quality and rated items on quality assessment forms, scores were calculated by adding quality scores and dividing them by the maximum score for any given category)

Evidence Table 5a. Delivery of Preventive Health Care Services, Colon Cancer Screening: Randomized ControlledTrials.

Author, year	Description of study groups	Target of interven-tion	Length of F/U	Outcome	Outcome self-reported by patients or providers	N	Baseline	F/U	Change	Ad-justed	Qual. score / tertile
Morrissey, 1995	Full Medicare reimburse-ment and office reminders (intervention group)	Providers and patients	12-26 months	Fecal occult blood test delivered	Not self-reported	Baseline: 231	55%	91%	NR	No	87 / High
	Control group					Baseline: 224	58%	43%			
Belcher, 1990	The intervention group was offered self-referral to a health promotion clinic.	NR	5-year	Fecal occult blood testing performed.	Not self-reported	Baseline 400, F/U: 260	24%	70%	*	No	63 / Low
	The comparison group received usual care.					Baseline 274, F/U:192	21%	20%			

* p <0.05 for change from baseline to follow-up.
F/U = follow-up; CART = comprehensive annotated reminder tool; NR = not reported; HME = health maintenance exam.
Qual. Score = quality score (for assessments of study quality, each reviewer independently judged study quality and rated items on quality assessment forms, scores were calculated by adding quality scores and dividing them by the maximum score for any given category)

Evidence Table 5b. Delivery of Preventive Health Care Services, Colon Cancer Screening: Retrospective Cohort Study.

Author, year	Description of study groups	Target of interven-tion	Length of F/U	Outcome	Outcome self-reported by patients or providers	N	Baseline	F/U	Change	Ad-justed	Qual. score / tertile
Williams, 1998	Intervention: (touch-sensitive computer system) with HME	Patients and providers (providers: primary care study practices =unit of analysis)	12 months	A: Flexible sigmiodoscopy B: Fecal occult blood test	Not self-reported	NR	A: 4.8% B: 2.8%	A: 5.3% B: 4.3%	A: 0.5% B: 1.5%	Yes†	76 / High
	Intervention: (touch-sensitive computer system) not receiving HME						A: 4.4% B: 17%	A: 6.9% B: 12.8%	A: 2.5% B: -4.2%		
	Control (no computer system) with HME						A: 8.7% B: 20.3%	A: 12.3% B: 14.7%	A: 3.6% B: -5.6%		
	Control (no computer system)not receiving HME						A: 4.2% B: 5.5%	A: 2.9% B: 3.1%	A: -1.3% B: -2.4%		

Evidence Table 5c. Delivery of Preventive Health Care Services, Colon Cancer Screening: Cross-sectional Studies.

Author, year	Description of study groups	Target of interven-tion	Outcome	Outcome self-reported by patients or providers	N	F/U	Qual. score tertile
Hahn, 1999	Received preventive services with HMO insurance	Patients	A: Sigmoidoscopy B. Fecal occult blood testing	Not self-reported	Baseline: 17032	A: 29% B: 41%	50 Low
	Did not receive preventive services with HMO insurance (acute care visit)				Baseline: 16629	A: 21% B: 27%	
	Received preventive services with FFS insurance				Baseline: 9199	A: 21% B: 35%	
	Did not receive preventive services with FFS insurance (acute care visit)				Baseline: 13425	A: 15% B: 20%	

Evidence Table 5c. Delivery of Preventive Health Care Services, Colon Cancer Screening: Cross-sectional Studies. (continued)

Author, year	Description of study groups	Target of interven-tion	Outcome	Outcome self-reported by patients or providers	N	F/U	Qual. score / tertile
Sox, 1997	Received a PHE	Patients and providers	A: Mean proportion of persons in each practice receiving sigmoidoscopy B: Mean proportion of persons in each practice receiving fecal occult blood testing	Yes (patients)	Baseline: both groups=2775	A: Mean (SD): 0.158 (0.134) * B: Mean (SD): 0.504 (0.264) †	63 / Med.
	Usual care					A: Mean (SD): 0.126 (0.179) B: Mean (SD): 0.307 (0.267)	

* $p = 0.04$ between groups.
† $p < 0.001$ between groups.
F/U = follow-up; HMO = health maintenance organization; FFS = fee for service; SD = standard deviation; PHE = periodic health exam.
Qual. Score = quality score (for assessments of study quality, each reviewer independently judged study quality and rated items on quality assessment forms, scores were calculated by adding quality scores and dividing them by the maximum score for any given category)

Evidence Table 5d. Delivery of Preventive Health Care Services, Colon Cancer Screening: Pre-post Study.

Author, year	Description of intervention	Target of interven-tion	Length of F/U	Outcome	Outcome self-reported by patients or providers	N	Baseline	F/U	Change	Qual. score tertile
Schnei-der, 2003	Patients: written material, reminder, phone call; Providers: education on prevention measures.	Patients and providers	2 months	A: Percentage receiving fecal occult test. B: Percentage receiving sigmoidoscopy	Not self-reported	A: Baseline 303 B: Baseline 296 F/U 296	A: 40% B: 30.5%	A: 54.2% B: 39.9%	A: 14.2%* B: 9.4%†	69 Med.

* $p = 0.01$.
† $p = 0.06$.
F/U = follow-up.
Qual. Score = quality score (for assessments of study quality, each reviewer independently judged study quality and rated items on quality assessment forms, scores were calculated by adding quality scores and dividing them by the maximum score for any given category)

Evidence Table 6a. Delivery of Preventive Health Care Services, Mammogram Delivered: Randomized Controlled Trial.

Author, year	Description of study groups	Target of interven-tion	Length of F/U	Outcome	Outcome self-reported by patients or providers	N	Baseline	F/U	Change	Ad-justed	Qual. score / tertile
Morri-ssey, 1995	Full Medicare reimbursement and office reminders (intervention group)	Providers and patients	12-26 months	Delivery of mammogram	Not self-reported	231	33%	43%	NR	No	87 / High
	Control group					224	25%	28%			

F/U = follow-up; NR = not reported.
Qual. Score = quality score (for assessments of study quality, each reviewer independently judged study quality and rated items on quality assessment forms, scores were calculated by adding quality scores and dividing them by the maximum score for any given category)

Evidence Table 6b. Delivery of Preventive Health Care Services, Mammogram Delivered: Retrospective Cohort Study.

Author, year	Description of study groups	Target of interven-tion	Length of F/U	Outcome	Outcome self-reported by patients or providers	N	Baseline	F/U	Change	Ad-justed	Qual. score / tertile
Williams, 1998	Intervention: (touch-sensitive computer system) with HME	Patients and providers: patients receiving HME during study year	12 months	Delivery of mammogram	Not self-reported	Total N = 507 (random sample of 9858 patients)	37.2%	47.6%	10.4%*	No	76 / High
	Intervention: (touch-sensitive computer system) not receiving HME						18.1%	20.8%	2.7%		
	Control (no computer system) with HME						64.1%	44.2%	-19.9%*		
	Control (no computer system)not receiving HME						10.8%	11%	0.2%		

* p <0.05 (comparing baseline and follow-up).
F/U = follow-up; HME = health maintenance exam; NR = not reported.
Qual. Score = quality score (for assessments of study quality, each reviewer independently judged study quality and rated items on quality assessment forms, scores were calculated by adding quality scores and dividing them by the maximum score for any given category)

Evidence Table 6c. Delivery of Preventive Health Care Services, Mammogram Delivered: Cross-sectional Studies.

Author, year	Description of study groups	Target of interven-tion	Outcome	Outcome self-reported by patients or providers	N	F/U	Ad-justed	Qual. score tertile
Somkin, 2004	Check-up in last 12 months	Patients	Received mammogram	Patients	1463	OR: 2.28; 95% CI: (1.68-3.0)	Yes*	77 High
	No check-up in last 12 months					1.0 (Reference)		
Tao, 2001	Received a general medical examination	Patients	Received mammogram	Providers	NA	45%	No	53 Low
	Did not receive a general medical examination					55%		
Finkelstein, 2002	Received an annual health examination/ preventive screening	Patients	Received mammogram	Not self-reported	Total= 2232	OR: 3.89; 95% CI: (2.5-6.1)	Yes†	70 Med.
	No annual health examination/ preventive screening					1.0 (Reference)		

Evidence Table 6c. Delivery of Preventive Health Care Services, Mammogram Delivered: Cross-sectional Studies. (continued)

Author, year	Description of study groups	Target of interven-tion	Outcome	Outcome self-reported by patients or providers	N	F/U	Ad-justed	Qual. score tertile
Hahn, 1999	Received preventive services with HMO insurance	Patients	Received mammogram	Not self-reported	17032	87%	No	50 Low
	Did not receive preventive services with HMO insurance				16629	60%		
	Received preventive services with FFS insurance				9199	83%		
	Did not receive preventive services with FFS insurance				13425	46%		
Parchman, 2001	Check-up in past year	Patients	Received mammogram in past 2 years	Patients	Total= 1409	65.2% OR: 5.8; 95% CI: (2.5-13.4)	No	55 Low
	No check-up in past year					24.4% 1.0 (Reference)		

Evidence Table 6c. Delivery of Preventive Health Care Services, Mammogram Delivered: Cross-sectional Studies. (continued)

Author, year	Description of study groups	Target of interven-tion	Outcome	Outcome self-reported by patients or providers	N	F/U	Ad-justed	Qual. score tertile
Kottke, 1997	Patients with visit for a physical examination or check-up	Providers	Rate[‡] mammograms offered by providers	Patients	Total = 6830	Mean (± SD): 0.38 (± 0.35)[§]	No	64 Med.
	Patients with visit for urgent problem					Mean (± SD): 0.21 (± 0.30)		
	Patients with visit for continuing condition					Mean (± SD): 0.13 (± 0.17)		
	Patients with visit for F/U					Mean (± SD): 0.14 (± 0.18)		
	Patients with visit for other reason					Mean (± SD): 0.21 (± 0.20)		
Nutting, 2001	Had annual examination		Mammogram recommended by physician	Providers		OR: (A) 4.5; (B) 8.1 95% CI: (A) (3.2-6.3); (B) (3.3-20.1)	Yes[‖]	43 Low
	Had chronic care visit					1.0 (Reference)		
Sox, 1997	Received a PHE	Patients	Mean proportion of patients receiving mammogram	Patients	2775	Mean (± SD): 0.736 (± 0.191)[¶]	Yes[#]	63 Med.
	Usual care					Mean (± SD): 0.414 (± 0.317)		

Evidence Table 6c. Delivery of Preventive Health Care Services, Mammogram Delivered: cross-sectional studies. (continued)

* Age, race, insurance, education, language, years in U.S., annual household income.
† Age, income, residence, patient has regular physician.
‡ Clinic weighted rate across 44 primary care clinics.
§ p = 0.003 for this group versus all other groups combined.
‖ Model A: adjusted for physician characteristics: sex, training level, knowledge, beliefs, past experiences; Model B: adjusted for patient and physician characteristics: patient history and beliefs. physician sex, training level, knowledge, beliefs, past experiences.
Age, sex, education, practice mix, provider's sex, number of years with physician; number of visits per year; perceived health status.
¶ $p < 0.001$.
F/U = follow-up; OR=odds ratio; CI=confidence interval; NA = not applicable; HMO = health maintenance organization; FFS = fee for service; SD = standard deviation; PHE = periodic health exam.
Qual. Score = quality score (for assessments of study quality, each reviewer independently judged study quality and rated items on quality assessment forms, scores were calculated by adding quality scores and dividing them by the maximum score for any given category)

Evidence Table 6d. Delivery of Preventive Health Care Services, Mammogram Delivered: Pre-post Studies.

Author, year	Description of study Groups	Target of interven-tion	Length of F/U	Outcome	Outcome self-reported by patients or providers	N	Baseline	F/U	Ad-justed	Qual. score tertile
Schnei-der, 2003	Patients: written material, reminder, phone call; Providers: education on prevention measures	Patients and providers	2 months	Mammogram delivered	NA	Baseline: 220* F/U: 214	70.1%	80.2%†	No	69 Med.
Geiger, 1993	Physicians educated about providing preventive services in the context of a "health check"	Patients	5 months	Mammogram delivered	NR	Baseline: 15 F/U: 23	7 (47%)	23 (100%)†	No	72 High

* Random cross-sectional samples of patients in 1999 and 2000.
† Not statistically significant.
F/U = follow-up; NA = not applicable; NR = not reported. Qual. Score = quality score (for assessments of study quality, each reviewer independently judged study quality and rated items on quality assessment forms, scores were calculated by adding quality scores and dividing them by the maximum score for any given category)

Evidence Table 7a. Proximal Clinical Outcome, Disease Detection: Randomized Controlled Trials.

Author, year	Description of study groups	Target of interven-tion	Length of F/U	Outcome: disease detected	Outcome self-reported by patients or providers	N	Baseline	F/U	Change	Ad-justed	Qual. score tertile
Stone, 1981; Stone, 1978;SE London, 1977; SE London, 2001; Trevelyan, 1973; Stone, 1978	The intervention group were South London patients aged 40 to 64 years in specific group practices; received 2 multiphasic screenings 2 years apart.	Patients	5 years after initial screening	A: Angina[76] B: High diastolic blood pressure[76] C: Ischemia on electrocardio-gram[76] D: Bronchitis symptoms[76]	Patients (questionn aire)	1978		A: 21.9% B: 2.8% C: 17.9% D: 29.0%	NR	Yes*	68 Med.
	The comparison group consisted of South London patients aged 40 to 64 years in specific group practices; received usual care.					1950		A: 22.4% B: 3.1% C: 16.6% D: 30.6%			

Evidence Table 7a. Proximal Clinical Outcome, Disease Detection: Randomized Controlled Trials. (continued)

Author, year	Description of study groups	Target of interven-tion	Length of F/U	Outcome: disease detected	Outcome self-reported by patients or providers	N	Baseline	F/U	Change	Ad-juste d	Qual. score tertile
Fletcher, 1977	Multiphasic screening group	Providers	1 year	A: Disease detection of ALL problems before and after intervention (number of new medical problems detected at F/U) B: Disease detection of important problems before and after intervention	Not self-reported	36	A: N = 169 B: N = 98	A: N = 246 B: N =123	NR	No	70 Med.
	Medical chart abstraction group (physicians given abstracted information about patients from chart)					40	A: N = 144 B: N = 95	A: N = 158 B: N = 101			
	Physicians reviewed patients chart					36	A: N = 181 B: N = 100	A: N = 185 B: N =100			

* Age, sex, smoking, lipids, blood pressure, diabetes, social class, general practice group.
F/U = follow-up; NR = not reported.
Qual. Score = quality score (for assessments of study quality, each reviewer independently judged study quality and rated items on quality assessment forms, scores were calculated by adding quality scores and dividing them by the maximum score for any given category)

Evidence Table 7b. Proximal Clinical Outcome, Disease Detection: Retrospective Cohort Study.

Author, year	Description of study groups	Target of interven-tion	Length of F/U	Outcome: disease detected	Outcome self-reported by patients or providers	N	F/U	Ad-justed	Qual. score / tertile
Hama, 2001	Pre-assignment medical exam 1 year before assignment	Patients	1 year	A: Cardiac arrhythmia B: Neurological problems C: Hyperlipidemia D: GI ulcers E: Hypertension F: Severe obesity (BMI >28.6 kg/m^2) G: Proteinuria	Not self-reported	196	A: 0% B: 0% C: 3.1% D: 0.5% E: 4.1% F: 0.5% G: 1.5%	Yes*	73 / High
	No pre-assignment medical exam 1 year before assignment					44	A: 2.3% B: 2.3% C: 15.9%† D: 0% E: 11.4% F: 4.5%† G: 0%		

* Age, sex, smoking, lipids, blood pressure, diabetes, social class, general practice group.
† Odds ratio (95% confidence interval) for group C = 5.86 (1.94-17.74) and for group F = 10.99 (1.58-76.63).
F/U = follow-up; GI = gastro-intestinal; BMI = body mass index.
Qual. Score = quality score (for assessments of study quality, each reviewer independently judged study quality and rated items on quality assessment forms, scores were calculated by adding quality scores and dividing them by the maximum score for any given category)

Evidence Table 8. Proximal Clinical Outcome, Change in Health Habits: Randomized Controlled Trials.

Author, year	Description of study Groups	Target of interven-tion	Length of F/U	Outcome	Outcome self-reported by patients or providers	N	Baseline	F/U	Change	Ad-justed	Qual. score tertile
Patrick, 1999	Medicare beneficiaries (enrolled in a HMO) randomized to preventive services package and to receive a health risk assessment for 2 years	Patients	24 months	Improvement in A: Physical activity B: Diet (fat and fiber) C: Advance directives D: Breast self-exam E: Smoking F: Alcohol G: Seat belt use	Patients	Baseline: 1282 F/U:1211	NR	NR	A: 27%* B: 19% C: 35%† D: 21% E: 2% F: 6% G: 10%	No	62 Low
	Usual care					Baseline: 1276 F/U: 1234			A: 21% B: 17% C: 18% D: 17% E: 3% F: 7% G: 12%		

Evidence Table 8. Proximal Clinical Outcome, Change in Health Habits: Randomized Controlled Trials. (continued)

Author, year	Description of study Groups	Target of interven-tion	Length of F/U	Outcome	Outcome self-reported by patients or providers	N	Baseline	F/U	Change	Ad-justed	Qual. score tertile
Elder, 1995; Mayer, 1994	Medicare beneficiaries receiving a health promotion workshop including a health risk appraisal	NR	48 months	A: Fiber servings per day[54] B: Fat servings per week[54] C: Salt use[54] D: Caffeine drinks per day[54] E: Stretching minutes per week[54] F: Consumption of cruciferous foods[54]	Patients	Baseline: 405 F/U: 405	Mean (SD): A: 5.89 (0.98) B: 2.76 (0.99) C: 2.88 (0.92) D: 2.16 (0.79) E: 14.98 (22.75) F: 1.89 (0.64)	Mean (SD): A: 6.01(1.00) B: 2.63 (0.89) C: 2.85 (0.92) D: 2.09 (0.71) E: 20.3 (27.43) † F: 1.93 (0.65)	NR	No	75 Med.
	Usual care					Baseline: 393 F/U: 393	A: 5.75 (0.92) B: 2.77 (0.99) C: 2.88 (0.96) D: 2.23 (0.78) E: 19.23 (27.00) F: 1.8 (0.62)	A: 5.87 (0.94) B: 2.65 (0.87) C: 2.87 (0.93) D: 2.21 (0.74) E: 17.9 (25.01) F: 1.85 (0.62)			

Evidence Table 8. Proximal Clinical Outcome, Change in Health Habits: Randomized Controlled Trials. (continued)

Author, year	Description of study Groups	Target of interven-tion	Length of F/U	Outcome	Outcome self-reported by patients or providers	N	Baseline	F/U	Change	Ad-justed	Qual. score tertile
Burton, 1995; German, 1995; Burton, 1997; Burton, 1995	Received coverage for an annual preventive visit and tests (Medicare vouchers for 2 free preventive visits)	Patients	2 years	A: Smoking[78] B: Problem alcohol drinking[78]	Patients	Baseline (of 1573): A: 241 B: 79			A: -24.2% B: -57%	No	76 HIgh
	No coverage for an annual preventive visit and tests					Baseline (of 1524): A: 252 B: 85			A: -17.9% B:-67.1%		

Evidence Table 8. Proximal Clinical Outcome, Change in Health Habits: Randomized Controlled Trials. (continued)

Author, year	Description of study Groups	Target of interven-tion	Length of F/U	Outcome	Outcome self-reported by patients or providers	N	Baseline	F/U	Change	Ad-justed	Qual. score / tertile
Stone, 1981; Stone, 1978; South-east London, 1977; Treve-lyan, 1973; South-east London, 2001	The intervention group were South London patients aged 40 to 64 years in specific group practices; received 2 multiphasic screenings 2 years apart.	Patients	5 years	Percentage still smoking[7]	Patients	Baseline: 1651	NR	51.5	NR	No	68 / Med.
	The comparison group consisted of South London patients aged 40 to 64 years in specific group practices; received usual care.					Baseline: 1950		50.8			

Evidence Table 8. Proximal Clinical Outcome, Change in Health Habits: Randomized Controlled Trials. (continued)

Author, year	Description of study Groups	Target of interven-tion	Length of F/U	Outcome	Outcome self-reported by patients or providers	N	Baseline	F/U	Change	Ad-justed	Qual. score tertile
OX-CHECK, 1995; Lang-ham, 1996	Intervention group: Health check at baseline	Patients	3 years	A: Smoking[59] B: Alcohol use[59] C: Exercise less than once per month[59] D: Use full cream milk[59] E: Use butter or hard margarine[59]	NR	Baseline: 2205 F/U: 1660	NR	A: 356 (21.4) B: 156 (9.4) C: 1094 (66.5) D: 300 (18.5) E: 303 (18.3)	A: Diff (95% CI)* 5.0 (2.2-7.8) B: 1.6 (-0.42-0.04) C: 4.5 (1.4-7.5) D: 12.1 (9.4-26.0) E: 12.4 (9.6-15.2)	NR	65 High
	Control group: No health check at baseline					Baseline: 2783 F/U: 1916		A: 506 (26.4) B: 210 (11.0) C: 1354 (70.9) D: 587 (30.6) E: 587 (30.7)			

* $p = 0.020$.
† $p = 0.000$.
‡ $p = 0.0002$.
F/U = follow-up; HMO = health maintenance organization; NR = not reported; SD = standard deviation; NR = not reported; CI = confidence interval.
Qual. Score = quality score (for assessments of study quality, each reviewer independently judged study quality and rated items on quality assessment forms, scores were calculated by adding quality scores and dividing them by the maximum score for any given category)
**Data does not contribute to findings reported in summary tables but displayed here for completeness.

Evidence Table 9. Proximal Clinical Outcome, Patient Attitudes: Randomized Controlled Trials.

Author, year	Description of study groups	Target of interven-tion	Length of F/U	Outcome	Outcome self-reported by patients or providers	N	Baseline	F/U	Change	Ad-justed	Qual. score / tertile
Patrick, 1999	Medicare beneficiaries (enrolled in a HMO) randomized to preventive services package and to receive a health risk assessment for 2 years	Patients	24 months	Mean score health worry*	Patients	Baseline: 1282 F/U: 1089	3.09	3.51	0.42†	NR	62 / Low
	Usual care					Baseline: 1276 F/U: 1144	2.94	3.63	0.69		

* Larger values indicate worse health.
† $p = 0.047$.
F/U = follow-up; HMO = health maintenance organization; NR = not reported.
Qual. Score = quality score (for assessments of study quality, each reviewer independently judged study quality and rated items on quality assessment forms, scores were calculated by adding quality scores and dividing them by the maximum score for any given category)

Evidence Table 10. Proximal Clinical Outcomes, Health Status: Randomized Controlled Trials.

Author, year	Description of study groups	Target of interven-tion	Length of F/U	Outcome	Outcome self-reported by patients or providers	N	Baseline	F/U	Change	Ad-justed	Qual. score / tertile
Patrick, 1999	Medicare beneficiaries (enrolled in a HMO) randomized to preventive services package for 2 years	Patients	24 months	Change in health status (on Quality of Well-Being Scale)[53]	Patients	Baseline: 1134 F/U: 1134 (excluded deaths)	0.71	0.70	-0.01‡	No	62 / Low
	Usual Care					Baseline: 1176 F/U: 1176 (excluded deaths)	0.70	0.70	0.00		
Burton, 1995; German, 1995; Burton, 1997; Burton, 1995	Received coverage for an annual preventive visit and tests (Medicare vouchers for 2 free preventive visits)	Patients	A: baseline to 2 years B: 2 years to 4 years	Change in health status (on Quality of Well Being Scale) of intervention and control groups from baseline to 2 years[79] or from 2 to 4 years after intervention [80]	Patients	Baseline: 1748	NR	NR	A: -0.0631† B: -0.091‡	No	76 / High
	No coverage for an annual preventive visit and tests					Baseline: 1755			A: -0.0832 B: -0.084		

* Difference from control at follow-up.
F/U = follow-up; NR = not reported
Qual. Score = quality score (for assessments of study quality, each reviewer independently judged study quality and rated items on quality assessment forms, scores were calculated by adding quality scores and dividing them by the maximum score for any given category)
†p=0.0109
‡not statistically significant

Evidence Table 11a. Proximal Clinical Outcome, Blood Pressure: Randomized Controlled Trials.

Author, year	Description of study Groups	Target of interven-tion	Length of F/U	Outcome	Outcome self-reported by patients or providers	N	Baseline	F/U	Change	Ad-justed	Qual. score / tertile
Elder, 1995; Mayer, 1994	Medicare beneficiaries receiving a health promotion workshop including a health risk appraisal	NR	48 months	A: Mean systolic blood pressure at 12 months[54] B: Mean diastolic blood pressure at 12 months[54]	Patients	Baseline: 899	Mean (SD) A: 139.21 (18.79) B: 75.06 (10.46)	Mean (SD) A: 135.5 (16.12) B: 71.05 (9.21)	NR	No	75 / Med.
	Usual care					Baseline: 901	Mean (SD) A: 140.00 (18.32) B: 74.56 (9.85)	Mean (SD) A: 137.44 (16.94) B: 71.36 (9.49)			
OX-CHECK, 1995; Lang-ham, 1996	Intervention group: Health check at baseline	Patients	3 years	A: Systolic blood pressure at 3-year follow up[59] B: Diastolic blood pressure at 3-year follow up[59] C: Proportion of high risk diastolic pressure (≥100mm Hg) from 3 year F/U when compared to control[59]	NR	Baseline: 2205 F/U: 1660	Mean (SD) A: 126.5 (19.3) B: 75.7 (11.6) C: 3.3%	Mean (SD) A: 126.8 (19.6) B:75.7 (11.5) C: 3.4%	Mean (SD) A: 2.2* CI (0.9,3.5) B: 1.5* CI (0.7,2.3); C: 1.2%* CI (-0.1,2.5)	NR	65 / High
	Control group: No health check at baseline					F/U: 1916	NR	Mean (SD) A: 129 (20.4) B: 77.2 (11.7) C: 4.5%	NR		

Evidence Table 11a. Proximal Clinical Outcome, Blood Pressure: Randomized Controlled Trials. (continued)

*Difference from control at follow-up
F/U = follow-up; NR = not reported; CI = confidence interval (95%); SD = standard deviation
Qual. Score = quality score (for assessments of study quality, each reviewer independently judged study quality and rated items on quality assessment forms, scores were calculated by adding quality scores and dividing them by the maximum score for any given category)

Evidence Table 11b. Proximal Clinical Outcome, Blood Pressure: Retrospective Cohort Study.

Author, year	Description of study groups	Target of interven-tion	Length of F/U	Outcome: disease detected	Outcome self-reported by patients or providers	N	F/U	Ad-justed	Qual. score / tertile
Hama, 2001	Pre-assignment medical exam 1 year before assignment	Patients	1 year	A: Mean systolic blood pressure B: Mean diastolic blood pressure C: Proportion of hypertension	Not self-reported	196	Mean(SD) A: 122 (13.6)† B: 74.9 (11.7)‡ C: 4.1%	Yes*	73 / High
	No pre-assignment medical exam 1 year before assignment					44	Mean(SD) A: 122.2 (12.9) B: 76.3 (10.6) C: 11.4%		

* Age, sex, smoking, lipids, blood pressure, diabetes, social class, general practice group.
F/U = follow-up; SD = standard deviation
Qual. Score = quality score (for assessments of study quality, each reviewer independently judged study quality and rated items on quality assessment forms, scores were calculated by adding quality scores and dividing them by the maximum score for any given category)
†p=0.914 for comparison between pre-assignment group and group not receiving pre-assignment
‡p=0.468 for comparison between pre-assignment group and group not receiving pre-assignment

Evidence Table 12a. Proximal Clinical Outcome, Changes in Serum Cholesterol: Randomized Controlled Trial.

Author, year	Description of study groups	Target of interven-tion	Length of F/U	Outcome	Outcome self-reported by patients or providers	N	Baseline	F/U	Change	Ad-justed	Qual. score / tertile
OX-CHECK, 1995; Lang-ham, 1996	Intervention group: Health check at baseline	Patients	36 months	A: Mean total cholesterol at 3-year F/U[59] B: Proportion of high risk cholesterol (≥8mmol/l) at 3 year F/U[59]	NR	Baseline: 2205; F/U: 1660	Mean (SD) A: 5.99 (1.10) B: 3.9%	Mean (SD) A: 5.93 (1.06) B: 3.1%	A: 0.25* CI (0.18, 0.33) B: 4.7%* CI (3.2,6.2)	NR	65 / High
	Control group: No health check at baseline					F/U: 1916	NR	Mean (SD) A: 6.18 (1.17) B: 7.8%	NR		

* Difference from control at follow-up.
F/U = follow-up; NR = not reported; CI = confidence interval; SD = standard deviation
Qual. Score = quality score (for assessments of study quality, each reviewer independently judged study quality and rated items on quality assessment forms, scores were calculated by adding quality scores and dividing them by the maximum score for any given category)

Evidence Table 12b. Proximal Clinical Outcome, Changes in Serum Cholesterol: Retrospective Cohort Study.

Author, year	Description of study groups	Target of interven-tion	Length of F/U	Outcome: disease detected	Outcome self-reported by patients or providers	N	F/U	Ad-justed	Qual. score / tertile
Hama, 2001	Pre-assignment medical exam 1 year before assignment	Patients	1 year	A: Mean total cholesterol B: Mean LDL cholesterol C: Mean triglycerides D: Mean HDL cholesterol E: Proportion of hyperlipidemia	Not self-reported	A-D:94 E: 196	Mean(SD) A: 204.9 (31.1)† B: 117.6 (33.4)‡ C:144.9 (120)§ D: 58.2 (15.1)€ E: 3.1%¥	Yes*	73 / High
	No pre-assignment medical exam 1 year before assignment					A-D: 21 E: 44	Mean(SD) A: 187.8 (51.0) B: 117.1 (36.7) C: 124.7 (63.0) D: 57.3 (16.4) E: 15.9%		

* Age, sex, smoking, lipids, blood pressure, diabetes, social class, general practice group.
†0.028 for comparison of those receiving pre-assignment medical examination versus those not receiving pre-assignment medical examination
‡0.944 for comparison of those receiving pre-assignment medical examination versus those not receiving pre-assignment medical examination
§0.416 for comparison of those receiving pre-assignment medical examination versus those not receiving pre-assignment medical examination
€0.799 for comparison of those receiving pre-assignment medical examination versus those not receiving pre-assignment medical examination
¥<0.05 for comparison of those receiving pre-assignment medical examination versus those not receiving pre-assignment medical examination
F/U = follow-up; LDL = low-density lipoprotein; HDL = high-density lipoprotein; SD = standard deviation
Qual. Score = quality score (for assessments of study quality, each reviewer independently judged study quality and rated items on quality assessment forms, scores were calculated by adding quality scores and dividing them by the maximum score for any given category)

Evidence Table 13a. Proximal Clinical Outcomes, Body Mass Index: Randomized Controlled Trials.

Author, year	Description of study groups	Target of interven-tion	Length of F/U	Outcome	Outcome self-reported by patients or providers	N	Baseline	F/U	Change	Ad-justed	Qual. score tertile
Patrick, 1999	Medicare beneficiaries (enrolled in a HMO) randomized to preventive services package and to receive a health risk assessment for 2 years	Patients	48 months	A: At risk for obesity, 24-month F/U	Patients	Baseline: 1282; F/U:1211			A: -3%	No	62 Low
	Usual care					Baseline: 1276; F/U: 1234			A: -4%		
Elder, 1995; Mayer, 1994	Medicare beneficiaries receiving a health promotion workshop including a health risk appraisal	NR	48 months	A: Mean BMI at 24 months (end of intervention period)[54] B: Mean BMI at 48 months (end of F/U)[54]	Patients	Baseline, 405**	Mean (SD) 26.15 (3.96)	Mean (SD) A: 25.92 (3.93) B: 26.21 (4.33)	NR	No	75 Med.
	Usual care					Baseline, 393**	Mean (SD) 25.72 (3.81)	Mean (SD) A: 25.8 (3.82) B: 26.06 (4.08)			

Evidence Table 13a. Proximal Clinical Outcomes, Body Mass Index: Randomized Controlled Trials. (continued)

Author, year	Description of study groups	Target of interven-tion	Length of F/U	Outcome	Outcome self-reported by patients or providers	N	Baseline	F/U	Change	Ad-juste d	Qual. score tertile
OX-CHECK, 1995; Lan-gham, 1996	Intervention group: Health check at baseline	Patients	36 months	A: Mean BMI at 3-year F/U[59] B: Percentage of participants with BMI ≥ 30[59]	NR	Baseline: 2205; F/U: 1660	Mean (SD) A: 25.88 (4.21) B: 13.5%	Mean (SD) A: 25.89 (4.14) B: 14.3%	A: 0.37* CI (0.9,0.65) B: 2.4%* CI (0.0,4.7)	NR	65 High
	Control group: No health check at baseline					F/U: 1916	NR	Mean (SD) A: 26.26 (4.31) B: 15.9%	NR		

* Difference from control at follow-up
** Sample completing 4-year follow-up
F/U = follow-up; BMI = body mass index; NR = not reported; HMO = health maintenance organization; CI = confidence interval; SD = standard deviation
Qual. Score = quality score (for assessments of study quality, each reviewer independently judged study quality and rated items on quality assessment forms, scores were calculated by adding quality scores and dividing them by the maximum score for any given category)

Evidence Table 13b. Proximal Clinical Outcomes, Body Mass Index: Retrospective Cohort Study.

Author, year	Description of study groups	Target of interven-tion	Length of F/U	Outcome: disease detected	Outcome self-reported by patients or providers	N	F/U	Ad-justed	Qual. score / tertile
Hama, 2001	Pre-assignment medical exam 1 year before assignment	Patients	1 year	A: Mean BMI; B: Proportion of severe obesity (BMI ≥ 28.6)	Not self-reported	196	Mean(SD) A: 23.8† (3.0) B: 0.5%‡	Yes*	73 / High
	No pre-assignment medical exam 1 year before assignment					44	Mean(SD) A: 24.8 (4.6) B: 4.5%		

* Age, sex, smoking, lipids, blood pressure, diabetes, social class, general practice group.
F/U = follow-up; BMI = body mass index; SD = standard deviation.
Qual. Score = quality score (for assessments of study quality, each reviewer independently judged study quality and rated items on quality assessment forms, scores were calculated by adding quality scores and dividing them by the maximum score for any given category)
† p=0.068 for persons receiving pre-assignment examination versus those not receiving pre-assignment examination
‡p<0.05 for persons receiving pre-assignment examination versus those not receiving pre-assignment examination

Evidence Table 14a. Economic Outcomes, Costs: Randomized Controlled Trials.

Author, year	Description of study groups	Target of interven-tion	Length of F/U	Outcome	Outcome self-reported by patients or providers	N	Baseline	F/U	Change	Ad-justed	Qual. score tertile
Cutler, 1973; Collen, 1973; Dales, 1973; Ram-charan, 1973; Fried-man, 1986; Dales, 1979; Norin-der, 2002	Intervention group: California Kaiser Health Plan members aged 35-54 years encouraged to have multiphasic checkup California Kaiser Health Plan members aged 35-54 years received usual care	Patients	11 years	A: Average annual cost for physician visit per participant at 7 years (men, aged 45-54 years at baseline)[47] B: Average annual cost for physician visit per participant at 11 years (men, aged 45-54 years at baseline)[94] C: Average annual expense per participant in multi-phasic health checkup expense at 7 years. (men, aged 45-54 years at baseline)[47] D: Average annual expense per participant in multi-phasic health checkup expense at 11 years. (men, aged 45-54 years at baseline)[94]	Not self-reported	Sub-sample of larger study- A and C: 1229 A and C: 1364	NR	A: $32 B: $43 C: $36 D: $59 A: $28 B: $41 C: $10 D: $23	NR	No	56 Low

Evidence Table 14a. Economic Outcomes, Costs: Randomized Controlled Trials. (continued)

Author, year	Description of study groups	Target of interven-tion	Length of F/U	Outcome	Outcome self-reported by patients or providers	N	Baseline	F/U	Change	Ad-justed	Qual. score tertile
Burton, 1995; German, 1995; Burton, 1997; Burton, 1995	Received coverage for an annual preventive visit and tests (Medicare vouchers for 2 free preventive visits)	NR	2 to 4 years (interven-tion duration = 2 years)	A: Total health care charges, Year 1[56] B: Total health care charges, Year 2[56] C: Mean monthly Medicare Part A charges, Year 1[56] D. Mean monthly Medicare Part A, charges Year 2[56] E. Mean monthly Medicare Part A charges Year 3 (1 year post-intervention)[56] F. Mean monthly Medicare Part A charges Year 4 (2 years post-intervention)[56]	Not self-reported	A,C: 2105 B,D: 2020 E: 2105 (baseline), 1573 (F/U) F: 1573 (baseline), 1382 (F/U)	NR	A: $8,826,078 B: $10,735,142 C: $205 D: $264 E: $242 F: $281	NR	Yes*	76 High
	No coverage for an annual preventive visit and tests					A,C: 2090 B,D: 1971 E: 2090 (baseline), 1524 (F/U) F: 1524 (baseline), 1380 (F/U)		A: $8,991,063 B: $11,014,199 C: $216 D: $274 E: $267 F: $298			

Evidence Table 14a. Economic Outcomes, Costs: Randomized Controlled Trials. (continued)

Author, year	Description of study groups	Target of interven-tion	Length of F/U	Outcome	Outcome self-reported by patients or providers	N	Baseline	F/U	Change	Ad-justed	Qual. score tertile
Morrissey, 1995	Full Medicare reimbursement and office reminders (intervention group) Control group	Physicians and patients	2- year interven-tion, follow-up to one year post inter-vention	A: 3-year post-intervention cumulative Medicare charges. B: 3-year post-intervention cumulative Medicare reimbursement (2 years of intervention and one year following)	Not self-reported	A: 954 B: 954 A: 960 B: 960	NR	A: $8,937◊ (S.D. 17,009) B: $4,607§ (S.D. 8463) A: $10,143 (SD 21,143) B: $5110 (SD 10024)	NR	No	87 High

Evidence Table 14a. Economic Outcomes, Costs: Randomized Controlled Trials. (continued)

Author, year	Description of study groups	Target of interven-tion	Length of F/U	Outcome	Outcome self-reported by patients or providers	N	Baseline	F/U	Change	Ad-justed	Qual. score tertile
Patrick, 1999	Medicare beneficiaries (enrolled in a HMO) randomized to preventive services package and to receive a health risk assessment for 2 years		48 months	Average total cost per participant	NR	1282	Year prior to interven-tion: $3595[†]	24 months: ‖ $3564 48 months: ‖ $3998[‡]	NR	No	62 Low
	Usual care					1276	Year prior to interven-tion: $3414	24 months: $3300 48 months: $4010			

Evidence Table 14a. Economic Outcomes, Costs: Randomized Controlled Trials. (continued)

Author, year	Description of study groups	Target of interven-tion	Length of F/U	Outcome	Outcome self-reported by patients or providers	N	Baseline	F/U	Change	Ad-justed	Qual. score / tertile
OX-CHECK, 1995; Lang-ham, 1996	Intervention group: Health check at baseline	Patients	36 months (interventio n group)	Cost effectiveness: cost per 1% reduction in coronary risk using Dundee risk scores	NR	Baseline 2205: F/U: 1660		Men: 1.63 Women: 1.22 All: 1.46	NR	No	65 / High
	Control group: No health check at baseline					1916					

* Time.
† $p = 0.392$.
‡ $p = 0.320$.
§ These costs do not include $294 per patient cost of the preventive services delivered as the intervention.
‖ These costs do not include $186 per patient cost of the preventive services delivered as the intervention.
F/U = follow-up; NR = not reported; SD = standard deviation.
Qual. Score = quality score (for assessments of study quality, each reviewer independently judged study quality and rated items on quality assessment forms, scores were calculated by adding quality scores and dividing them by the maximum score for any given category)

Evidence Table 14b. Economic Outcomes, Costs: Retrospective Cohort Studies.

Author, year	Description of study groups	Target of interven-tion	Length of F/U	Outcome	Outcome self-reported by patients or providers	N	F/U	Ad-justed	Qual. score / tertile
Burton, 2002	Exposed group: executives eligible for and receiving the periodic health examination	Patients	3 years	Average cost in medical claims paid per employee	Not self-reported	1046	$5361*	Yes†	55 / Low
	Unexposed group: executives eligible for but not participating in the periodic health examination					727	$6426*		

Evidence Table 14b. Economic Outcomes, Costs: Retrospective Cohort Studies. (continued)

Author, year	Description of study groups	Target of interven-tion	Length of F/U	Outcome	Outcome self-reported by patients or providers	N	F/U	Ad-justed	Qual. score / tertile
Bernacki, 1988	Exposed group: corporation executives eligible for PPE and receiving 3 PPEs during 3-year study period	Patients	3 years	Health care claims cost per capita in Year 3	Not self-reported	315	$1039	No	48 / Low
	Exposed group: corporation executives eligible for PPE and receiving 1 or 2 PPEs during 3-year study period					314	$588		
	Unexposed group: corporation executives eligible for PPE and not receiving a PPE during the 3-year study period					81	$452		

Evidence Table 14b. Economic Outcomes, Costs: Retrospective Cohort Studies. (continued)

Author, year	Description of study groups	Target of interven-tion	Length of F/U	Outcome	Outcome self-reported by patients or providers	N	F/U	Ad-justed	Qual. score / tertile
Grimaldi, 1965	Exposed group: corporation middle management employees opting to participate in PPE	Patients	8 years	Mean medical expense per claim	NR	74	$292.03[μ]	No	37 / Low
	Unexposed group: corporation middle management employees opting not to participate in PPE					26	$529.58		
	Unexposed group: employees from another site not offered the PPE					94	$393.75		

* $p = 0.0263$.
[†] Age, sex.
[μ] t=3.147 for comparison with unexposed corporation middle manager group
F/U = follow-up; PPE = periodic physical examination; NR = not reported.
Qual. Score = quality score (for assessments of study quality, each reviewer independently judged study quality and rated items on quality assessment forms, scores were calculated by adding quality scores and dividing them by the maximum score for any given category)

Evidence Table 14c Economic Outcomes, Costs: Cross-sectional Studies.

Author, year	Description of study groups	Length of F/U	Outcome	Outcome self-reported by patients or providers	N	F/U	Ad-justed	Qual. score / tertile
Nakanishi, 1996	Japanese adults aged 40 years and older in National Health Insurance program	Receipt of health checkup(s) in 1992; outcomes measured in May 1993	A: Inpatient cost per insured person (yen) correlated with rate of use of health check-ups B: High inpatient cost (600,000 yen or more) correlated with rate of use of health check-ups C: Outpatient cost per insured person correlated with rate of use of health check-ups		227,581	A: CC = -0.724* B: CC = -0.625‡ C: CC = -0.454§	Yes†	72 / High

* $p = 0.014$.
† Age, sex.
‡ $p = 0.036$.
§ $p = 0.110$.
F/U = follow-up; CC = correlation coefficient.
Qual. Score = quality score (for assessments of study quality, each reviewer independently judged study quality and rated items on quality assessment forms, scores were calculated by adding quality scores and dividing them by the maximum score for any given category)

Evidence Table 15a. Distal Economic Outcomes, Disability: Randomized Controlled Trials.

Author, year	Description of study groups	Target of interven-tion	Length of F/U	Outcome	Outcome self-reported by patients or providers	N	Baseline	F/U	Change	Ad-justed	Qual. score tertile
Stone, 1981; South-east London, 1977; South-east London, 2001; Stone, 1978a; Stone, 1978b; Trevelyan, 1973	The intervention group were South London patients aged 40 to 64 years in specific group practices; received 2 multiphasic screenings 2 years apart.	Patients	5 years	Major disability (e.g., inability to dress or undress themselves)[7]	Patients	1978	NR	2.5%*	NA	Yes†	68 Med.
	The comparison group consisted of South London patients aged 40 to 64 years in specific group practices; received usual care.					1950		1.8%*			

Evidence Table 15a. Distal Economic Outcomes, Disability: Randomized Controlled Trials. (continued)

Author, year	Description of study groups	Target of interven-tion	Length of F/U	Outcome	Outcome self-reported by patients or providers	N	Baseline	F/U	Change	Ad-justed	Qual. score tertile
Cutler, 1973; Collen, 1973; Dales, 1973; Ramcha-ran, 1973; Friedman, 1986; Dales, 1979; Norinder, 2002	Intervention group: California Kaiser Health Plan members aged 35-54 encouraged to have multiphasic checkup	Patients	7 -11 years	A: Disability at 7 years[95] B: Disability at 11 years among men aged 45-54[96]	Patients	A: baseline= 871, 7-year F/U = 793 B: 677	A: 95, 10.9%	A: 168, 21.1% B: 158, 23.3%‡	B: Health risk factors	NR	56 Low
	Control group: California Kaiser Health Plan members aged 35-54 received usual care					A: baseline= 941, 7-year F/U = 829 B: 738	A: 137, 14.6%	A: 204, 24.6% B: 219, 29.7%‡			

* Authors reported there were no statistically significant differences, but formal significance testing was not reported.
† Age, smoking, lipids, blood pressure, diabetes, social class, general practice group.
‡ p <0.01, chi square test.
F/U = follow-up; NR = not reported NA = not applicable; NR = not recorded.
Qual. Score = quality score (for assessments of study quality, each reviewer independently judged study quality and rated items on quality assessment forms, scores were calculated by adding quality scores and dividing them by the maximum score for any given category)

Evidence Table 15b. Distal Economic Outcomes, Disability: Retrospective Cohort Study.

Author, year	Description of study groups	Target of interven-tion	Length of F/U	Outcome	Outcome self-reported by patients or providers	N	Baseline	F/U	Change	Ad-justed	Qual. score / tertile
Burton, 2002	Exposed group: executives eligible for and receiving the periodic health examination	Patients	3 years	A: Average number of short-term disability days per employee B: Total short-term disability days in 3 years C: Any short-term disability days (%)	Not self-reported	1046	NA	A: 2.78 days absent* B: 2134* C: 6.2%†	NA	Yes‡	55 / Low
	Unexposed group: executives eligible for but not participating in the periodic health examination					727		A: 4.02 days absent* B: 2707* C: 11.0%§	NR	No	

* Study terminology; PHE = periodic health examination.
* p <0.01, chi square test.
† p <0.001.
‡ Age, sex.
§ Authors reported there were no statistically significant differences, but formal significance testing was not reported.
F/U = follow-up; NA = not applicable; NR = not recorded.
Qual. Score = quality score (for assessments of study quality, each reviewer independently judged study quality and rated items on quality assessment forms, scores were calculated by adding quality scores and dividing them by the maximum score for any given category)

Evidence Table 16a. Distal Clinical Outcomes, Hospitalization: Randomized Controlled Trials.

Author, year	Description of study groups	Target of interven-tion	Length of F/U	Outcome	Outcome self-reported by patients or providers	N	Baseline	F/U	Change	Ad-justed	Qual. score tertile
Morri-ssey, 1995	Full Medicare reimbursement and office reminders (intervention group)	Providers and patients	12-36 months	A: Utilization data: hospital days per enrollee over two years of intervention and one year post-intervention B: Admissions per enrollee over two years of intervention and one year post-intervention	Not self-reported	954 (baseline)	NR	A: Mean (SD): 7.27 (18.97) B: 0.73 (1.43)	NR	No	87 High
	Control group					960 (baseline)		A: Mean (SD): 8.55 (26.25) B: 0.79 (1.50)			

Evidence Table 16a. Distal Clinical Outcomes, Hospitalization: Randomized Controlled Trials. (continued)

Author, year	Description of study groups	Target of interven-tion	Length of F/U	Outcome	Outcome self-reported by patients or providers	N	Baseline	F/U	Change	Ad-justed	Qual. score tertile
Burton, 1995; German, 1995; Burton, 1997; Burton, 1995	Received coverage for an annual preventive visit and tests (Medicare vouchers for 2 free preventive visits)	Patients	2 years	A: Mean inpatient days for the intervention and control groups who had a hospital discharge in that year (Year 1)[56] B: Mean inpatient days Year 2[56] C: Hospital discharges per 1000 Year 1[56] D: Hospital discharges per 1000 Year 2[56]	Not self-reported	A: 2105 (baseline) B: 2020 (baseline)	NR	A: 15.7 days B: 17.6 days C: 345.6 D: 378.0	NR	No	76 High
	No coverage for an annual preventive visit and tests					A: 2090 (baseline) B: 1971 (baseline)		A: 14.7 days B: 16.8 days C: 355.2 D: 404.4			

Evidence Table 16a. Distal Clinical Outcomes, Hospitalization: Randomized Controlled Trials. (continued)

Author, year	Description of study groups	Target of interven-tion	Length of F/U	Outcome	Outcome self-reported by patients or providers	N	Baseline	F/U	Change	Ad-justed	Qual. score / tertile
Stone, 1981; South-east Lon-don, 1977; South-east Lon-don, 2001; Stone, 1978a; Stone, 1978b; Treve-lyan, 1973	The intervention group were South London patients aged 40 to 64 years in specific group practices; received 2 multiphasic screenings 2 years apart.	Patients	9 years	Hospitalizations/ 1000 person years at risk (1976)[7]	Patients	Baseline: 3876, F/U: 3292	NR	73.4	NR	No	68 / Med.
	The comparison group consisted of South London patients aged 40 to 64 years in specific group practices; received usual care.					Baseline: 3353, F/U: 3132		70.7			

F/U = follow-up; NR = not reported; SD = standard deviation.
Qual. Score = quality score (for assessments of study quality, each reviewer independently judged study quality and rated items on quality assessment forms, scores were calculated by adding quality scores and dividing them by the maximum score for any given category)

Evidence Table 16b. Distal Clinical Outcomes, Hospitalization: Cross-sectional Study.

Author, year	Description of study groups	Target of interven-tion	Outcome	Outcome self-reported by patients or providers	N	F/U	Ad-justed	Qual. score / tertile
Nakanishi, 1996	Japanese adults aged 40 years and older in National Health Insurance program	Patients	A: Hospital admission rate per 1000 insured persons correlation with rate of use of health checkups B: Length of stay of 180 days or more per 1000 insured persons correlated with rate of use of health checkups	Not self-reported	22,7581	A: CC = -0.890* B: CC = -0.584‡	Yes†	72 / High

* $p = 0.001$.
† Age, sex.
‡ $p = 0.049$.
F/U = follow-up; CC = correlation coefficient.
Qual. Score = quality score (for assessments of study quality, each reviewer independently judged study quality and rated items on quality assessment forms, scores were calculated by adding quality scores and dividing them by the maximum score for any given category)

Evidence Table 17a. Distal Clinical Outcome, Mortality: Randomized Controlled Trials.

Author, year	Description of study groups	Target of interven-tion	Length of F/U	Outcome	Outcome self-reported by patients or providers	N	Baseline	F/U	Change	Ad-justed	Qual. score / tertile
Patrick, 1999	Medicare beneficiaries (enrolled in a HMO) randomized to preventive services package and to receive a health risk assessment for 2 years	Patients	4 years	A: Mortality at 24 months B: 48 months	Not self-reported	1282: 854 aged under 75 years, 428 aged 75 years or older	NR	A: 5.5%; 3.3% under 75; 10.0% aged 75 or older* B: 9.8%; 6.3% under 75; 18.6% aged 75 or older †	NR	No	62 / Low
	Usual care					1276: 839 aged under 75 years, 437 aged 75 years or older		A: 3.3 %; 2.4% aged under 75; 5.0% aged 75 or older B: 8.2%; 5.6% aged under 75; 13.5% aged 75 or older			

Evidence Table 17a. Distal Clinical Outcome, Mortality: Randomized Controlled Trials. (continued)

Author, year	Description of study groups	Target of interven-tion	Length of F/U	Outcome	Outcome self-reported by patients or providers	N	Baseline	F/U	Change	Ad-justed	Qual. score / tertile
Burton, 1995; German, 1995; Burton, 1997; Burton, 1995	Received coverage for an annual preventive visit and tests (Medicare vouchers for 2 free preventive visits)	Patients	2 years	Mortality[79]	Not self-reported	2105	NR	175 (8.3%)‡	NR	N	76 / High
	No coverage for an annual preventive visit and tests					2090		231 (11.1%)			

Evidence Table 17a. Distal Clinical Outcome, Mortality: Randomized Controlled Trials. (continued)

Author, year	Description of study groups	Target of interven-tion	Length of F/U	Outcome	Outcome self-reported by patients or providers	N	Baseline	F/U	Change	Ad-justed	Qual. score / tertile
Stone, 1981; South-east London, 1977; South-east London, 2001; Stone, 1978a; Stone, 1978b; Trevelyan, 1973	The intervention group were South London patients aged 40 to 64 years in specific group practices; received 2 multiphasic screenings 2 years apart.	Patients	9 years	Mortality rate per 1000 person-years at risk: A. All cause death[7] B: Neoplasm[7] C. Central nervous system[7] D. Cardiovascular disease[7] E: Respiratory disease[7] F: All other causes[7]	Not self-reported	3292 18,404.3 person-years	NR	A: 10.0‖ B: 2.5‖ C: 0.9‖ D: 4.3‖ E: 1.4‖ F: 0.9‖	NR	Yes§	68 Med.
	The comparison group consisted of South London patients aged 40 to 64 years in specific group practices; received usual care.					3132 19,972.3 person-years		A: 9.2 B: 2.6 C: 0.7 D: 2.8 E: 2.9 F: 1.1			

Evidence Table 17a. Distal Clinical Outcome, Mortality: Randomized Controlled Trials. (continued)

Author, year	Description of study groups	Target of interven-tion	Length of F/U	Outcome	Outcome self-reported by patients or providers	N	Baseline	F/U	Change	Ad-justed Y/N	Qual. score / tertile
Cutler, 1973; Collen, 1973; Dales, 1973; Ramcharan, 1973; Friedman, 1986; Dales, 1979; Norinder, 2002	Intervention group: California Kaiser Health Plan members aged 35-54 encouraged to have multiphasic checkup	Patients	16 years	Deaths, rate per 1000 persons A: All cause deaths[9,94,96] B: Death from potentially postponable causes ¶[9,94,96] C: Death from colorectal cancer[9,94,96] D: Death from breast cancer (women only) [9,94,96] E: Death from cervical/uterine cancer (women only) [9,94,96] F: Death from prostate cancer (men only) [9,94,96] G: Death from hypertension-associated causes[9,94,96] H: Death from ischemic heart disease[9,94,96] I: Death from respiratory system disease[9,94,96] J: Death from musculoskeletal disease[9,94,96] K: Death from mental, nervous, or sensory organ disease[9,94,96] L: Death from endocrine,	Not self-reported	7-year F/U: A: 5146 B: 5146 C: 5146 D: 2718 E: 2718 F: 2360 G: 5146 H: 5146 I: 5146 J: 5146 K: 5146 L: 5146 M: NR N: 5138 11-year F/U: A: 5138 B: 5138 C: 5138 D: 2791 E: 2791 F: 2347 G: 5138 H: 5138 I: 5138 J: 5138 K: 5138 L: 5138 M: 5138 N: 5138 16 –year F/U: A:	NR	7-year F/U: A: 183, 35.6 B: 19, 3.7# C: 2, 0.4# D: 4, 1.4 E: 1, 0.4 F: 0, 0.0 G: 8, 1.6 H: 49, 9.5 I: 7, 1.4 J: 3, 0.6 K: 1, 0.2** L: 3, 0.6 M: NR N: 8, 1.6# 11-year F/U: A: 353, 68.7 B: 44, 8.6# C: 5, 3.3# D: 14, 5.0 E: 1, 0.4 F: 0, 0.0	NR	N	56 / Low

Evidence Table 17a. Distal Clinical Outcome, Mortality: Randomized Controlled Trials. (continued)

Author, year	Description of study groups	Target of interven-tion	Length of F/U	Outcome	Outcome self-reported by patients or providers	N	Baseline	F/U	Change	Ad-justed Y/N	Qual. score / tertile
Cutler, 1973; Collen, 1973; Dales, 1973; Ramcharan, 1973; Friedman, 1986; Dales, 1979; Norinder, 2002 (cont')				nutritional, and metabolic disease[9,94,96] M. Death from suicide[9,94,96] N: Death from lymphohematopoetic cancer[9,94,96]		5138B: 5138 C: 55 D: 2791 E: 2791 F: 2347 G: 5138 H: 5138 I: 5138 J: 5138 K: 5138 L: 5138 M: 5138 N: 5138		G: 13, 2.5 H: 92, 17.9 I: 10, 2.0 J: 4, 0.8 K: 3, 0.6 L: 5, 1.0 M: 18, 3.5[#] N: 15, 2.9[#]16-year F/U: A: 585, 113.9[‡‡] B: 77, 15.0[††] C: 12, 2.3[#] D: 21, 4.1 E: 5, 1.0 F: 1, 0.2 G: 24, 4.7 H: 155, 30.2 I: 19, 3.9 J: 4, 0.8 K: 7, 1.6 L: 9, 1.9 M: 25, 4.9[#] N: 22, 4.3[#]			

Evidence Table 17a. Distal Clinical Outcome, Mortality: Randomized Controlled Trials. (continued)

Author, year	Description of study groups	Target of interven-tion	Length of F/U	Outcome	Outcome self-reported by patients or providers	N	Baseline	F/U	Change	Ad-justed Y/N	Qual. score / tertile
Cutler, 1973; Collen, 1973; Dales, 1973; Ramcharan, 1973; Friedman, 1986; Dales, 1979; Norinder, 2002 (cont')	Control group: California Kaiser Health Plan members aged 35-54 received usual care					7-year F/U: A: 5540 B: 5540 C: 5540 D: 2908 E: 2908 F: 2631 G: 5540 H: 5540 I: 5540 J: 5540 K: 5540 L: 5540 M: NR N: 5540 11-year F/U: A: 5536 B: 5536 C: 5536 D: 2914 E: 2914 F: 2622 G: 5536 H: 5536 I: 5536 J: 5536 K: 5536 L: 5536 M: 5536		7-year F/U: A: 217, 39.2 B: 41, 7.4# C: 10, 1.8# D: 9, 3.1 E: 2, 0.7 F: 1, 0.4 G: 16, 2.9 H: 46, 8.3 I: 11, 2.0 J: 3, 0.5 K: 2, 0.4** L: 3, 0.5 M:NR N: 3, 0.5# 11-year F/U: A: 393 B: 73, 13.2# C: 18, 3.3# D: 14, 4.8 E: 4, 1.4 F: 2, 0.8 G: 26, 4.7 H: 98, 17.7 I: 18, 3.3			

Evidence Table 17a. Distal Clinical Outcome, Mortality: Randomized Controlled Trials. (continued)

Author, year	Description of study groups	Target of interven-tion	Length of F/U	Outcome	Outcome self-reported by patients or providers	N	Baseline	F/U	Change	Ad-justed Y/N	Qual. score / tertile
Cutler, 1973; Collen, 1973; Dales, 1973; Ramcharan, 1973; Friedman, 1986; Dales, 1979; Norinder, 2002 (cont')						N: 5536 16-year F/U: A: 5536 B: 5536 C: 5536 D: 2914 E: 2914 F: 2622 G: 5536 H: 5536 I: 5536 J: 5536 K: 5536 L: 5536 M: 5536 N: 5536		J: 3, 0.5 K: 5, 0.9 L: 5, 0.9 M: 7, 1.3[#] N:5, 0.9[#] 16-year F/U: A: 643, 116.1[‡‡] B: 119, 21.5[††] C: 29, 5.2[#] D: 24, 4.3 E: 5, 0.9 F: 5, 0.9 G: 40, 7.2 H: 151, 27.3 I: 30, 5.4 J: 4, 0.7 K: 9, 1.6 L: 9, 1.6 M: 11, 2.0[#] N: 10, 1.8[#]			

Evidence Table 17a. Distal Clinical Outcome, Mortality: Randomized Controlled Trials. (continued)

Author, year	Description of study groups	Target of interven-tion	Length of F/U	Outcome	Outcome self-reported by patients or providers	N	Baseline	F/U	Change	Ad-justed	Qual. score tertile
Theobald, 1998	Intervention group: Stockholm residents aged 18-65 offered a general health examination	NR	22 years	A: All cause mortality B: Cardiovascular disease mortality C: Cancer mortality D: Accidents and intoxication mortality	Not self-reported	A: 3064 B: 3064 C: 3064 D: 3064	NR	A: RR 1.03, 95% CI (0.94-1.14) B: OR 1.06, 95% CI (0.91 - 1.23) C: OR 1.06, 95% CI (0.88-1.23) D: OR 0.97, 95% CI (0.73-1.30)	NR	Yes***	63 Low
	Control group: Stockholm residents aged 18-65 received usual care							Reference group			

Evidence Table 17a. Distal Clinical Outcome, Mortality: Randomized Controlled Trials. (continued)

* Overall, $p = 0.006$; <75 years old, $p = 0.267$; ≥75 years old, $p = 0.005$.
† Overall, $p = 0.062$; <75 years old, $p = 0.528$; ≥75 years old, $p = 0.05$.
‡ $p = 0.003$.
§ Age, sex, smoking, lipids, blood pressure, diabetes, social class, general practice office.
‖ Authors reported there were no statistically significant differences, but formal significance testing was not reported.
¶ Colon/rectum, breast, cervix/uterine, prostate, and kidney cancer, hypertension, hypertensive cardiovascular disease, hemorrhagic cerebrovascular disease.
# $p < 0.05$, chi-square.
** 7-year follow-up includes nervous system and sensory organs only.
†† p=0.012.
‡‡ p=0.710.
*** Age, sex, need for service.
F/U = follow-up; NR = not reported; RR = risk ratio; OR = odds ratio; CI = confidence interval.
Qual. Score = quality score (for assessments of study quality, each reviewer independently judged study quality and rated items on quality assessment forms, scores were calculated by adding quality scores and dividing them by the maximum score for any given category)

Evidence Table 17b. Distal Clinical Outcome, Mortality: Prospective Cohort Study.

Author, year	Description of study groups	Target of interven-tion	Length of F/U	Outcome	Outcome self-reported by patients or providers	N	F/U	Ad-justed	Qual. score / tertile
Chiou, 2002	Exposed group: Taiwanese adults aged 65 years and older reporting receiving a physical examination in past year	Patients	6 years	Relative risk of mortality	Not self-reported	1193 in exposed and un-exposed groups combined	RR 0.50, 95% CI (0.36-0.69) for those receiving check-up in past year	Yes*	59 / Med.
	Unexposed group: Taiwanese adults aged 65 and older not receiving physical examination in past year						Reference group	No	

* Age, sex, race, education, comorbities, living arrangements.
F/U = follow-up; RR = relative risk; CI = confidence interval.
Qual. Score = quality score (for assessments of study quality, each reviewer independently judged study quality and rated items on quality assessment forms, scores were calculated by adding quality scores and dividing them by the maximum score for any given category)

Evidence Table 17c. Distal Clinical Outcome, Mortality: Prospective Cohort Study with Historical Control.

Author, year	Description of study groups	Target of interven-tion	Length of F/U	Outcome	Outcome self-reported by patients or providers	N	F/U	Ad-justed	Qual. score tertile
Robert, 1969	Exposed group: U.S. employed men receiving employer-sponsored periodic health examination	Patients	15 years	Actual/expected deaths	Not self-reported	20,648	0.56	Yes*	38 Low
	Unexposed group: historical comparison of U.S. white men					NA	Reference group	No	

* Age, race, sex.
F/U = follow-up; NA = not applicable.
Qual. Score = quality score (for assessments of study quality, each reviewer independently judged study quality and rated items on quality assessment forms, scores were calculated by adding quality scores and dividing them by the maximum score for any given category)

Evidence Table 18a. Receipt of the Periodic Health Exam: Non-randomized Controlled Trials.

Author, year	Description of study groups	Target of interven-tion	Length of F/U	Outcome	Outcome self-reported by patients or providers	N	Baseline	F/U	Change	Ad-justed	Qual. score / tertile
Christen-sen, 1995	Intervention group: Denmark patients of general practitioners received mailing that a preventive health examination was free	Patient	Not specified	Attendance at PHE	No	1259	NR	829 (66%)*	NR	No	77 / High
	Control group: Denmark patients of general practitioners received mailing that a preventive health examination was 40 Danish Krone					1193		443 (37%)			

* $p < 0.05$
F/U = follow-up; PHE = periodic health evaluation; NR = not reported.
Qual. Score = quality score (for assessments of study quality, each reviewer independently judged study quality and rated items on quality assessment forms, scores were calculated by adding quality scores and dividing them by the maximum score for any given category)

Evidence Table 18a. Receipt of the Periodic Health Exam: Randomized Controlled Trials. (continued)

Author, year	Description of intervention	Target of interven-tion	Length of F/U	Outcome	Outcome self-reported by patients or providers	N	F/U	Qual. score tertile
Norman, 1992	Patients who received an invitation letter with an appointment to health check	Patients	NR	Attendance at PHE (%)	Patients	399	69.7†	68 Med.
	Patients who received an open invitation letter to health check					419	37.1	

† $p < 0.05$.
F/U = follow-up; SD = standard deviation.
Qual. Score = quality score (for assessments of study quality, each reviewer independently judged study quality and rated items on quality assessment forms, scores were calculated by adding quality scores and dividing them by the maximum score for any given category)

Evidence Table 18b. Receipt of the Periodic Health Exam: Cross-sectional Studies.

Author, year	Description of study groups	Target of interven-tion	Length of F/U	Outcome	Outcome self-reported by patients or providers	N	Baseline	Ad-justed	Qual. score / tertile
Faulkner, 1997	Behavioral Risk Factor Surveillance Survey 1991: All preventive services covered by health plan	NA	NA	Odds of receiving checkup according to level of health insurance compared to no health insurance coverage A: Men, aged 18-39 years B: Men, aged 40-64 years C: Women, aged 18-39 years D: Women, aged 40-64 years		Total = 9432 A: 2925 B: 1980 C: 2820 D: 1707	A: OR 2.5, 95% CI (2.0-3.0) B: OR 2.0, 95% CI (1.5-2.6) C: OR 1.4, 95% CI (1.1-1.8) D: OR 1.7, 95% CI (1.2-2.4)	Yes*	64 / Med.
	Most preventive services covered by health plan					Total = 17157 A: 4974 B: 3916 C: 4565 D: 3702	A: OR 1.4, 95% CI (1.2-1.7) B: 1.7, 95% CI (1.4-2.1) C: 1.5 D: 1.7		
	Some preventive services covered by health plan					Total = 7647 A: 2114 B: 1750 C: 2040 D: 1743	A: OR 1.4, 95% CI (1.1-1.7) B: OR 1.2, 95% CI (0.9-1.5) C: OR 1.2, 95% CI (1.0-1.5) D: OR 1.2, 95% CI (1.0-1.4)		

Evidence Table 18b. Receipt of the Periodic Health Exam: Cross-sectional Studies. (continued)

Author, year	Description of study groups	Target of interven-tion	Length of F/U	Outcome	Outcome self-reported by patients or providers	N	Baseline	Ad-justed Y/N	Qual. score / tertile
Slesinger, 1976	Employees who chose prepaid group insurance plan					506	48%†	No	47 / Med.
	Random sampling of employees who chose the traditional BC/BS plan					483	45%		

* Race, education, insurance status, marital status, employment, income.
† Not significant.
F/U = follow-up; OR = odds ratio; CI = confidence interval; BC/BS = Blue Cross/Blue Shield; NA = not applicable.
Qual. Score = quality score (for assessments of study quality, each reviewer independently judged study quality and rated items on quality assessment forms, scores were calculated by adding quality scores and dividing them by the maximum score for any given category)

Evidence Table 18c. Receipt of the Periodic Health Exam: Pre-post Study.

Author, year	Description of study groups	Target of interven-tion	Length of F/U	Outcome	Outcome self-reported by patients or providers	N	Baseline	F/U	Ad-justed	Qual. score / tertile
Schnei-der, 2003	Patients: written material, reminder, phone call Providers: education on prevention measures	Patients and providers	After 1-year interven-tion.	Health maintenance exam performed	Not self-reported	321 pre-interven-tion (baseline) 356 post-interven-tion (F/U)	11.9%	19.4%*	No	69 / Med.

* $p < 0.005$.
F/U = follow-up; NR = not reported.
Qual. Score = quality score (for assessments of study quality, each reviewer independently judged study quality and rated items on quality assessment forms, scores were calculated by adding quality scores and dividing them by the maximum score for any given category)