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August 11, 2014

The Honorable Ron Wyden
Chairman
Committee on Finance
United States Senate

The Honorable Tom Harkin
Chairman
Committee on Health, Education, Labor and Pensions
United States Senate

The Honorable Sheldon Whitehouse
United States Senate

Health Prevention: Cost-effective Services in Recent Peer-Reviewed Health Care Literature

Cost-effective health preventive services, such as immunizations and screenings, may assist providers in helping patients avoid the onset or worsening of various health conditions. Services are determined to be cost-effective when they improve the benefit (e.g., health outcomes) in a less costly way than a given alternative. Some preventive services may also result in cost savings, where the cost of implementing the service is less than the expected future costs to treat a disease or condition. However, some preventive services may not be appropriate for the entire patient population.

We previously reported on available information about the cost-effectiveness of and cost savings from preventive health services in December 2012.[1] We found that multiple factors affect these estimates, including the population targeted for a health benefit (e.g., children and high-risk populations) and assumptions about effectiveness of the service (e.g., how many years of protection a vaccine provides). In a January 2012 report, we examined preventive care use in Medicare, including how these services were aligned with U.S. Preventive Services Task Force (Task Force) and Advisory Committee on Immunization Practices (ACIP) recommendations, and the use of these services by Medicare beneficiaries.[2] The Task Force develops its recommendations by reviewing research on clinical services and issuing each service a grade. Task Force grades of "A" or "B" levels generally indicate that the service is

[1]In addition, we examined information on preventive health spending by the Departments of Health and Human Services, Veterans Affairs, and Defense, and the limitations of that information, and compared U.S. spending to other countries' spending on preventive health. See GAO, *Preventive Health Activities: Available Information on Federal Spending, Cost Savings, and International Comparisons Has Limitations,* GAO-13-49 (Washington, D.C.: Dec. 6, 2012).

[2]We also examined the extent to which new Medicare beneficiaries used a preventive care examination, and whether use of that examination was associated with higher use of preventive care services. In addition, we compared the use of preventive services in fee-for-service and Medicare Advantage plans; the extent to which use varied among Medicare Advantage plans; and the practices of these plans in promoting the use of preventive services. See GAO, *Medicare: Use of Preventive Services Could Be Better Aligned with Clinical Recommendations,* GAO-12-81 (Washington, D.C.: Jan. 18, 2012).

recommended because there is moderate or high certainty the net benefit is moderately or substantially beneficial.[3] There may also be some services not characterized by the Task Force as grades "A" or "B" that have some benefits to an individual patient, or the current evidence is insufficient to assess the potential benefits or harms of the service. In addition, the Task Force does not review all services used to prevent the onset or worsening of various health conditions. The Task Force limits its review to preventive screening, counseling, and drug treatment services in a primary care setting and does not make recommendations for adults or children with no symptoms of disease. However, there are many preventive services that may be beneficial outside of the primary care setting (e.g., modifications to diet or physical activity) or that apply to individuals who already have a disease or condition.

Given the lack of readily available detailed information on the value of preventive services, you asked for additional information on the services that may be potentially cost-effective or cost saving. In this report we examined recent peer-reviewed literature to identify preventive services that were shown to be cost-effective and the extent of potential cost savings identified.

To address our research objective, we conducted a literature review and examined articles about U.S. preventive services in meta-analyses or comparative studies published in peer-reviewed journals published between January 2007 and April 2014 that addressed cost-effectiveness or cost savings.[4] For our literature review, we searched the EMBASE, MEDLINE, SciSearch, and Proquest databases using search terms, including "prevent," words relating to cost (e.g., "cost saving," "cost effective," and "cost benefit"), "health care cost," and "value." We required that articles have an abstract or executive summary, study a U.S. population, be published in English, and not duplicate the primary article. We found a total of 29 articles that met our inclusion criteria. The articles we reviewed are listed in enclosure I.

For each of the 29 articles reviewed, we identified preventive services found to be cost-effective and/or cost saving by the study authors, usually indicated by quality-adjusted life year (QALY).[5] We excluded articles where the authors did not provide a definitive conclusion on the cost-effectiveness or cost savings of a specific preventive service.[6] To determine if preventive services were cost-effective or cost saving, we used the criteria established by the authors, such as the cost per QALY or the return on investment.[7] There were some differences in how the authors of the studies determined services to be cost-effective or cost saving. In many of the studies we reviewed, the authors noted that different methodologies used for estimating cost-effectiveness or cost savings across the studies in their reviews made it difficult to develop explicit estimates of the cost impacts, and they instead provided an explanation of their

[3]ACIP takes similar benefits and risks into account in developing its recommendations.

[4]We use "meta-analysis" to mean the authors performed quantitative analysis based on data from multiple articles, and "comparative study" to mean the authors systematically reviewed the information in multiple articles to reach a conclusion.

[5]In cost-effectiveness analyses, cost and health outcomes are compared between two services or against not taking any action. The net cost to the net outcome of using one service over another forms the estimate of cost-effectiveness. A QALY measures the number and quality of years added by using a service. An estimate of cost-effectiveness using QALYs as the outcome is expressed as the cost (in U.S. dollars) per QALY. Researchers also assess cost-effectiveness using other outcomes, such as disability-adjusted life years and return on investment.

[6]In some studies, the authors recommended that more research be conducted on the potential for cost-effectiveness or cost savings of a particular preventive service. In addition, we did not consider other types of health prevention, such as policy interventions (e.g., changes to tobacco taxes).

[7]We did not independently assess the methodologies of the articles, including the reliability of the data used.

assessment. For this reason, we did not include quantified estimates of cost-effectiveness or cost savings in our results. In addition, we linked the preventive services found to be cost-effective in the articles to Task Force grade "A" or "B" or ACIP recommendations, if significant overlap existed.[8] For example, if a preventive service from an article targeted a population aged 50 to 54, we considered that linked to a Task Force grade "A" recommendation for the same service that did not specify an age range.

We conducted our work from June to August 2014 in accordance with all sections of GAO's Quality Assurance Framework that are relevant to our objectives. The framework requires that we plan and perform the engagement to obtain sufficient and appropriate evidence to meet our stated objectives and to discuss any limitations in our work. We believe that the information and data obtained, and the analysis conducted, provide a reasonable basis for any findings and conclusions. Because we did not evaluate the policies or operations of any federal agency to develop the information presented in this report, we did not seek comments from any agency.

The results of our review are presented in table 2 in enclosure II. We categorized each service identified in our review into a preventive service type (e.g., clinical intervention, screening, and vaccination), provided information on the target population (e.g., age and sex), whether a service was cost saving, and whether a service had been included as a Task Force-recommended "A" or "B" grade or recommended by ACIP.

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For further information regarding this report, please contact me at (202) 512-7114 or cosgrovej@gao.gov. In addition, the report will be available at no charge on GAO's website at http://www.gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. Major contributors to this report were Christine Brudevold, Assistant Director; Tom Basson; George Bogart; Leia Dickerson; Beth T. Morrison; and E. Jane Whipple.

James Cosgrove
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Enclosures – 2

[8]Task Force grades are current as of July 2014.

Articles Identified through Literature Review

We identified 29 articles that included peer-reviewed meta-analyses or comparative studies examining cost-effectiveness of or cost savings from health services in various preventive service types published between January 2007 and April 2014. Table 1 categorizes the articles by preventive service type with the numbers corresponding to the list of articles that follows.

Table 1: Index of Articles by Preventive Service Type

Preventive service type	Article numbers
Clinical intervention	4, 16
Drug treatment	4, 10, 12, 16, 22, 24
Lifestyle intervention	4, 5, 12, 13, 14, 16, 20, 27, 28
Screening	2, 4, 5, 6, 8, 9, 10, 12, 15, 16, 17, 29
Vaccination	1, 3, 5, 7, 11, 18, 19, 21, 23, 25, 26

Source: GAO. I GAO-14-789R

The 29 articles that GAO identified in the literature are as follows:

1. Armstrong, E.P. “Prophylaxis of Cervical Cancer and Related Cervical Disease: A Review of the Cost-Effectiveness of Vaccination Against Oncogenic HPV Types.” *Journal of Managed Care Pharmacy*, vol. 16, no. 3 (2010): 217-230.
2. Asif, I.M., A.L. Rao, and J.A. Drezner. “Sudden cardiac death in young athletes: what is the role of screening?” *Current Opinion in Cardiology*, vol. 28 (2013): 55-62.
3. Babigumira, J.B., I. Morgan, and A. Levin. “Health economics of rubella: a systematic review to assess the value of rubella vaccination.” *BMC Public Health*, vol. 13, no. 406 (2013).
4. Braithwaite, R.S. and S.M. Mentor. “Identifying Favorable-Value Cardiovascular Health Services.” *American Journal of Managed Care*, vol. 17, no. 6 (2011): 431-438.
5. Cohen, J.T., P.J. Neumann, and M.C. Weinstein. “Does Preventive Care Save Money? Health Economics and the Presidential Candidates.” *The New England Journal of Medicine*, vol. 358, no. 7 (2008): 661-663.
6. Cruzado, J., F.I. Sánchez, J.M. Abellán, F. Pérez-Riquelme, and F. Carballo. “Economic evaluation of colorectal cancer (CRC) screening.” *Best Practice & Research Clinical Gastroenterology*, vol. 27 (2013): 867-880.
7. de Waure, C., M.A. Veneziano, C. Cadeddu, S. Capizzi, M.L. Specchia, S. Capri, and W. Ricciardi. “Economic value of influenza vaccination.” *Human Vaccines & Immunotherapeutics*, vol. 8, no. 1 (2012): 119-129.
8. Duffus, W.A. and K.W. Kintziger. “How useful is universal screening for HIV infection? A review of the evidence.” *Future Virology*, vol. 9, no. 2 (2014): 131.
9. Echouffo-Tcheugui, J.B., M.K. Ali, G. Roglic, R.A. Hayward, and K.M. Narayan. “Screening intervals for diabetic retinopathy and incidence of visual loss: a systematic review.” *Diabetic Medicine*, vol. 30 (2013): 1272-1292.
10. Fleurence, R.L., C.P. Iglesias, and J.M. Johnson. “The Cost Effectiveness of Bisphosphonates for the Prevention and Treatment of Osteoporosis: A Structured Review of the Literature.” *Pharmacoeconomics*, vol. 25, no. 11 (2007): 913-933.

11. Gilchrist, S.A.N., A. Nanni, and O. Levine. “Benefits and Effectiveness of Administering Pneumococcal Polysaccharide Vaccine With Seasonal Influenza Vaccine: An Approach for Policymakers.” *American Journal of Public Health*, vol. 102, no. 4 (2012): 596-605.

12. Hunt, T.L., B.R. Luce, M.J. Page, and R. Pokrzywinski. “Willingness to Pay for Cancer Prevention.” *Pharmacoeconomics*, vol. 27, no. 4: 299-312.

13. John, J., C.M. Wenig, and S.B. Wolfenstetter. “Recent economic findings on childhood obesity: cost-of-illness and cost-effectiveness of interventions.” *Current Opinion in Clinical Nutrition and Metabolic Care,* vol. 13 (2010): 305-313.

14. Kahende, J.W., B.R. Loomis, B. Adhikari, and L. Marshall. “A Review of Economic Evaluations of Tobacco Control Programs.” *International Journal of Environmental Research and Public Health*, vol. 6, no. 1 (2009): 51-68.

15. Kang, J., P. Mandsager, A.K. Biddle, and D.J. Weber. “Cost-Effectiveness Analysis of Active Surveillance Screening for Methicillin-Resistant *Staphylococcus aureus* in an Academic Hospital Setting.” *Infection Control and Hospital Epidemiology*, vol. 33, no. 5 (2012): 477-486.

16. Li, R., P. Zhang, L.E. Barker, F.M. Chowdhury, and X. Zhang. “Cost-Effectiveness of Interventions to Prevent and Control Diabetes Mellitus: A Systematic Review.” *Diabetes Care*, vol. 33, no. 8 (2010): 1872-1894.

17. Lim, L.S., L.J. Hoeksema, K. Sherin, and the ACPM Practice Committee. “Screening for Osteoporosis in the Adult U.S. Population: ACPM Position Statement on Preventive Practice.” *American Journal of Preventive Medicine*, vol. 36, no. 4 (2009): 366-375.

18. Peasah, S.K., E. Azziz-Baumgartner, J. Breese, M.I. Meltzer, and M. Widdowson. “Influenza cost and cost-effectiveness studies globally – A review.” *Vaccine*, vol. 31 (2013): 5339-5348.

19. Prescott Jr, W.A., F. Doloresco, J. Brown, and J.A. Paladino. “Cost Effectiveness of Respiratory Syncytial Virus Prophylaxis: A Critical and Systematic Review.” *Pharmacoeconomics*, vol. 28, no. 4 (2010): 279-293.

20. Saha, S., U. Gerdtham, and P. Johansson. “Economic Evaluation of Lifestyle Interventions for Preventing Diabetes and Cardiovascular Diseases.” *International Journal of Environmental Research and Public Health*, vol. 7 (2010): 3150-3195.

21. Salleras, L., E. Navas, N. Torner, A.A. Prat, P. Garrido, N. Soldevila, and A. Dominguez. “Economic benefits of inactivated influenza vaccines in the prevention of seasonal influenza in children.” *Human Vaccines & Immunotherapeutics*, vol. 9, no. 3 (2013): 707-711.

22. Schackman, B.R. and A.A. Eggman. “Cost-effectiveness of pre-exposure prophylaxis for HIV: a review.” *Current Opinion in HIV and AIDS*, vol. 7 (2012): 587-592.

23. Seto, K., F. Marra, A. Raymakers, and C.A. Marra. “The Cost Effectiveness of Human Papillomavirus Vaccines: A Systematic Review.” *Drugs*, vol. 72, no. 5 (2012): 715-743.

24. Solomon, M.D., A.J. Ullal, D.D. Hoang, J.V. Freeman, P. Heidenreich, and M.P. Turakhia. “Cost-effectiveness of pharmacologic and invasive therapies for stroke prophylaxis in atrial fibrillation.” *Journal of Cardiovascular Medicine*, vol. 13 (2012): 86-96.

25. Stupiansky, N.W., A.B. Alexander, and G.D. Zimet. “Human papillomavirus vaccine and men: what are the obstacles and challenges?” *Current Opinion in Infectious Diseases*, vol. 25, no. 1 (2012): 86-91.

26. Tom-Revzon, C. “Rotavirus Live, Oral, Pentavalent Vaccine.” *Clinical Therapeutics*, vol. 29, no. 12 (2007): 2724-2737.

27. Urbanski, P., A. Wolf, and W.H. Herman. “Cost-Effectiveness of Diabetes Education.” *Journal of the American Dietetic Association*, vol. 108, no. 4 (2008): S6-S11.

28. Vuori, I.M., C.J. Lavie, and S.N. Blair. “Physical Activity Promotion in the Health Care System.” *Mayo Clinic Proceedings*, vol. 88, no. 12 (2013): 1446-1461.

29. Waugh, N., G. Scotland, P. McNamee, M. Gillett, A. Brennan, E. Goyder, R. Williams, and A. John. “Screening for type 2 diabetes: literature review and economic modeling.” *Health Technology Assessment*, vol. 11, no. 17 (2007).

Cost-effective Preventive Services, Target Population, Cost Savings, and Task Force Recommendation Information

Table 2 presents the preventive services we identified in the literature review that were cost-effective, categorized by preventive service type, and provides information on the target population for the service, whether the service was found to be cost saving, and whether the service had been included as a U.S. Preventive Services Task Force (Task Force) recommended "A" or "B" grade or recommended by the Advisory Committee on Immunization Practices (ACIP). In some cases, the service was found by the study authors to be cost saving, but it did not fall under a current Task Force "A" or "B" grade. Some other cost-effective services were not found to be cost saving by the study authors but received a grade "A" from the Task Force, such as using aspirin to prevent stroke in persons who have had a stroke or stroke-like symptoms. For some cost-effective services, the benefit only becomes cost saving in certain populations. For example, for screening persons with known hypertension for high blood pressure and providing treatment to them to prevent myocardial infarction and stroke, the authors found the service was cost saving for persons with diabetes, but not cost saving (although still cost-effective) for persons without diabetes.

Table 2: Preventive Services Found in Literature Review to be Cost-effective

Preventive service	Target population	Cost saving	Recommendation
Clinical intervention			
Comprehensive foot care to prevent ulcers compared with usual care	Persons with type 1 and type 2 diabetes	Yes	—
Multicomponent interventions (e.g., education, drug treatment, and screening) for diabetic risk factor control and early detection of complications compared with standard glycemic control	Persons with type 2 diabetes	Yes	—
Multicomponent interventions (e.g., drug treatment and screening) for diabetic risk factor control and early detection of complications compared with conventional insulin therapy	Persons with type 1 diabetes	Yes	—
Implantable defibrillator to prevent sudden cardiac arrest	Persons who have congestive heart failure because of myocardial infarction and who do not have heart failure symptoms at rest	No	—
Small incision procedure with balloon compression and possibly stent insertion for relief of pain symptoms in lower legs with walking or exercise	Persons who have lifestyle-limiting symptoms	No	—
Immediate surgery to treat damage to the retinas caused by diabetes compared with deferred surgery	Persons with type 1 and type 2 diabetes	No	—
Intensive insulin treatment compared with conventional glycemic control	Persons with type 1 diabetes	No	—
United Kingdom Prospective Diabetes Study-like intensive glycemic control applied to the U.S. health care system compared with conventional glycemic control[a]	Persons aged 25 to 54 with newly diagnosed type 2 diabetes	No	—

Preventive service	Target population	Cost saving	Recommendation
Multicomponent interventions (e.g., drug treatment and screening) for damage to the retinas compared with intensive insulin therapy	Persons with type 1 diabetes	No	—
Drug treatment			
Use of aspirin to prevent myocardial infarction	Middle-aged men with 10-year coronary heart disease risk of greater than 5% without increased bleeding risk	Yes[b]	U.S. Preventive Services Task Force (Task Force) “A”
Drug treatment to relax blood vessels for intensive hypertension control compared with standard hypertension control	Persons with type 2 diabetes	Yes	—
Use of drug that treats blood clots to prevent blocked artery in the lungs	Persons recently diagnosed as having deep blood clot	Yes	—
Drug treatment to relax blood vessels to prevent end-stage renal disease compared with no drug treatment	Persons with type 2 diabetes	Yes	—
Early drug treatment to prevent end-stage renal disease compared with later treatment	Persons with type 2 diabetes	Yes	—
Use of aspirin to prevent stroke	Persons who have had a stroke or stroke-like symptoms	No	Task Force “A”
Use of aspirin to prevent future myocardial infarction	Persons who have coronary heart disease	No	Task Force “A”
Use of aspirin compared to use of a drug that stops blood clots (warfarin)	Persons with low stroke risk	No	Task Force “A”
Hormone-therapy drug treatment to prevent breast cancer versus no intervention	Women with a high risk for breast cancer	No	Task Force “B”
Drug treatment for prevention and treatment of osteoporosis	Women aged greater than 70, particularly in patients that have previous fractures	No	—
Use of cholesterol-lowering drugs for secondary prevention of cardiovascular disease compared with no drug treatment	Persons with type 2 diabetes and high cholesterol, with cardiovascular disease history	No	—
Preexposure drug treatment for HIV prevention	High risk men who have sex with men	No	—
Drug treatment for blood clots and necessary laboratory testing for 6 months to prevent blocked artery in the lungs	Persons with first deep blood clot without known reason	No	—
Beta-blockers to prevent future myocardial infarction	Persons who have had coronary heart disease	No	—
Use of cholesterol-lowering drugs to prevent myocardial infarction	Persons with known coronary heart disease	No	—
Use of cholesterol-lowering drugs to prevent myocardial infarction	Persons with moderately or severely high cholesterol and with 10-year coronary heart disease risk of greater than 5% (including all individuals with diabetes)	No	—

Preventive service	Target population	Cost saving	Recommendation
Use of cholesterol-lowering drugs for primary prevention of cardiovascular disease compared with no treatment	Persons with type 2 diabetes and high cholesterol, without cardiovascular disease history	No	—
Use of drug that stops blood clots for 12 months to prevent future myocardial infarction	Persons who have had myocardial infarction or other acute coronary event	No	—
Drug treatment for blood clots and necessary laboratory testing to prevent future stroke	Persons with nonvalvular irregular heartbeat and less than 1 previous stroke, aged equal to or greater than 75, hypertension, congestive heart failure, or diabetes	No	—
Use of drug that stops blood clots to prevent stroke	Persons who have had a stroke or stroke-like symptoms	No	—
Use of a drug that stops blood clots (warfarin) compared to aspirin	Persons with at least moderate stroke risk	No	—
Lifestyle intervention			
Smoking cessation with counseling, nicotine and drug treatment to stop smoking, and to reduce the risk of cardiovascular and other diseases	All smokers	Yes[b]	Task Force “A”
Physical activity combined with nutrition to prevent obesity	Children and adolescents	Yes[b]	—
Physician smoking cessation advice/booklet versus no counseling	Men aged 50-54	No	Task Force “A”
Tobacco interventions that combine therapies with some form of counseling compared with a single intervention	Pregnant women	No	Task Force “A”
Counseling and treatment for smoking cessation compared with no counseling and treatment	Persons with type 2 diabetes	No	Task Force “A”
Self-help and counseling programs, improved by the inclusion of nicotine replacement therapy	—	No	Task Force “A”
Intensive tobacco-use prevention program	Adolescents in 7th and 8th grade	No	Task Force “B”
Combined diet and physical activity interventions compared with sole dietary or physical activity interventions	School-aged children or focusing on the whole community	No	Task Force “B”[c]
Physical activity promotion in primary health care or community settings (e.g., exercise therapy prescription)	Population-based	No	—
Intensive lifestyle interventions to prevent type 2 diabetes compared with standard lifestyle recommendations	Persons with prediabetic symptoms	No	—
Intensive glycemic control by a Diabetes Prevention Program type of intensive lifestyle intervention compared with conventional glycemic control[d]	Persons with newly diagnosed type 2 diabetes	No	—
Diabetes education through self-management training	Population-based, especially for persons with poor glycemic control	No	—
Diabetes education through medical nutrition therapy	Persons with type 2 diabetes	No	—

Preventive service	Target population	Cost saving	Recommendation
Lifestyle interventions to reduce the long-term risk of type 2 diabetes and cardiovascular disease	Population-based	No	—
High-intensity smoking-relapse prevention program, as compared with a low-intensity program	—-	No	—
Screening			
One-time colonoscopy screening for colorectal cancer	Men aged 60-64	Yes	Task Force “A”
Universal bone mineral density screening combined with drug treatment	Women aged equal to or greater than 65 diagnosed with osteoporosis	Yes[e]	Task Force “B”
Screening for low bone mineral density before drug treatment	Both in postmenopausal women aged 65 or older and in women with rheumatoid arthritis taking corticosteroid drugs	Yes[e]	Task Force “B”
Targeted active surveillance screening for Methicillin-resistant *Staphylococcus aureus* (MRSA) compared with no surveillance	Hospital patients	Yes	—
Screening for high blood pressure and treating it with a drug to prevent myocardial infarction and stroke	Persons with known hypertension	No[f]	Task Force “A”
Colorectal cancer screening, regardless of approach, compared with no screening	Population-based	No	Task Force “A”
Colonoscopy once per 10 years versus no intervention	—	No	Task Force “A”
Cervical cancer screening every 3 years versus every 5 years	Women aged 20-59	No	Task Force “A”
Universal HIV screening	Persons in various clinical settings	No	Task Force “A”
Universal screening in routine medical care for undiagnosed type 2 diabetes compared with no screening	African Americans aged 45-54	No	Task Force “B”[g]
Mammography every 2 years versus observation	Women aged 40-49	No	Task Force “B”
Screening for diabetes	Persons aged 40 to 70, especially for people in hypertensive and obese subgroups	No	Task Force “B”[g]
One-time targeted screening in routine medical care for undiagnosed type 2 diabetes compared with no screening	Persons aged 45 and older with hypertension	No	Task Force “B”
Newborn screening for metabolic disorder, including being hypoglycemic	Newborns	No	—
Adding electrocardiogram alone, or with history and physical examination	Young athletes	No	—
Universal bone mineral density screening followed by drug treatment	Men aged equal to or greater than 80, or men aged equal to or greater than 65 with a prior fracture	No	—
Prostate cancer examination or test versus no screening	Persons aged 65	No	—

Preventive service	Target population	Cost saving	Recommendation
Annual screening for damage to the retinas caused by diabetes and ensuing treatment compared with no screening	Persons with type 1 and type 2 diabetes	No	—
Two-year screening interval for damage to the retinas	Persons with diabetes and no damage to the retinas at diagnosis	No	—
Vaccination			
Haemophilus influenzae type b vaccination to prevent disease (e.g., meningitis)	Toddlers	Yes	Advisory Committee on Immunization Practices (ACIP)
Rotavirus vaccination to prevent disease (e.g., inflammation of the intestines)	Infants who are not immunocompromized or have other contraindications	Yes[b]	ACIP
Influenza vaccination	Children and elderly populations	Yes[h]	ACIP
Influenza vaccination compared with no vaccination	Elderly and high-risk populations	Yes[b]	ACIP
Yearly influenza vaccination with inactivated vaccine compared with no vaccination	Children	Yes[i]	ACIP
Immunization against serious respiratory tract infections	Infants with chronic lung disease (high-risk population) during peak outbreak months	No	ACIP
Human papillomavirus (HPV) vaccination compared with cervical cancer screening alone	Females aged 12 with cervical screening intervals typically greater than 1 year	N/A[j]	ACIP
Routine HPV vaccination compared with cervical cancer screening alone	Adolescent females	No	ACIP
Rubella vaccination	Children, adolescent girls, and adult women	No	ACIP
HPV vaccination if female rates of vaccination remain fairly low	Males	No	ACIP
Pneumococcal vaccine at the same time as seasonal influenza vaccine compared to either vaccine given alone	Elderly and high-risk populations	No	—

Source: GAO. I GAO-14-789R

Notes: We used the criteria established by the authors to determine if preventive services were cost-effective or cost saving. We only included the services found to be cost-effective by the authors of the articles in our review. The majority of articles we reviewed did not quantify cost savings in their meta-analyses or comparative studies. The Task Force makes recommendations only for clinical preventive services in a primary care setting. Task Force grades of "A" or "B" levels generally mean that the service is recommended because there is moderate or high certainty the net benefit is moderately or substantially beneficial. ACIP is responsible for making recommendations on vaccinations. We did not indicate when the Task Force or ACIP recommend against a particular service.

[a]The United Kingdom Prospective Diabetes Study was a 20-year randomized control study with a 10-year post-trial monitoring period of newly diagnosed type 2 patients. The study examined intensive therapy compared with conventional therapy, and found continued risk reduction for intensive therapy patients across the entire study period.

[b]Articles note possible cost savings for the service.

[c]The Task Force recommendation is only for healthy diet counseling, not physical activity.

[d]The Diabetes Prevention Program examined the effect of lifestyle (e.g., diet and exercise) changes and drug treatment across multiple clinical centers in the United States and found that these interventions reduced the risk of developing diabetes among prediabetic patients.

[e]Articles note cost savings only for women aged 85. In addition, one article notes cost savings for women aged 95, and another article notes cost savings for women aged equal to or greater than 95.

[f]Article identifies service as cost saving for persons with diabetes, but not cost saving for persons without diabetes.

[g]The Task Force recommendation includes individuals with blood pressure over 135/80, regardless of age or race.

[h]Article notes cost savings for children.

[i]Article notes cost savings from a societal and family perspective, but no cost savings from a public or private perspective.

[j]Article methodology included a comparative review but did not seek to quantify cost-effectiveness or cost savings.

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