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Evidence for prevention and screening: recommendations in adults

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Summary

A growing body of evidence supports preventive interventions in asymptomatic adults. Primary prevention, which includes counselling (in particular for smoking cessation) and review of immunisation status, has been shown to be more cost-effective than secondary prevention. Evidence supports screening for hypertension, hyperlipidaemia, cervical cancer, colorectal cancer, breast cancer and obesity. Screening for lung, pancreatic and ovarian cancer has no effect on outcome and should not be performed. Controversial preventive interventions include general screening for diabetes mellitus, thyroid disorders and prostate cancer. Physicians should be aware of a possible hidden agenda in patients presenting for a check-up.

Key words: prevention; screening; periodic health exam

Introduction

Hardly any field in medicine has come under more scrutiny then the periodic health exam or medical check-up. The entire population consists of potential candidates for preventive health services. Thus the economic burden resulting from these interventions is high. These costs must be outweighed by the benefits resulting from the interventions. Since the candidates for these interventions are healthy adults the risks involved with these interventions should be as small as possible or outweighed by the benefits gained. Consequently it is no surprise that many medical societies and two North-American national task forces have reviewed this field and given recommendations regarding specific interventions.

This article reviews the history of the periodic health exam and how a better understanding of epidemiology, operating characteristics of tests and medical economics has changed the concept of the check-up over time to its present status. Current recommendations and the evidence they are based upon are summarised. We will focus on those interventions with good evidence supporting either their implementation or rejection. Some controversial interventions will also be discussed, but it is beyond the scope of this review to include all interventions. This review follows the recommendations given by the two North-American task forces, but differences between them and European strategies are highlighted where applicable. A guide for interpreting recommendations regarding preventive interventions and integrating guidelines into clinical practice is given.

History

The idea of performing periodic health exams in adults was first discussed in the medical literature of the 19th century [1]. However, it did not become popular until the beginning of the 20th century when an uncontrolled study by the Metropolitan Life Insurance showed that persons undergoing an annual physical examination had a lower mortality than expected [2]. Based on this study the American Medical Association recommended the annual physical examination for all

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Figure 1

Advertisement for check-up from last century. Courtesy National Library of Medicine.

persons over age 35 [3]. However, this recommendation was never properly implemented and resulted in a small group of wealthy individuals receiving extensive annual check-ups while a large majority of the people received little or no preventive care at all. Thus, the concept of that time, that a check-up should include a large battery of laboratory tests and a complete physical examination (figure 1), gave way slowly to a more selective and evidence-based approach. The first systematic review on screening measures for 36 diseases was published 1975 by Frame and Carlson [4]. In 1979 the Canadian Task Force (CTF) published its first report [5,6]. In this study rules of evidence to evaluate the quality of reported data were introduced. Subsequently the United States Preventive Services Task Force (USPSTF), the American College of Physicians, and other major groups published extensive reviews of the scientific evidence supporting specific preventive interventions [8–10].

Interpreting and integrating guidelines in clinical practice [11]

Some screening or preventive interventions are clearly effective, with benefit outweighing harm, such as phenylketonuria screening or screening for systolic hypertension among the elderly. However, for many interventions the benefit is less clear or the intervention has considerable potential to harm. In these situations clinicians need to know the real benefit, if any, to weigh this benefit against the potential harm. Finally, individual values of the person requesting a test or qualifying for a preventive intervention should be integrated into the decision whether to perform the preventive service. Criteria for evaluating guidelines or recommendations regarding screening are presented in table 1 and reviewed below.

Is there good evidence that earlier intervention works?

Guidelines recommending a screening intervention based on a randomised controlled trial (RCT) comparing the intervention with standard care relies on strong evidence. Observational studies might be sufficient to recommend a screening intervention, if the benefit is evident and potential harm is minimal. This is the case with cervical cancer screening or screening for phenylketonuria. However if benefit and harm are more evenly balanced, RCTs might be required since observational studies might be misleading due to lead-time and/or length-bias. Lead-time bias falsely appears to prolong survival by adding the asymptomatic to the symptomatic survival time. Length bias refers to diseases with a heterogeneous course where screening seems to improve survival by adding the oligosymptomatic or slow progressing group to the disease population. Systematic reviews and meta-analyses are helpful, if more than one RCT exists for a specific preventive intervention. Another reason to perform a meta-analysis is the presence of conflicting results.

Table 1

User's Guides for Guidelines and Recommendations about Screening. (From Barratt et al. [11], with permission.)

Are the recommendations valid?
Is there randomized controlled trial evidence that earlier intervention works? Were the data identified, selected and combined in an unbiased fashion?
What are the recommendations and will they help you in caring for your patients?
What are the benefits?
What are the harms?
How do these compare in different people and with different screening strategies?
What is the impact of people's values and preferences?
What is the cost-effectiveness?

Were the data identified, selected and combined in an unbiased fashion?

Studies upon which guidelines are based should be derived from a comprehensive search with specific inclusion and exclusion criteria. The methodological quality of the studies considered should be assessed.

What are the benefits?

Benefits of a preventive intervention are usually a reduction in mortality or an increase in quality of life. This can be expressed as absolute or relative risk reduction. The absolute risk reduction

depends on the baseline risk and thus represents a more realistic estimate of the size of effect (table 2). The number of people who need to be screened to prevent an adverse outcome is an alternative way to measure benefit.

What are the harmful aspects?

Obvious harm arises from complications of investigations and adverse effects of treatment in patients with positive test results. Other harmful aspects to be considered are the anxiety generated by screening tests and possibly during treatment, adverse effects of labelling or early diagnosis, unnecessary treatment of persons with a positive test result who have an oligosymptomatic or slowly progressing form of the disease and false reassurance in persons with a false-negative test result.

How does benefit and harm compare in different people and with different screening strategies?

Benefits and harmful aspects are not evenly distributed over the population. Persons with a higher risk for a condition will benefit more from a preventive or screening intervention. Often the mortality from a condition increases with age. Thus, younger persons benefit less from a screening intervention than older persons. But the benefit of an intervention is also dependent on the life expectancy. In a very old person the number of life years gained by a preventive intervention decreases compared to a younger person due to the limited life expectancy. Genetic susceptibility for a condition can also increase the benefit derived from screening. Furthermore the benefit of screening increases with a shorter screening interval. But the same can be said for the harm and costs, which must be weighed against the increased benefit to establish an optimal screening interval. Benefits and harm depend on the type of screening program. In general, in population based screening the risk profile and benefits are lower and the harm associated with screening higher, compared with opportunistic screening.

What is the impact of people's values and preferences?

The decision to participate in screening programme depends largely on the individual opinion about the benefits of the intervention. This view is based upon the quality of information on the benefit and harm of a preventive intervention that a person received and the personal beliefs and values of the individual.

What is the impact of uncertainty associated with the evidence?

Uncertainty for both benefit and harm is expressed by the 95% confidence interval around a specific value. Wider intervals increase the uncertainty and an individual test result in such a setting could be considerably smaller or greater.

What is the cost-effectiveness?

The cost-effectiveness analysis relates the benefit and harm of a preventive service to monetary units. The result of such an analysis may help in the decision whether to implement a preventive intervention. However, one should keep in mind that the assumptions on which a cost-effectiveness study is based are subject to change. This possible change must be addressed in a sensitivity analysis [12].

Example

The process of assessing a guideline is demonstrated for colorectal cancer screening with faecal occult blood test (FOBT). As outlined below, there is evidence from several RCTs, that intervention in the asymptomatic phase reduces colorectal cancer mortality. The relative risk reduction of 33% from the 3 largest of these trials translates into an absolute risk reduction of 13 deaths per 1000 persons screened for 15 years starting at age 50 [11]. For each person whose cancer death is prevented 9.3 years are gained. This benefit is not similar for all age groups. High-risk patients between age 60 and 80 benefit the most. The potential harm resulting from screening these 1000 persons with FOBT are 2263 false-positive tests leading to anxiety, further work-up by colonoscopy and 19 complications of colonoscopy such as perforation and bleeding.

Table 2

Comparison of data presented as relative and absolute risk reductions and number needed to screen with varying baseline risks of disease and constant relative risk (from Baratt et al. [11], with permission).

Baseline risk (risk in unscreened group), %	risk in screened group, %	relative risk reduction, %	absolute risk reduction, %	no. needed to screen
4	2	50	2	50
2	1	50	1	100
1	0.5	50	0.5	200
0.1	0.05	50	0.005	2000

"Grading" the evidence

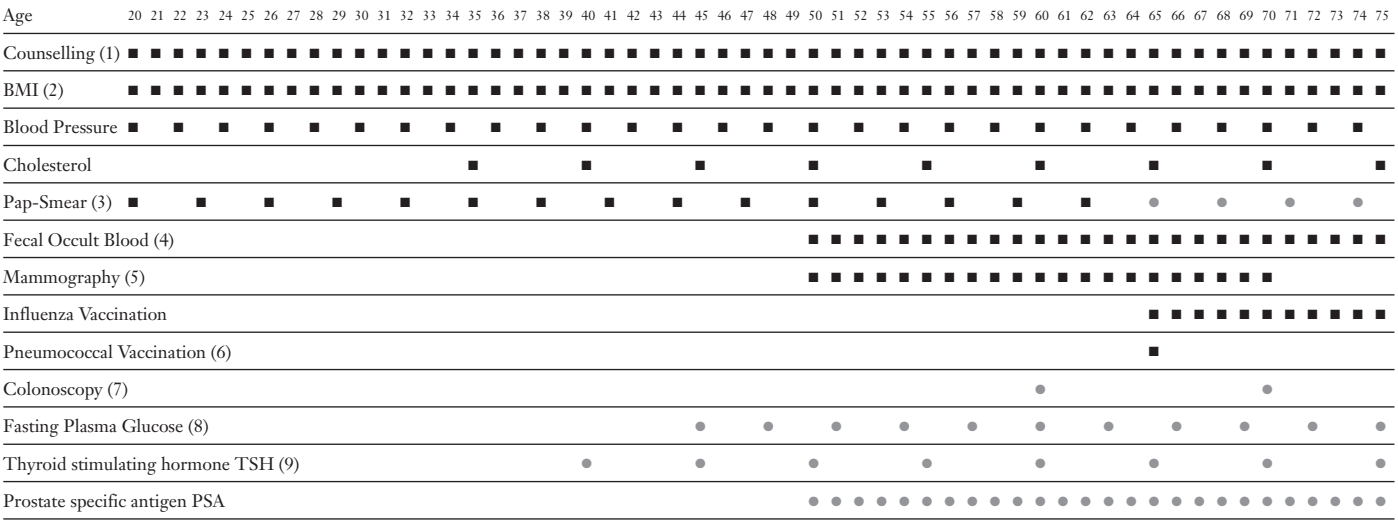
The two national Task Forces have published recommendations on performing or not performing a preventive service based upon scientific evidence [6–9]. Both groups use a similar five-point scale to grade the strength of the recommendation. For interventions with a proven benefit "A" or "B" recommendations were given. "A" recommendations were given if good evidence, such as large randomised controlled trials, supports the implementation. "B" recommendations were given if fair evidence supports the implementation. Interventions, which have been shown to be ineffective or even harmful, were given "D" or "E" recommendations. "E" recommendations were given for good evidence supporting the exclusion, and "D" recommendations for fair evidence supporting their exclusion. "C" recommendations were given if insufficient evidence exists that the preventive intervention is or is not effective. This may mean that appropriate studies have not been conducted so far or that the available studies have produced conflicting results. Another reason for a C recommendation is a close call between benefits and harm. However since more and more randomised controlled trials are published it is possible that this system will become insensitive to subtle differences in the quality of supporting studies [13]. Table 3 summarises selected, preventive interventions and recommendations regarding their implementation on an age-time scale. This grading system is still in use today.

Primary prevention

Primary prevention in medicine is more cost-effective than secondary or tertiary prevention. In a review on published economic analyses, Tengs et al. found primary preventive strategies to be four

Table 3

Selected, age-specific preventive interventions with strength of supporting evidence. Adapted from [82].



Good evidence against screening for
– lung cancer (Sputum and/or chest x-ray) in general population and smokers
– ovarian cancer (CA 125 and imaging studies)
– pancreatic cancer (CA 19-9 and imaging studies)
– coronary heart disease (EKG or exercise EKG) in general population

A black square ■ indicates good evidence supporting this counseling or screening measure.
A grey circle ● indicates insufficient evidence to recommend for or against using this intervention.

1. Counselling for all age-groups: prevention of tobacco use, proplem-drinking, domestic violence, sedentary lifestyle, healthy diet and dental hygiene. Age-specific: in younger risk-taking adults: prevention of motor vehicle accidents (no speeding, safety belts) and safer sex precautions; in elderly adults: minimizing risk for falls, aids for presbyacusis and presbyopia.
   Caveat: in up to 50% of patients presenting for a periodic health exam there is a "hidden agenda", such as a psychosocial problem.
2. Obesity: Body Mass Index (BMI) >27 kg/m^2
3. Screening for cervical cancer with Papanicolaou smears above age 65 is controversial
4. Annual, but not biennial, screening reduces colorectal cancer (CRC) related mortality
5. Recommended by USPSTF and CTF. Recent data (Lancet 2000;355:129) question significant effect on morbidity or mortality
6. Persons who were vaccinated before age 60 should receive a booster at age 65
7. Possible alternative to CRC-screening with yearly Faecal Occult Blood Test
8. High-risk sedentary lifestyle, BMI >27, hypertension, hyperlipidaemia, positive family history, polycystic ovaries
9. Good evidence supports screening women >45 for overt and subclinical hypothyroidism

times more cost effective than secondary or tertiary preventive strategies [14]. The two most important primary preventive measures in medicine are counselling and immunisations [15].

Counselling

Counselling by the physician consists of two elements. First, problem behaviour must be identified. This is followed by an appropriate intervention by the physician. Problem behaviours which should be addressed during the check-up visit are: tobacco use, sedentary lifestyle, unsafe sexual practices, unhealthy diet, alcohol excess, lack of dental hygiene, illicit drugs and injury prone behaviour [6–9]. The evidence grades supporting counselling on these topics are as follows: tobacco cessation (USA and CAN: A), wearing seat belts in cars and helmets on motorcycles or bikes (USA: A; CAN: B), promotion of physical activity (USA: A for risk-groups such as diabetics, obese patients or patients with hypertension, C for all others; CAN: B), safe sex practices (USA and CAN: B), healthy diet (USA and CAN: B), screening with the CAGE questionnaire and counselling for problem drinking (USA and CAN: B), dental hygiene (USA: B; CAN: C) [6–9]. Counselling to prevent morbidity and mortality from youth violence or drug use was only evaluated by the USPSTF and given a "C"-recommendation [8, 9]. Helpful tools to assess the readiness for change of an unhealthy behaviour and assist a patient in changing this behaviour exist. One example is the transtheoretical model of behaviour change developed by Prochaska and DiClemente [16]. This model uses a temporal dimension, the stages of change, to integrate processes and principles of change from different theories of intervention, hence the name transtheoretical. The transtheoretical model assumes that health behaviour change involves progression through six defined stages of change: pre-contemplation, contemplation, preparation, action, maintenance and termination (figure 2). The distribution among theses stages in the risk-population of smokers in the United States is as follows: 40% are in pre-contemplation, 40% are in contemplation and 20% in preparation [17–19]. In Switzerland the distribution in this risk-population is shifted towards the pre-contemplation stage: 75% are in pre-contemplation, 20% in contemplation and 5% in preparation [20]. The model is based on assumptions, that: 1) behaviour change is a process that unfolds over time through this sequence of stages; 2) without planned interventions populations will remain stuck in the early stages; and 3) specific processes and principles of change need to be applied at specific stages if progress through the stages is to occur. In the pre-contemplation stage the patient is unaware of his unhealthy behaviour. In this stage the physicians' task is to raise consciousness for a given problem. This is best achieved by linking unhealthy behaviour to subjective symptoms or signs, e.g., smoking to dyspnoea or obesity to hypertension. In the contemplation stage, ambivalence in the patient is nurtured and thus the progression into the next stage facilitated. Ambivalence is experienced as uncomfortable and something has to be done about it. One strategy to develop ambivalence is to have a patient list the "good things" and the "less good things" about a problem behaviour. The positive aspects are then reviewed and summarised with the patient. Then the negative aspects are explored more thoroughly and examples are requested. For example, "You said that your children are affected by your use of cigarettes. Tell me about a time that happened". In the preparation stage the change should be planned and support be offered, e.g., set a quit date or offer nicotine replacement. In the action and maintenance stage the role of the physician is to reinforce the new behaviour and develop a contingency management, such as alternative strategies to cigarette smoking after eating. These strategies are stage-specific. Applying strategies like contingency management or reinforcement to people in pre-contemplation or contemplation would represent efforts likely to be unsuccessful and not understood. Applying the transtheoretical model for smoking cessation increased the rate of abstinence after 6 months follow-up from 4.7 to 11.2% compared with an intervention based on self-help manuals [21]. A recent Swiss study documented the effectiveness of a computerised smoking cessation program based on the transtheoretical model of behaviour change. Abstinence after 7 months was 5.8% in the intervention group compared with 2.2% in the control group [22].

Counselling should not only be stage-specific, but also age-specific. When counselling younger risk-taking adults, the risk of speeding and impact

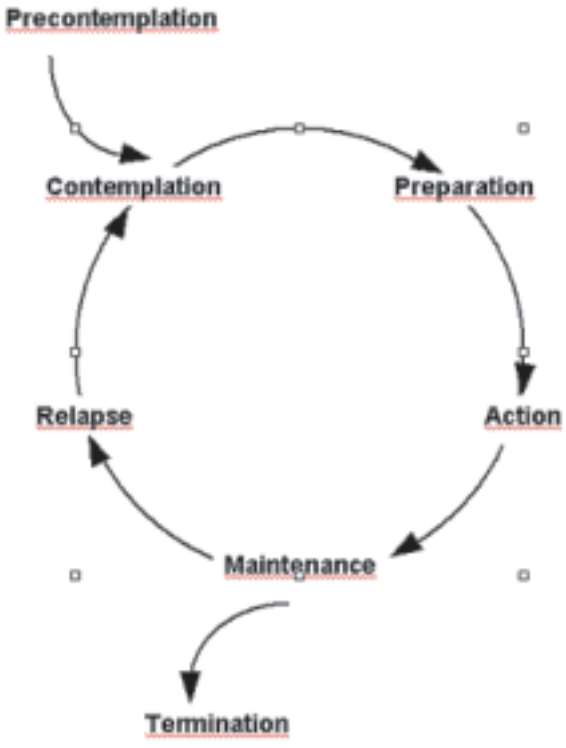


Figure 2

The readiness of change cycle adopted from Prochaska and DiClemente [16].

of using safety belts should be brought up. In older adults minimising the risk for falls in their home and possible reduced hearing, vision or cognitive function should be discussed [6–9].

Immunisation in adults

Immunisations in the adult population are often neglected despite the fact that in the Western hemisphere vaccine-preventable diseases occur predominantly in adults. In Switzerland approximately 1100 patients die each year from invasive pneumococcal infection and 400 patients die as a consequence of the annual influenza epidemic [23, 24]. These numbers could be reduced significantly by implementing the recommended vaccination strategies [25]. Mortality from other vaccine-preventable diseases is much lower and less important from an epidemiological point of view.

Influenza vaccine (USA and CAN: B). The influenza vaccine is derived from egg-grown viruses that are highly purified and inactivated. It contains strains representing the most recent influenza viruses circulating in the world and believed to be likely to cause the next epidemic [26]. The efficacy of the vaccine varies from strain to strain and depends also on the matching of the vaccine with the strain causing the epidemic. Vaccine efficacy is the measured protection from clinical and serologically confirmed disease. In general the efficacy of the influenza vaccine in young immunocompetent adults is between 70 and 80%. In adults older than sixty years the efficacy is between 40 and 60% [27]. Nevertheless, influenza vaccination in this risk population of adults older than 65 years reduces pneumonia and hospitalisations by 50% and mortality by 70% [28]. Other risk populations for which annual influenza vaccination is recommended include nursing home residents, patients with chronic cardiac or pulmonary diseases, diabetics, immunosuppressed patients including HIV-infected persons, and patients with renal insufficiency. Peak of serum antibody titres after vaccination are to be expected four to six weeks after immunisation and decrease by 50% after 6 months. From this serologic dynamics stems the recommendation to immunise the risk-population between October and November each year [26].

Pneumococcal vaccine (USA: B; CAN: A for institutionalised persons >55 years of age, C for independently living persons >55). The 23-valent polysaccharide vaccine is available all over Europe. Currently the 7-valent protein-conjugated vaccine is available in Switzerland, Germany, Italy, France, Belgium, Denmark, Spain and Portugal. At this time the 7-valent vaccine is registered only for the paediatric population. The 23 strains in the polysaccharide vaccine cover more than 90% of the strains responsible for invasive pneumococcal infections in Switzerland [23]. The results of studies evaluating the efficacy of the vaccine against clinical and radiological pneumonia and invasive infection documented by positive tissue or blood cultures vary. The vaccine does not seem to reduce the incidence of pneumonia especially in the risk-population [29]. Its primary benefit is in preventing invasive disease and death. A study which used the pneumococcal surveillance system established by the Centers for Disease Control and Prevention demonstrated a 57% overall efficacy in preventing invasive disease [30]. For Patients with diabetes the efficacy was shown to be 85%. For immunocompetent persons 65 years or older and patients with chronic cardiac conditions, the efficacy rate was 75%. The efficacy in patients with pulmonary disease was somewhat lower with 65%. However, in patients with immunosuppression, myeloproliferative disorders, renal insufficiency or hepatic failure no efficacy in preventing invasive pneumococcal infection could be shown [30]. Pneumococcal vaccination should be offered to persons 65 years and older. If these persons have been vaccinated more than 5 years ago they should receive a booster. The risk population is identical to the risk-population described above for influenza vaccination. Additionally patients with functional or anatomic asplenia should be vaccinated [26].

Screening

It is important to note that for most screening interventions in medical practice, there is still insufficient evidence whether these interventions improve outcome. Therefore the physician often needs to consider other factors than scientific evidence in determining whether to offer a preventive measure. Particularly for asymptomatic patients, thresholds for performing preventive services differ depending on their potential for harm in the absence of strong evidence of benefit. The conditions required to recommend a screening test are shown in table 4.

Screening recommended (Recommendation A and B)

Hypertension (USA and CAN: A). Screening for hypertension is recommended for all persons over age 20 at least biannually. There is good evidence supporting this recommendation, which shows that medical intervention in the asymptomatic stage reduces both mortality and morbidity from cardiovascular disease [31, 32].

Hypercholesterolaemia (USA and CAN: A). In persons without other risk factors for coronary heart disease screening for hypercholesterolaemia should be performed in five year intervals starting

Table 4

Required prerequisites for screening [3].

The condition must have a significant effect on the quality and quantity of life
Acceptable methods of treatment must be available
The condition must have an asymptomatic period during which detection and treatment significantly reduce morbidity or mortality
Treatment in the asymptomatic phase must yield a therapeutic result superior to that obtained by delaying treatment until symptom appear
Tests that are acceptable to patients must be available, at a reasonable cost, to detect the condition in the asymptomatic period

at age 35 for men and 45 for women. Several large studies have shown that patients with high total cholesterol or low HDL cholesterol who took cholesterol-lowering drugs for 5–7 years decreased their risk of heart disease by about 30% [33, 34]. The evidence for cholesterol screening in women is based on weaker evidence [35]. The recommended 5 year screening interval is based on expert opinion [36, 37].

Breast cancer (USA and CAN: A). Screening for breast cancer with annual mammography in women between age 50 and 70 is recommended by both North American Task Forces [6–9]. Several randomised studies including over 500'000 women have shown a reduction from breast cancer related mortality through annual mammography screening between 17–35% [38–41]. In most of these studies screening mammography was combined with clinical breast examination. An interesting study recently published showed that women who had annual mammography plus clinical breast examination between age 50 and 59 did not have a lower mortality than the control group which was screened with clinical breast examination alone [42]. A recent meta-analysis showed that most of the Scandinavian trials supporting screening mammography had methodological flaws, and that two adequately randomised trials found no effect of screening on breast-cancer mortality [43]. In the light of these new data the Swiss Cancer League is currently discussing its implementation of mammography screening. For women between age 40 and 49 the evidence supporting screening mammography is weaker. Screening in this group is given a "B" recommendation by the USPSTF [9] and a "C" recommendation by the CTF [7]. Breast self-examination appears to be less sensitive than mammography or a clinical breast examination for detecting breast cancer. But evidence is lacking to advocate for or against teaching breast self examination as a screening tool [6–9].

Colorectal cancer (FOBT: USA and CAN: A; Colonoscopy: USA and CAN: C). Colorectal cancer develops over years through a well known sequence with a defined precursor lesion, the adenoma. This asymptomatic sequence, the correlation of survival with the stage of the disease and the high incidence and prevalence make it an ideal candidate for screening. Thus, the USPSTF as well as the Swiss Cancer League recommend screening for colorectal cancer for all persons aged 50 or older [7, 44]. Available screening tests are the FOBT and colonoscopy. In Switzerland sigmoidoscopy is not used as frequently as in North America for colorectal cancer screening. A large randomised trial involving over 46000 volunteers over age 50 found that the 13-year cumulative mortality from colorectal cancer was 33% lower in the group undergoing annual FOBT [45]. However, it is difficult to determine to what extent the large number of colonoscopies performed in this trial produced this reduction in mortality. Based on this and several other trials [46, 47], annual FOBT in persons age 50 and older receives a "B" recommendation from the USPSTF and a "C" recommendation from the CTF. So far evidence evaluating colonoscopy as a screening intervention for colorectal cancer is only indirect and both task forces recommend neither for nor against it ("C") [48]. However, the recommendations regarding colonoscopic screening are in flux and recent data suggest that it might be at least as cost-effective as the other approaches [49–51].

Cervical cancer (USA: A; CAN: B). Screening for cervical cancer with Papanicolaou smear is recommended for all women who are sexually active in three year intervals. Evidence from both cohort and case-control studies have shown to reduce the incidence of invasive disease through screening by 20 to 60%. This large body of indirect evidence makes the performance of a randomised controlled trial unlikely for ethical reasons [52, 53].

Obesity (USA: A; CAN: C). Periodic weight and height measurements and calculation of the body mass index (BMI) is recommended for all adults by the USPSTF. There is insufficient evidence to recommend a specific screening interval. Obesity has been clearly linked to increased morbidity and mortality [54, 55]. Most randomised studies on weight reduction therapy show a short term success, but a lack of effectiveness after long term follow-up [56]. Thus screening for the condition was only given a "C" recommendation by the CTF [6].

Screening not recommended (Recommendation D and E)

Lung cancer. There is fair (USA and CAN: D) evidence to recommend against the use of chest x-ray for screening asymptomatic adults for lung cancer. There is good evidence (USA and CAN: E) to recommend against screening for the condition with sputum cytology. Both screening interventions were studied in the general population and in

smokers. Although early-stage, resectable tumors were found more frequently in the intervention groups, mortality rates in the intervention and control groups did not differ significantly for both chest x-ray and sputum cytology [57, 58]. Large RCTs assessing screening for lung cancer with low dose spiral computed tomography are currently in progress [59].

Pancreatic cancer (USA and CAN: D). Screening for pancreatic cancer using abdominal palpation, imaging studies (ultrasound, computerised tomography or magnetic resonance imaging) or tumour markers (CA 19-9) in asymptomatic persons is not recommended. A study of mass screening of more than 10 000 asymptomatic persons using either ultrasonography alone or CA 19-9 plus elastase-1 found the likelihood of pancreatic cancer in the presence of a positive test to be only 0.5% [60]. Evidence that early detection of pancreatic cancer lowers morbidity and mortality is not conclusive and most studies suffer from lead-time, length or selection biases [6, 8].

Ovarian cancer (USA and CAN: D). Screening asymptomatic women for ovarian cancer with ultrasound, measurement of CA 125, or pelvic examination is not recommended. In a retrospective, blinded study from Norway, sera from women who later developed ovarian cancer was compared with sera from matched controls. In this study the CA 125 had only a sensitivity of 30–35% [61]. Furthermore, due to the low specificity of the CA 125 a large proportion of women undergoing screening would be tested false positive [62]. These women would require further invasive procedures (laparoscopy or laparotomy) with substantial costs and risks [6–9].

Coronary heart disease (USA and CAN: D). Certain ECG findings (ST depression, T-wave inversion, Q waves and left axis deviation) are associated with increased likelihood of coronary atherosclerosis being present. They are not specific and occur only in 1–4% of asymptomatic men with coronary artery disease (CAD) [63]. Prospective studies have shown that only 3–15% of patients with these abnormalities in the ECG develop symptomatic CAD during follow-up periods between 5 and 30 years [64, 65]. The availability of a baseline screening ECG in patients presenting with chest pain and no history of CAD did not alter the clinical decision making [66]. The exercise ECG has better operating characteristics but has an unacceptable high cost to be used as a test for mass screening.

Controversial topics

As is evident from the above, only a small number of screening interventions can be clearly advocated or discarded. For most interventions a "C"-recommendation is given. Some of these controversial topics are discussed in this chapter.

Diabetes mellitus 2 (USA: C; CAN: D). So far evidence of a benefit of early detection of diabetes mellitus is lacking. Evidence from a randomised controlled trial is unlikely to emerge due to ethical reasons though. Furthermore the fasting plasma glucose as a screening test is not sufficiently sensitive (21–75%) [67, 68]. Sensitivities for HbA_{1c} are in a similar range (15–93%) [69]. For these reasons the CTF does not recommend screening. The USPSTF states that there is insufficient evidence to recommend for or against screening. The American Diabetes Association (ADA) has a different approach and recommends screening the general population in a clinical setting every 3 years starting at age 45 [70]. This recommendation is based on expert consensus. The same group recommends against community screening outside a clinical setting. There is evidence that screening and treating certain high risk groups for diabetes mellitus is beneficial. High-risk groups include persons with a BMI >27 kg/m^2, hyperlipidaemia, hypertension, polycystic ovary syndrome, positive family history and of certain ethnicity (black, Asian-pacific) [70].

Thyroid disorder (USA: D; CAN: C). In women older than 50 years thyroid dysfunction, especially hypothyroidism, has a high enough prevalence to warrant screening [71, 72]. The TSH assay has a good sensitivity and specificity. Whether therapy in the asymptomatic phase has an effect on the outcome used to be in dispute. There is now, however, emerging evidence that a considerable number of individuals with subclinical hypothyroidism in fact have symptoms. These trials also have demonstrated that treatment with thyroxine improves these symptoms and prevents overt hypothyroidism [73–75]. In the light of these new data, case-finding in women over 50 should be strongly considered.

Prostate cancer (USA and CAN: D). Currently the best available screening strategy for prostate cancer involves measurement of serum prostate specific antigen (PSA), followed by transrectal ultrasound and biopsy. This combined approach still lacks adequate specificity and sensitivity [76]. Given that prostate cancer is very common at autopsy and that a tumour smaller than 1.0 ml is not likely to result in an elevated PSA, tumours are possibly found simply by chance in men with an elevated PSA (the concentration of the PSA being related to the amount of benign prostatic hyperplasia) [77]. Furthermore, there is lack of evidence whether early treatment in the asymptomatic phase improves life expectancy and quality of life [78]. Screening does not necessarily lead to treatment, since watchful waiting is a possible therapeutic option in small, well differentiated prostate cancers [77]. Since the disease can have a long asymptomatic period and also a heterogeneous course it is a perfect example of lead time and length bias.

Hidden agenda

The "Check-up" as a reason for consultation is often used by patients to raise the issue of a specific problem that troubles them, i.e., patients may have a hidden agenda. There are some small studies, which have investigated this issue [79–81]. From those patients who present for a "Check-up" only 25% know about the concept of detecting disease in an asymptomatic phase. More than half of these patients have specific questions or wishes they want to have addressed and 45% do have psychosocial problems upon further questioning. Doctors need to be aware of this and address the patient's possible hidden agenda, such as a request for an HIV test or specific fears.

Conclusion

Primary prevention rather than secondary prevention should be the focus of each patient encounter, but especially during a check-up or periodic health exam. Interventions that address patients' personal health practices are vitally important and influence the patients' future health at least as much as the more expensive secondary preventive measures. Each preventive intervention, including those which are based on strong evidence from RCTs, should be discussed with the patient regarding the absolute risk reductions and potential side effects from labelling, investigations or therapy. Involvement of the patient in the decision-making ensures long lasting success. Secondary preventive measures, including screening, are to be tailored individually to a patients' risk profile and clinicians should be selective in ordering tests.

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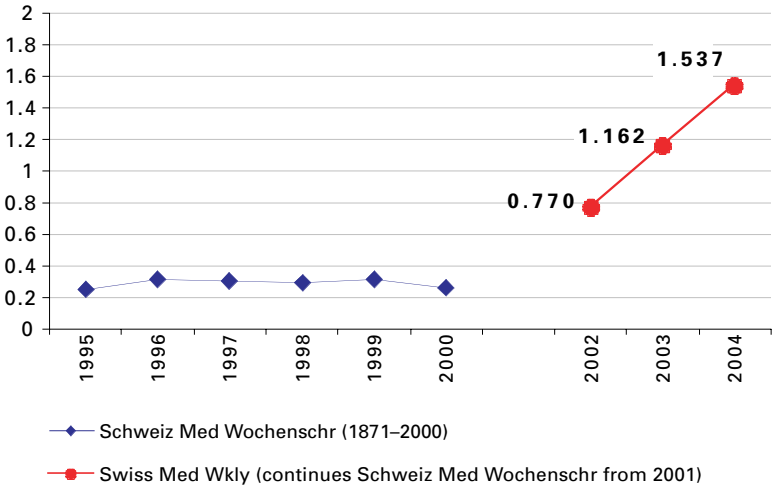

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