A Critical Review of Periodic Health Screening Using Specific Screening Criteria

Part 3: Selected Diseases of the Genitourinary System

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Despite the increasing interest in recent years in prevention and early recognition of asymptomatic disease, an objectively based program for periodic health screening of asymptomatic adults has yet to be proposed for the primary care physician. This is the third in a series of four articles which will critically examine the feasibility of screening procedures for 36 selected diseases. Six basic criteria are adopted as necessary to justify periodic screening. Specific screening recommendations are made for each disease, and a longitudinal screening program for asymptomatic adults will be proposed in the concluding article of this series.

This is the third in a series of four articles which are intended to evaluate what information is available concerning screening procedures for selected diseases. Our goal is to construct a longitudinal screening program or "life flow sheet" for *asymptomatic adult patients* in our own model family practice unit. Several other life flow sheets have already been published,[1] but none have included the data and rationale behind each recommendation. This series specifically includes a discussion of the rationale for each recommended screening test. Furthermore, it provides an extensive bibliography so that the reader may critically reevaluate each area and reach his own conclusions.

Methods

The following criteria are generally deemed necessary to justify screening for a given disease:

1. The disease must have a significant effect on quality or quantity of life.
2. Acceptable methods of treatment must be available.
3. The disease must have an asymptomatic period during which detection and treatment significantly reduce morbidity and/or mortality.
4. Treatment in the asymptomatic phase must yield a therapeutic result superior to that obtained by delaying treatment until symptoms appear.
5. Tests must be available at reasonable cost to detect the condition in the asymptomatic period.
6. The incidence of the condition must be sufficient to justify the cost of screening.

Using the "Geller Tables,"[2] American Cancer Society statistics,[3] and other sources, we tabulated a list of 36 diseases which were then evaluated according to the above criteria. We arbitrarily considered only diseases affecting adults. The following facts about each disease were specifically sought:

1. Incidence and prevalence of the disease, age and sex-specific, if possible.
2. Progression of the disease both with and without treatment, to include morbidity, mortality, and the length of the early asymptomatic period.
3. Risk factors associated with development of the disease.
4. Availability of screening tests, their safety, sensitivity and specificity in the early stages of the disease and their unit cost.

A brief discussion of each disease was then formulated and conclusions were made regarding the suitability and type of screening to be done. This article will deal with eleven major diseases of the genitourinary system. The prevalence of these diseases is shown in Table 1. In the last article of this series, a longitudinal screening program will be proposed based upon the six basic criteria which we have adopted to justify screening in asymptomatic adults.

Bacteriuria

Occurrence:

Bacteriuria is found in six percent of all pregnant women[4] and the prevalence rises with age to ten to 15 percent of women over 60.[5] Risk factors include frequent sexual intercourse and pelvic relaxation. Surprisingly, diabetes is not a risk factor.[6] Men have an incidence of bacteriuria of only 0.5 percent, considerably less than women.

Progression:

Bacteriuria follows a natural course of disappearance and reappearance. Ninety percent of women with bacteriuria have had symptoms of urinary infection in the past, while 76 percent have had symptoms within the past year. There is an association between bacteriuria and IVP changes, BUN, or blood pressure elevations.[5] However, bacteriuria does not signal these changes at an early stage and may, indeed, be an effect rather than a cause.

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Table 1. Diseases of the Genitourinary System

Disease	Occurrence per 100,000	
1. Bacteriuria	6,000	(P–W)
2. Gonorrhea	285	(I)
3. Cervical Cancer	25	(I)
4. Prostate Cancer	16.5	(I)
5. Endometrial Cancer	14	(I)
6. Syphilis	11.5	(I)
7. Ovarian Cancer	11	(I)
8. Bladder Cancer	7	(I)
9. Chronic Nephritis	7	(DR)
10. Cancer of the Kidney	3	(DR)
11. Cancer of the Testicle	2.3	(I)

I = Incidence P = Prevalence
DR = Death Rate W = Women

There is no evidence that bacteriuria causes the IVP changes associated with it.[4] There is no good data on the ultimate relationship of bacteriuria to kidney scarring, but the histologic findings of chronic interstitial nephritis cannot be related to bacteriuria.[6]

Diagnosis:

Careful culturing of the urine is the standard method of detecting bacteriuria and the method by which the condition is defined. It is relatively inexpensive, costing the patient $5 in our area.

Benefit from Treatment:

A single course of antibiotics will "cure" 80 percent of cases of bacteriuria. However, Asscher reports that one year later only 55 percent of those treated will still have sterile urine.[7] During the same time period, 36 percent of an untreated control group spontaneously developed sterile urine. The difference between these groups after one year was not statistically significant. Also, it has been found that relapses after treatment are more likely to be symptomatic than are relapses in the untreated group.[5]

Conclusion:

Asscher has stated, "Even if persistant bacteriuria did lead to progressive renal damage its eradication would be difficult, costly, time-consuming and probably dangerous."[7] We feel that although the incidence of bacteriuria in women is high and it can be easily detected, there is no demonstrated long-range benefit from treatment and, indeed, possible long range morbidity in terms of renal damage is controversial. Therefore, we do not recommend screening asymptomatic persons for bacteriuria. (Fails criteria 1, 4)

Gonorrhea

Occurrence:

Gonorrhea is considerably more frequent in urban lower class populations than in rural or middle-class populations. The overall incidence in the United States is 285 per 100,000. In cities it may be as high as 610 per 100,000 while rural areas report an incidence of 84 per 100,000.[8,9] More than 75 percent of cases occur in persons between 15 and 50. Promiscuity and homosexuality are also significant risk factors.[9]

Progression:

Gonorrhea is asymptomatic in 75 percent of women.[8] It has recently been shown that ten percent of men may also be asymptomatic.[10] This large carrier group has made elimination of the disease an enormous job. Some experts consider it epidemiologically an uncontrollable disease.[8]

The usual presentation in the male is a urethritis seven to 21 days after sexual contact. The 25 percent of females with symptoms present with increased discharge, vaginitis, or more generalized pelvic inflammatory disease. Less frequent complications include salpingitis, prostatitis or epididymitis in two percent of cases and arthritis in 0.1 to 0.3 percent of cases. Dermatitis and carditis are seen less frequently.[11]

Diagnosis:

The only reliable method of diagnosis in asymptomatic persons is by culture on one of several commercially available media. This costs our patients $5.

Benefit from Treatment:

Gonorrhea can be cured with appropriate doses of antibiotics, either penicillin or one of several second line drugs. However, in cases treated late there may be complications such as sterility in women or urethral strictures in men.

Conclusion:

Gonorrhea is still generally an acute symptomatic illness in men despite the ten percent rate of asymptomatic carriers. Therefore, screening asymptomatic males is not warranted. In females, the morbidity is so low (75 percent asymptomatic) that screening is also not justified. If it were possible to eliminate the disease by systematic screening and treatment of whole populations, the situation would be different and screening might be justified. However, workers in this area are pessimistic that gonorrhea can be controlled or eliminated on a mass basis with present technology and social values.[8] Therefore, we do not feel any routine screening for gonorrhea is indicated. (Fails criteria 1,4)

Syphilis

Occurrence:

The overall incidence of primary and secondary syphilis in the United States is 11.5 per 100,000.[9] Latent and late syphilis, the prevention of which is the primary goal of screening, has a higher incidence of 24.6 per 100,000.[12] The disease occurs in young and middle-aged adults with 95 percent of cases affecting people between 15 and 50. The peak incidence is in persons 20 to 24 years old.

All incidence figures for syphilis are subject to wide variation by geographic area. It is more common in urban areas, the lower class, and homosexuals. Men and women are probably infected with equal frequency.[9]

Progression:

Syphilis progresses through the classic primary, secondary, latent, and tertiary phases known to all medical students and older practicing physicians. The Tuskegee study showed that after 15 years, 75 percent of untreated patients would have tertiary complications while 25 percent would be clinically normal.[13] Most of the complications are cardiovascular. Untreated patients have a 20 percent decrease in life expectancy. Syphilis is a curable disease in the primary and secondary stages. Tertiary changes, however, are

not reversed by antibiotic therapy.

Diagnosis:

There are several excellent, reliable, and cheap serologic tests for syphilis suitable for screening, such as the VDRL. These tests have a low rate of false positive results and give very few false negative results. The cost of a VDRL in our area is $3.50. Other tests such as the fluorescent treponemal antibody absorption test (FTA-ABS) are better used for confirmation rather than for initial screening.[12] Darkfield examination is useful in the acute primary phase but not for screening asymptomatic persons.

Conclusions:

Seventy-five percent of undetected cases of syphilis will eventually develop irreversible tertiary complications with significant morbidity and mortality. We therefore recommend that the "at risk" age group of persons 20 to 50 be screened by serologic testing every six years. In high-risk geographic areas more frequent screening may be indicated.

Cancer of the Testicle

Occurrence:

Testicular cancer occurs in white men between ages 15 and 60.[14] It is rarely seen in blacks or orientals. The overall incidence is 2.3 per 100,000. The peak incidence occurs at age 34.[15] Histologically, 40 percent are seminomas, 15 to 20 percent embryonal cell, and 20 percent are teratocarcinomas.[14] Cryptorchidism increases the risk of testicular cancer whether or not orchiopexy is done prior to puberty.

Progression and Benefit from Treatment:

The progression of testicular cancer is much more influenced by histologic type than by size of tumor, location, duration of symptoms, or maldescent of the testes. The overall five-year survival is 65 percent. For localized disease, the five-year survival ranges from 66 to 84 percent. The five-year survival by histologic type is seminoma 95 percent, embryonal 34 percent; teratocarcinoma 45 percent, choriocarcinoma 14 percent.[14] Thus, the 65 percent overall survival is as high as it is because of the 95 percent cure rate for seminomas.

Diagnosis:

The diagnosis of testicular cancer is made by palpation of the testes with subsequent biopsy of suspicious areas. Palpation can either be done by the patients themselves or by physicians. No studies of periodic screening for testicular cancer have been reported.

Conclusions:

The low incidence of testicular cancer and the fact that histologic type is a greater factor in prognosis than early detection makes routine physician palpation for testicular cancer unjustified. White men should, however, be taught to periodically palpate their testes and report any masses or nodules to their doctor. (Fails criteria 4,6)

Carcinoma of the Bladder

Occurrence:

Carcinoma of the bladder has an incidence in males of 6.2 to 15.5 per 100,000 and 2.8 to 5.0 per 100,000 in women.[3,16] The overall incidence is probably between five and ten per 100,000 population. It is a disease of middle-aged and older persons. Most cases occur in persons over 40 with a peak incidence between 65 and 84 of 48.7 per 100,000.[16] Dye workers have a markedly higher incidence.

Progression and Benefit from Treatment:

As with most tumors, there is a range of virulence among bladder tumors with some progressing more rapidly than others. In general, they progress relentlessly and 70 percent of patients eventually die from their tumor.[17] The five-year survival of cases treated early is 33 to 55 percent. If the disease is not treated until the later stages, it is 17 to 38 percent.[18]

Diagnosis:

Several methods have been used to screen for bladder tumors, especially among the high-risk group of dye workers.

Hematuria is frequently present in cases of bladder cancer. Using hematuria to screen for bladder cancer, Crabbe found 28.4 percent false negatives and 22.7 percent false positives.[19] Thus, hematuria can be expected to detect 70 to 75 percent of bladder cancers.

The cytologic examination of urine samples has also been used to screen for bladder tumors with a six percent rate of false negatives and 11 percent false positives.[19] This technique requires a skilled pathologist practiced in the method.

In Europe, routine yearly cystoscopy has been done in some dye workers, and in one study 25 of 91 bladder cancers were detected before the onset of hematuria.[19] Routine cystoscopy has not been done in the normal population.

None of the early detection techniques, hematuria, cytology, or cystoscopy, has been shown to affect the ultimate course of the disease. They have been shown only to detect disease in the presymptomatic phase.

Conclusions:

Bladder cancer has a relatively low incidence in the general population. We do not recommend routine screening of asymptomatic persons for bladder cancer. Screening may be justified in high-risk groups such as dye workers. (Fails criteria 1,6)

Carcinoma of the Prostate

Occurrence:

Prostatic carcinoma is a disease of older men. Less than one percent of cases are in persons under 50.[20] The overall incidence is 16.5 per 100,000, but in men over 65 it is 148.8 per 100,000.[16] The median age for localized tumor is 70.8 years.[21]

Progression and Benefit from Treatment:

The disease has a variable progression. In some cases there is only a small local prostatic tumor, yet distant metastases are already present, and the disease is rapidly fatal. Other cases present with a large irregular prostatic mass which spreads slowly. The untreated five-year survival is ten percent. With treatment, early localized disease has a five-year survival of 44 percent. If the tumor is discovered later, after metastasis has occurred, the five-year survival is only 20 percent.[21]

Diagnosis:

Rectal palpation with subsequent biopsy of suspicious areas is the only feasible method of screening for asymptomatic prostatic cancer. Eighty-three percent of tumors occur posteriorly and should be palpable.[20]

The big question is, at what stage in the disease is the nodule palpable? Almost all prostatic carcinomas will have rectal findings late in the course of the disease. No study has shown that periodic rectal exams increased the detection of early localized disease. Many newly discovered nodules are found in men symptomatic of obstructive uropathy and not in asymptomatic persons.

Urinary cytology is a poor detector of prostatic cancer.[22] The serum acid phosphatase is elevated only after the tumor has spread through the capsule and, therefore, is not adequate for detecting early disease.

Conclusions:

Prostatic cancer is another disease for which it is difficult to decide whether or not screening is justified. It has a very high incidence in older men and is *potentially* detectable by the simple procedure of rectal examination. However, the difference in five-year survival between early and late cases is only 24 percent. Also, periodic rectal exam has never actually been proven to yield earlier diagnosis or increased survival.

The question arises "How often should rectal exams be done?" if one decides to do them. There is no hard data on this point, but presumably it would have to be quite often, every year at least, or perhaps every six months. Finally, one must remember that these patients are often in their seventies, frequently with multiple medical problems to which they may succumb even if their prostatic cancer is cured.

Confronted with this dilemma and the uncertain benefit from screening, we do not recommend screening for prostatic cancer. (Fails criteria 2,5)

Carcinoma of the Kidney

Occurrence:

Ninety percent of renal neoplasms in adults are adenocarcinoma. The overall death rate in 1965 was 3.1 per 100,000 in men and 2.3 per 100,000 in women. The disease is unusual before age 45 and increases to an incidence of 22.4 per 100,000 in people 65 to 84.[16]

Progression and Benefit from Treatment:

The disease has an insidious onset presenting with an abdominal mass in 50 to 60 percent of cases, pain in 35 percent, and hematuria in five to ten percent. Forty percent have distant metastases at the time of initial diagnosis. The five-year survival with treatment is 30 to 65 percent while the ten-year survival is 18 to 23 percent.[16]

Diagnosis:

The only sensitive diagnostic test for renal cancer is the intravenous pyelogram. This test, however, is not feasible for screening because of its high cost (about $40). Hematuria is usually a late sign, except in the small proportion of cases which involve the renal pelvis. Urinary cytology has been shown not to be a sensitive test for renal cancer.[22]

Abdominal palpation usually only detects a mass after a considerable increase in kidney size has occurred. There has been no study showing that frequent abdominal palpation will detect early renal neoplasms.

Conclusions:

We do not recommend screening for renal carcinoma because there is no satisfactory diagnostic screening test. The IVP is too expensive, and an abdominal mass or hematuria usually signifies advanced disease. (Fails criteria 5,6)

Chronic Nephritis

Occurrence:

Chronic nephritis includes several histologic entities which eventually lead to end-stage renal failure.[23] We are not including acute renal disease such as post streptococcal glomerulonephritis or acute tubular necrosis. The death rate for chronic renal failure is between four and ten per 100,000.[23,24] It increases steadily with age from two per 100,000 in persons 15 to 24 to 33 per 100,000 in persons 65 to 74.[24] Much of this renal failure, however, occurs in persons with other primary disease in other organ systems. In one survey only 20 percent of renal deaths were from primary renal disease and only three percent were from primary noninfectious renal disease.[25] Thus, most chronic renal failure occurs not in people who are included in the healthy, asymptomatic population being considered in this article, but in people already suffering from another primary illness.

Progression and Benefit from Treatment:

Chronic renal disease has a highly variable progression leading to renal failure in a few years or in as long as ten to 30 years. Unfortunately, there is no specific therapy that will significantly change the natural history of most primary renal failure.[26] Treatment involves reducing the metabolic load by low protein diets, handling complications of the disease and, of course, in the later stages, dialysis and transplantation. There is no effective treatment available in the early asymptomatic stages.

Diagnosis:

Renal damage can be detected by determining the serum creatinine or blood urea nitrogen, or by urinalysis. Of the blood tests, the creatinine is more specific, but extrarenal causes for an elevated BUN can usually be ascertained from clinical data and do not pose a significant problem. Proteinuria and examination of the urinary sediment in some cases is more sensitive than the BUN or creatinine but is less specific. All three tests are inexpensive costing an average of $3 to $3.50 each.

Conclusion:

Screening for primary chronic renal disease is not justified in spite of available effective diagnostic tests because there is no specific treatment for the disease other than end-stage dialysis and transplantation. (Fails criterion 4)

Carcinoma of the Cervix

Occurrence:

Since the development of the Papanicolaou smear, carcinoma of the cervix has been one of the most frequently screened for diseases. It occurs with an overall incidence from 14 to 36 per 100,000 women.[27,28] It is rare before age 20 and increases in incidence to the fifth decade where an incidence of 85 per 100,000 women has been reported.[28] After the fifth decade, the incidence decreases but is still highly significant. Factors which increase the risk of cervical cancer include low socioeconomic class and frequent sexual contact.[29]

Diagnosis:

The Pap smear has been established as an inexpensive, reliable test for cer-

vical carcinoma which, when properly done, has a false negative rate of less than six percent.[30] It does, however, have a considerably higher rate of false positive tests which require further evaluation to rule out carcinoma. Frost discusses the technique of taking Pap smears and concludes that multiple slides are not necessary, but the specimen should contain endocervical cells as well as cells from the vaginal pool.[30] In our area at the present time the cost to the patient of a Pap smear is about five dollars.

Progression:

In past years there has been considerable debate about the relationship between dysplasia, carcinoma in situ, and invasive carcinoma of the cervix. Recently there is more agreement that dysplasia, cancer in situ, and invasive cancer are stages in a continuum of malignant cellular changes.[31]

Given this continuum, the key question with respect to screening is "What is the progression time from dysplasia to cancer in situ and from cancer in situ to invasive cancer?" In a prospective study by Richart[31] the average progression time from dysplasia to cancer in situ was 44 months with a range from 12 months to 86 months. Petersen[32] followed a series of in situ lesions and found 11 percent became invasive within three years, 22 percent within five years, and 39 percent within nine years. These studies suggest that cancer of the cervix is a slowly progressive disease requiring between five and ten years to progress from dysplasia to invasive carcinoma.

Gray, discussing the frequency of taking cervical smears, found that the yield of positive smears decreased markedly in women who had had several previous negative smears. He concludes that after two annual negative smears, screening every three to five years is sufficient. He points out that women of low socioeconomic class or who have frequent sexual contact are at much higher risk than the general population and need more frequent screening.[29]

Benefit from Treatment:

In its early stages, cervical cancer is a curable disease. Typical five-year survival rates are: Stage 0 – 99 percent; Stage I – 90 percent; Stage II – 60 percent; Stage III – 30 percent; Stage IV – less than ten percent.[33] Thus, diagnosis and treatment in early stages is important to the achievement of a long-term cure.

Conclusions:

Cervical cancer meets our criteria for a disease warranting periodic screening. The question is "How often do women need to have a Pap smear?" We recommend that all women over 20 have annual Pap smears for two years and then have a smear every other year indefinitely. This is a compromise recommendation between the tradition of annual Pap smears and evidence suggesting a five to ten year progression from dysplasia to invasive carcinoma. It should be remembered that lower socioeconomic populations may benefit from more frequent screening.

Endometrial Cancer

Occurrence:

Endometrial cancer is a disease of older women in the perimenopausal and postmenopausal years. Sixty-five to 85 percent of patients are over age 50 with the average age about 60.[28,34] The overall age adjusted incidence is 14 per 100,000 women.[28]

Progression:

The most common symptom of endometrial cancer, postmenopausal bleeding, is found in up to 79 percent of patients.[34] In one series 39 percent of patients had had bleeding six months or more before diagnosis and 20 percent had bleeding up to a year prior to diagnosis.[35] Less common presentations are pelvic pain and discovery of a pelvic mass.

Most endometrial cnacer is diagnosed in Stage I (73 percent in Anderson's Series) and these persons have an 80 percent five-year survival.[34] The overall survival for all stages is about 70 percent.[34,35] Stages II and III have a 55 percent and 33 percent survival respectively. Interestingly, premenopausal women have an 88 percent five-year survival compared to 62 percent for postmenopausal women. A normal or small uterus at the time of diagnosis is associated with a 90 percent five-year survival, while an enlarged uterus is a poor prognostic sign associated with a 64 percent five-year survival.[34] Risk factors felt to be associated with an increased incidence of endometrial cancer include diabetes, hypertension, and estrogen stimulation.

Diagnosis:

Possible diagnostic procedures for endometrial carcinoma include (1) history of bleeding and pelvic exam, (2) Pap smear, (3) endometrial jet washings, and (4) dilatation and curettage.

The Pap smear has been shown to have a very poor accuracy of between 26 and 60 percent[33,36] for picking up D&C proven cases of endometrial cancer and is, therefore, unsuitable for screening for this disease.

Endometrial jet washings[36,37] and the related intrauterine sponge biopsy procedure[38] have been shown to be close to 100 percent accurate in identifying cases of adenocarcinoma in symptomatic patients being admitted for diagnostic D&C, if a satisfactory specimen is obtained. In ten percent of patients, however, the washings are unsatisfactory for diagnosis and in postmenopausal patients, those with the highest risk, 25 percent of washings are unsatisfactory.[37] It is often difficult to introduce the Gravelee jet into stenotic postmenopausal cervices.

No large scale study has been done to demonstrate that jet washings will pick up endometrial cancer prior to suspicion from other symptoms.

Dilatation and curettage is the present standard for diagnosing endometrial cancer. Its use as a screen for asymptomatic women is prohibitive because of its risks, complexity, time required, and unit cost of over $100.

Conclusions:

Most endometrial cancer is currently diagnosed in Stage I without a widespread screening program. It therefore seems unlikely that screening will significantly increase survival unless a test is developed which will detect the disease in asymptomatic persons. The Pap smear is grossly inadequate. Endometrial jet washings have been tried only in symptomatic persons and routine D&C's are much too time consuming and costly. Physical examination of the uterus is a helpful prognostic sign, but enlargement indicates progression of the disease has already occurred and this is associated with a poorer prognosis. We feel that education of the patient to report any postmenopausal bleeding and menopausal metrorrhagia to her physician is the best screen currently available. We also

recommend a biannual pelvic exam but this is primarily done for the Pap smear detection of cervical cancer. (Fails criterion 5)

Ovarian Carcinoma

Occurrence:

The overall incidence of ovarian cancer is ten to 13 per 100,000 women. Eighty percent of cases occur in women over 40. The peak incidence is in the seventh decade.[39]

Progression and Benefit from Treatment:

Ovarian carcinoma progresses very rapidly, in terms of months, once it becomes symptomatic. Presumably it is also rapidly progressive in the asymptomatic stage before diagnosis, but there is little data on this question. The overall five-year survival is 25 to 35 percent.[33,40] The five-year survival is 75 percent if the disease is localized.[40] Unfortunately, only 30 percent of cases have localized disease at the time of surgery. Risk factors include endometriosis, dysmenorrhea and infertility.[39]

Diagnosis:

Symptoms of ovarian cancer, most frequently abdominal pain or a mass, are often late occurrences and are associated with a poor prognosis.

Manual palpation of the ovaries is the most frequently used screening test. There is no data, however, that indicates it is an effective way of picking up localized disease. This is because there may be widespread disease with minimal findings and also because the cancer spreads so rapidly. Most localized cancer is actually discovered at laparotomy for unrelated reasons.[39]

The Pap smear is a poor detector of early ovarian cancer with a false negative rate of 38 to 77 percent.[30]

Laparoscopy is a newer procedure which might be better for detecting early tumors but is much too expensive and elaborate for use as a routine screen.

Conclusion:

There is no adequate diagnostic test for early ovarian carcinoma and therefore no screening is recommended. We will, however, continue to palpate the ovaries whenever a Pap smear is done for cervical cancer. (Fails criterion 5)

Discussion

We have attempted to strictly require that all criteria were fulfilled before recommending any particular screening test. Failing a single criterion was enough to disqualify a test or disease from screening. This is perhaps more rigid than many of us are in practice but was necessary to avoid the pitfall of being carried away by intuition, special interest group propaganda, "common practice," and personal emotional bias. Therefore, many commonly used reasons for doing screening tests such as, "The test has a high yield," "It is so easy to do," or "It's good to have a baseline value," were not sufficient.

It should also be emphasized that we are considering screening only the hypothetical *completely asymptomatic person.* This does not imply that the screening test is a sufficient work-up for the disease being screened once detected or that incidental symptoms should not be evaluated.

We feel that health screening programs must be objectively based. In an area as controversial as health screening, many people will undoubtedly disagree with some of our conclusions. This is good if it leads to further discussion of the issues and objectively based arguments and experimentation. In the last article of this series we will propose a longitudinal screening program for asymptomatic adults based on the criteria used in this study.

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