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Evidence Summaries

Are routine general health checks in healthy adults effective in preventing morbidity and mortality due to cardiovascular diseases and cancer? Summary of the evidence and implications for public health programmes

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ABSTRACT

A Cochrane Review that sought to quantify the benefits and harms of general health checks included 14 trials conducted in Europe and North America that randomised 182,880 adults (18–65 years) unselected for disease or risk factors, to single or repeated health checks (screening multiple organ systems), with or without a life-style intervention, or to no health checks.

Compared to no health checks, general health checks did not reduce total mortality, or mortality or morbidity due to cardiovascular disease or cancer, over 4 to 22 years of follow up (median 9 years). Health checks increased the number of new diagnoses and people using antihypertensive drugs in some trials. Other outcomes were poorly reported.

General health screening in asymptomatic healthy adults is unlikely to yield clinically important benefits. Investigations guided by clinical indications in people at risk or with disease are more likely to result in clinically important benefits.

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1. The evidence

A Cochrane Review and meta-analysis of fourteen randomised controlled trials conducted in Europe and North America that randomised 76,403 adults (18–65 years) to general health checks and 106,477 to no health checks concluded that:

Compared to no health checks, single or repeated health checks screening for more than one disease or for more than one risk factor in more than one organ system (with or without a life-style intervention) did not reduce overall morbidity or mortality, or that due to cardiovascular disease

or to cancer, in 182,880 adults unselected for disease or risk factors and followed up for a median period of nine years (4–22 years).

Review on which this evidence summary is based

This evidence update presents the summary of a Cochrane Review: Krogsbøll LT, Jørgensen KJ, Grønhøj Larsen C, Gøtzsche PC. General health checks in adults

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Table 1 – General health checks versus no health checks in healthy adults living in high-income countries. Summary of findings on mortality: follow-up: 4 years–22 years (median 9 years).

Outcomes	Relative risk (95% CI)	Absolute risks* (95% CI)		Number of participants (trials)	Overall evidence quality
		No health checks	Health checks		
Deaths from all causes	0.99 (0.95–1.03)	75 per 1000	74 per 1000 (71–77)	155,899 (9)	High
Deaths from cardiovascular causes	1.03 (0.01–1.17)	37 per 1000	38 per 1000 (34–43)	152,435 (8)	Moderate
Deaths due to cancer	1.01 (0.92–1.12)	21 per 1000	21 per 1000 (19–24)	139,290 (8)	High

CI Confidence interval.
 *The risk with no health checks is the median risk across the trials; the risk with health checks (and 95% CI) is the product of this median risk and the relative risk.

for reducing morbidity and mortality from disease. *Cochrane Database of Systematic Reviews* 2012, Issue 10. Art. No.: CD009009. <http://dx.doi.org/10.1002/14651858.CD009009.pub2>.

This summary presents an overview of the findings and the implications for low and middle income countries. For further details, please read the full review that can be downloaded, free of charge (through various funded provisions) in most parts of the world, from *The Cochrane Library* (<http://www.thecochranelibrary.com>). This review was featured in an editorial in *The Cochrane Library*¹ and was also subsequently published in the *BMJ*.²

diseases. They can also identify risk factors that may predict the development of diseases in the future, and can reassure people if no abnormalities are detected.

- However, the actual benefits in terms of reduction in morbidity or mortality have not been adequately evaluated, or demonstrated.
- Moreover, health checks may be associated with harms such as over-diagnosis; unnecessary or potentially harmful additional tests; unnecessary and potentially harmful interventions; increased worry and distress; false negative results and false re-assurance; and increased costs and resource use from a payer's and societal perspective.

2. Why is this question important?

- General health checks that use a mixture of screening tests in healthy people aim to identify diseases that can then be treated by drugs, life-style modifications, and other measures in order to prevent complications and death due the

What did the systematic review seek and what did they find?

Review objectives: To quantify the benefits and harms of general health checks.

	What did the review authors search for?	What did the review find?
Types of studies	Randomised controlled trials. The review specifically excluded observational studies, and non-randomised trials due to the risk of bias with these designs. Randomised trials targeting those over 65 years, or those with known risk factors or disease conditions; and trials screening for single diseases, or using single screening tests which could detect more than one disease; and trials that did not evaluate outcomes pre-specified in the review were excluded	Of 16 eligible trials, 14 trials reported in 73 articles had usable outcomes and were included in analyses. Five trials randomised clusters (couples, households, factories). Nine trials were reported in the 1960s and 1970s. Five were published from 1982 to 1999
Setting	The trials were to be conducted in a community or primary care setting, by any type of health professional	The included trials were conducted in North America and Europe (Belgium, Denmark, England, Italy, Poland, Sweden, and Yugoslavia). The setting was in general practice (5 trials), community (8 trials) and the workplace (1 trial)
Participants	Adults aged 18–65 years	Of the fourteen included trials, five trials included only men. They included people that were not selected for diseases or risk factors
Interventions	Health checks involving single or repeated screening using more than one test in more than one system, with or without advice on life-style interventions Control: no health checks	The 14 included trials included 182,880 participants with 76,403 allocated to health checks and 106,477 to control. Five trials included a clinical examination. Six trials used broad screening without any important life-style

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	What did the review authors search for?	What did the review find?
Outcomes	<p>The review's primary outcomes were all-cause mortality and disease-specific mortality because these were considered less likely to be biased than surrogate outcomes such as risk factors, health behaviours or screening rates. The review's secondary outcomes included morbidity and other outcomes considered to be directly of relevance to participants, and that captured both beneficial and harmful effects. No time frame was pre-specified for evaluating these outcomes, although the review authors acknowledged the latency in the development of many of these outcomes</p>	<p>interventions. The other trials screened for cardiovascular risk factors and included a life-style intervention. Five trials screened for cancer using chest radiographs only (two trials), or in combination with mammography (two trials), and cervical smear (one trial), or pelvic exam and sigmoidoscopy (one trial), or faecal occult blood (one trial). Of the nine trials contributing data on mortality, six offered more than one health check.</p> <p>Nine trials with 155,899 participants reporting a total of 11,940 deaths were included in meta-analysis; and one on-going trial has yet to report data on mortality. The length of follow-up for mortality varied from 4 to 22 years. Cardiovascular and cancer mortality were reported in eight trials. A few trials reported data on morbidity (non-fatal stroke and coronary heart disease, angina, incident cancers, reasons for hospitalisation etc., though in some, the morbidity reported were risk factors such as hypertension). One trial reported rates of new diagnoses in the first six years. Four trials reported on the findings at the first screening in the intervention group. Three trials investigated the effects on disability. Two trials measured psychological distress. Four measured self-reported health. One trial reported incomplete data on referral to specialists and five on non-scheduled visits to general practitioners. None of the trials reported the number of additional diagnostic procedures required because of positive screening tests, the total number of new prescriptions or surgeries performed. Two trials reported on absence from work</p>
Date of the last search: 3 July 2012		
Funding sources: Nordic Cochrane Centre, Denmark; Trygfonden, Denmark		
Limitations: none detected. This review followed standard methods of the Cochrane Collaboration and the Effective Practice and Organization of Care Review Group		
What were the effects of general health checks on the main outcomes sought in the review?	<p>Table 1 (adapted from the review) reveals that compared to no interventions; general health checks did not reduce total mortality or mortality due to cardiovascular disease or cancer</p> <p>These results did not differ in sub-group analyses of trials of only one health check versus several; with or without physical examination by a physician; health checks with or without advice on life-style; trials in North America versus Europe; high versus low risk of biases; or long (more than five years) versus short follow-up. Exclusion of cluster trials in sensitivity analyses also did not alter the results</p>	
What were the effects of general health checks on other outcomes?	<p>The review did not find health checks to have an effect on clinical events or other measures of morbidity such as admission rates, days in hospital, patient worry, disability, visits to physicians, and number of referrals. Health checks were likely to increase the number of new diagnoses, but the outcome was poorly reported in most trials. In one trial an increased occurrence of hypertension and hyper-cholesterolaemia with screening was reported. One trial found an increased occurrence of self-reported chronic disease. One trial found a 20% increase in the total number of new diagnoses per participant over six years compared to the control group. Two out of four trials found an increased number of people using antihypertensive drugs. Two out of four trials found small beneficial effects on self-reported health, but the trials were not blinded. Other outcomes were poorly reported or not reported, including data on resource use and costs</p>	
What were the conclusions of the review?	<p>The review authors concluded that, "With the large number of participants and deaths included, the long follow-up periods used, and considering that cardiovascular and cancer mortality were not reduced, general health checks are unlikely to be beneficial"</p>	
What were the assessments of the overall quality of the evidence?	<p>The review authors assessed the overall quality of the evidence for the outcomes of total mortality and mortality due to cardiovascular and cancer related mortality using the GRADE approach that attempts to integrate evaluations regarding a) study limitations; b) unexplained inconsistency in the results; c) indirectness (how representative of clinical practice the populations, interventions, control conditions, and outcomes were); d) imprecision in the estimates (in terms of statistical significance as well as clinical importance); and e) the likelihood that publication bias affected the estimates. The evidence for total mortality</p>	

(continued)

and cancer deaths was graded as *high quality* denoting that the effect estimates are likely to reflect the effects obtained in clinical practice and that further research is very unlikely to change our confidence in these estimates of effect. The evidence for cardiovascular mortality was graded as *moderate quality* due to substantial heterogeneity in effect estimates that was possibly due to different outcome definitions used in the trials. This indicates that further research is likely to have an important impact on our confidence in this estimate of effect and may change the estimate

The confidence one may place in the review's secondary outcomes is uncertain due to the considerable differences in definitions and methods used due to poor reporting of these that precluded data synthesis, and the risk of biases due to the lack of blinding and high attrition for some outcomes. The people in the control group were not prevented from using health checks and many did, hence possibly reducing the relative magnitude of the effect of health checks. Many of the studies were conducted before the 1960s and 1970s and though the general nature of tests that are done have not changed substantially, the interventions offered have, and these may potentially be more effective. However, there were no time trends in the effects on mortality in the review, and the effects of newer interventions in those with established diseases is likely to differ from their effects as preventive strategies. The results of one on-going trial identified by this review in around 60,000 patients that began in the late 1990s will provide data on mortality following general health checks aimed at reducing cardiovascular mortality using more contemporary interventions in those identified at risk

Did the results and conclusions of the review differ from other reviews on this topic?

The results of this review concurred with another systematic review³ that included observational studies, had fewer trials, included geriatric trials, and used different definitions of general health checks, in revealing no effects for general health checks in reducing total mortality, hospitalisation, and disability, and regarding the number of new diagnoses (disease detection). The results of the additional trials in the Cochrane review revealed no effects of general health checks on patient worry, refuting the beneficial effects seen in the earlier systematic review. The conclusions of the two reviews differed on the utility of health checks, but the conclusions of the Cochrane review were based on the lack of benefit on clinically important outcomes. The Cochrane review excluded studies in the elderly and trials of those with established risk factors and health conditions; hence these results do not apply to them. Those seeking health checks generally differ in gender, age, socio-demographic status and ethnicity from those that do not; and are also less likely to have risk factors or clinical needs.⁴ None of the trials in the review were conducted in low or middle income countries where the proportion of people seeking routine health checks are more likely to be healthier and wealthier than those not seeking such health checks, and to have different risk profiles and co-morbidities as well. In the included studies, many in the control groups sought help from their physicians, whose index of suspicion to investigate, and the treatments provided, are likely to differ from the routine care available to these living in countries with less developed health systems; and where inequities exist in access to affordable healthcare, and where health provision is largely provided by the private and un-regulated health sector

What are the implications of the review for public health?

- This review highlights the lack of benefit on clinically important outcomes such as mortality and morbidity with general health screening in asymptomatic healthy adults, as opposed to the likelihood of clinically important benefit when investigations and interventions are guided by clinical indications
- The results of the on-going trial will provide additional evidence to confirm or refute the results of this review regarding total and cardiovascular mortality using contemporary interventions
- However, the current practice of providing general health checks to asymptomatic healthy adults is unlikely to yield clinically meaningful benefits unless newer interventions are found that demonstrate reduced mortality and morbidity in those identified with risk factors, or with early or sub-clinical disease

Conflicts of interest

Thambu David Sudarsanam and Prathap Tharyan are contributors to The Cochrane Collaboration.

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