Evaluations of the 45-49 year old health check program in Australian general practice

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Thesis abstract

Background: A health check refers to the practice of comprehensive medical assessments to detect and manage risk factors and early chronic disease. Debate about the value of health checks has lasted for decades. A systematic review reported that general health checks in middle-aged populations did not reduce total mortality. Nevertheless, new government funded health check programs have recently been introduced in several developed countries. In 2006, Medicare Australia funded a 45-49 year old health check in Australian general practice for all people at risk of developing chronic disease. However, this program has not been fully evaluated. To date, research has taken the perspective of health care providers, investigating their perceptions about the feasibility and challenges in performing a heath check. No study has yet investigated important questions arising from the perspective of patients or the government. Such research would provide a better understanding of which patients participate and why, and also the potential benefits and costs of this health check program.

Objectives: To investigate the effectiveness of general practice-based health checks; to understand patients' perceptions about general health checks and the psychological determinants of their attendance at a GP invited health check; to compare the demographic characteristics, past health service use including preventive health care of attendees and non-attendees at the 45-49 year old health check; to examine the long-term health effects of this health check program and to quantify its economic impact on the health care system.

Methods: A systematic review and meta-analysis was performed to determine the effectiveness of general practice-based health checks, using both surrogate and final outcome indicators.

A prospective cohort study was conducted in two general practices in the Adelaide metropolitan area. Patients who were eligible for the 45-49 year old health check program were identified from the two practices. A structured questionnaire was developed and sent to all eligible participants. Questions about demographic characteristics, self-reported medical history and perceptions about general health checks were included. After the return of study questionnaires, an invitation letter was sent to all participants, whether they had returned the questionnaire or not. Attendance at the health check in the following 6 months was recorded. Then, relevant medical records of all study participants from one year prior to the invitation were extracted from the electronic medical record system in each practice. Extracted data included gender, age, residential postcode; the number of general practice visits, pre-existing prescriptions and the uptake of preventive health care.

Finally, a Markov chain model was constructed to simulate the health check effects on a hypothetical cohort of 10,000 'healthy' Australians aged 45-49 years. The risk profiles of a baseline cohort were generated using data from the 2011 Australian National Health Survey. Intervention effects were simulated using data on risk factor changes after the health check (results from the systematic review). The Life-Years and Quality Adjusted Life Years (QALYs) gained over the cohort's remaining lifetime after a health check was estimated. The maximum acceptable costs for this health check program, including the initial consultation

and subsequent interventions, was calculated using a cost-effectiveness threshold of $50,000 per QALY.

Results: The systematic review of general practice-based health checks demonstrated significant, albeit small improvement in most investigated surrogate outcomes (i.e. total cholesterol, systolic and diastolic blood pressure and body mass index) after the intervention, especially among high risk patients. No significant improvement in surrogate outcomes was observed in non-practice based health check studies. No difference in total mortality was found in either practice-based or non-practice based studies. However, most general practice-based studies were not originally designed or powered to evaluate mortality changes.

The cohort study recruited 515 eligible participants from two participating general practices. 293 of the 515 (56.9%) participants returned the study questionnaire and altogether 117 (22.7%) attended the health check within 6 months. In the questionnaire study, respondents who indicated a strong attendance intention ($p<0.01$), and self-reported no pre-existing biomedical risk factors ($p<0.01$) and less recent uptake of preventive health care ($p<0.01$) were significantly more likely to attend a health check. In the medical record analysis, no significant differences in age, gender or socio-economic status were observed between health check attendees and non-attendees. However, the questionnaire respondents were almost 3 times as likely to attend as non-respondents (31% vs 12%) and the characteristics that were associated with attendance were different in questionnaire respondents and non-respondents. Among the respondents, those with more pre-existing prescriptions and recent uptake of preventive health care

were slightly less likely to attend. Conversely, among non-respondents, individuals with two or more types of pre-existing prescriptions were significantly more likely to attend than those without (p=0.03).

The modelling study demonstrated that the 45-49 year old health check program would lead to 8.6 and 2.6 QALYs gained among 1,000 male and female attendees respectively in a lifelong projection (50 years). The threshold costs for the health check to be considered cost-effective were $465 for a male and $140 for a female patient using a threshold of $50,000 per QALY.

Conclusions: For health checks to be most effective, they should be undertaken in general practice as opposed to other settings (e.g. community or workplace). Tailored invitations could be employed to selectively invite patients who would most benefit from a health check (patients who are less proactive). Finally, the 45-49 year health check program is unlikely to be cost-effective among females in the current Australian context. Given these results, health policy changes such as delaying the health check by 5-10 years, introducing pre-screening procedures or targeting vulnerable patient groups should be considered to improve the effectiveness and cost-effectiveness of this health check program.

Declaration

This thesis contains no material which has been accepted for the award of any other degree or diploma in any university or other institution. I affirm that to the best of my knowledge, the thesis contains no material previously published or written by another person, except where due reference is made in the text of thesis.

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Signed.....

Si Si

Date .....

List of publications contributing to this thesis

1. Si S, Moss JR, Sullivan TR, Newton SS, Stocks NP. Effectiveness of general practice-based health checks: a systematic review and meta-analysis. BJGP. 2014;64(618):e47-e53.
2. Si S, Moss JR, Giles LC, Stocks NP. Factors influencing attendance at the 45-49 year old health check: a questionnaire survey.
3. Si S, Moss JR, Giles LC, Stocks NP. Determinants of attendance at a 45-49 year old health check in Australian general practice: An observational cohort study.
4. Si S, Stocks NP, Moss JR, Karnon J. Effectiveness and cost estimates for the 45-49 year old health check in Australian general practice: a modelling study. Submitted to Applied Health Economics and Health Policy; Submitted in Jul 2014.

List of conference presentations during candidature

- Si S, Moss J, Stocks N. *An evaluation of the 45-49 year health assessment in Australian general practices: determinants of attendance, subsequent medical service use and costs.* Postgraduate Health Research Conference 2012; 2012 Sep; Adelaide

- Si S, Moss J, Stocks N. *The effectiveness of general practice-based health checks: a systematic review and meta-analysis*. North America Primary Health Care Group (NAPHCG) Annual Meeting 2013; 2013 Nov; Ottawa

- Si S, Moss J, Stocks N. *Characterizing attendees at the 45-49 year health check in two family practices in Adelaide.* North America Primary Health Care Group (NAPHCG) Annual Meeting 2013; 2013 Nov; Ottawa

- Si S, Stocks N, Moss J, Karnon J. *Effectiveness and cost estimates for the 45-49 year old health check in Australian general practice: a modelling study*. 2014Primary Health Care Research Conference; 2014 Jul; Canberra

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Abbreviations

ABB	Affective Behavioural Belief
ABHI	Australian Better Health Initiative
ABS	Australian Bureau of Statistics
AIHW	Australian Institute of Health and Welfare
ANHS	Australian National Health Survey
AR-DRG	Australian Refined Diagnosis-Related Group
BB	Behavioural Belief
BEACH	Bettering the Evaluation and Care of Health
BI	Behavioural Intention
BMI	Body Mass Index
CB	Control Belief
CCA	Cost-consequence Analysis
CDM	Chronic Disease Management
CEA	Cost-effectiveness Analysis
CHD	Coronary Heart Disease
CMR health check	Cardio-Metabolic Risk health check
COAG	Council of Australian Governments
CVA	Cerebral Vascular Abnormality
CVD	Cardiovascular Disease
DBP	Diastolic Blood Pressure
DM	Diabetes Mellitus
DOB	Date of Birth
DoH	Department of Health
EPC	Enhanced Primary Care
FRE	Framingham Risk Equations
GP	General Practitioner
HDL	High-Density Lipoprotein
IBB	Instrumental Behavioural Belief
LDL	Low-Density Lipoprotein
MBS	Medicare Benefits Schedule
MCS	Monte-Carlo Simulation
MI	Myocardial Infarction
NB	Normative Belief
NHCDC	National Hospital Cost Data Collection
NHMD	National Hospital Morbidity Database
NHMS	National Health Measurement Survey
NHS health check	National Health Service health check
OR	Odds Ratio
PBC	Perceived Behavioural Control
PHC	Preventive Health Care
PHE	Periodic Health Examination

QALY	Quality Adjusted Life Year
QoL	Quality of Life
RACGP	Royal Australian College of General Practitioners
RCT	Randomized Controlled Trial
RR	Relative Risk
SA	Stable Angina
SBP	Systolic Blood Pressure
SD	Standard Deviation
SES	Socio-economic Status
SMR	Standard Mortality Rate
SN	Subjective Norm
TC	Total Cholesterol
TIA	Transient Ischemia Attack
TPB	Theory of Planned Behaviour
UA	Unstable Angina
WHO	World Health Organization

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