



Screening for abdominal aortic aneurysm – a pilot study in six medical schemes

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Objective. A pilot study to assess the feasibility and affordability of a targeted screening programme for abdominal aortic aneurysms in a group of employer-based medical schemes.

Design. Administrative database review and data extraction. Member enrolment by mail. Analysis using simple descriptive statistics. Review of international experience

Outcome measures. Screening uptake and findings, type and cost of interventions recommended by providers.

Results. Database review identified 2 187 age-eligible subjects (males between 60 and 65 years) who were advised to consult with their doctor/s if they had a history of smoking/and or cardiovascular disease. Two hundred and seven were referred for abdominal ultrasound screening, and aneurysms ≥ 3.0 cm were found in 11 (5.3%). Only 1 subject had an aneurysm of sufficient size to justify early surgical intervention, and which

resulted in the patient's death. Total cost of this pilot study approached R1 million. Analysis indicated that the sampling rate would have to be increased if such a programme were to be introduced as a routine medical benefit.

Conclusions. International experience has been that screening for abdominal aortic aneurysms reduces morbidity and mortality but at a significant cost. Opinion of the researchers and trustees of the participating medical schemes was that this cost would be beyond the means of schemes at this time. Screening programmes, particularly those that increase health care costs in the early phases by identifying subjects for costly interventions, are unlikely to enjoy support as long as the health funding environment maintains its focus on short-term costs and benefits.

S Afr Med J 2007; 97: 58-62.

The Medical Schemes Act and its Regulations¹ define managed health care as 'clinical and financial risk assessment and management of health care, with a view to facilitating appropriateness and cost effectiveness within the constraints of what is affordable, through the use of rules-based and clinical management-based programmes'. The Regulations¹ further indicate that such management should incorporate evidence-based medicine, defined as 'the conscientious, explicit and judicious use of current best evidence in making decisions about care of beneficiaries'. With these definitions in mind, health risk managers within Medscheme's Managed Care Division (subsequently known as Solutio Health Risk Management) introduced several preventive health programmes in 2003. The first two programmes were based on results of in-house research that showed an increased hip fracture risk in premenopausal women who had suffered minor fractures² and also in long-term users of corticosteroids.³

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These initiatives involved communication with identified high-risk members, and the recommendation that the possibility of fracture should be discussed with their health care provider/s. A third programme identified long-term users of anticoagulant therapy who were not submitting claims for monitoring of coagulation status, drew their attention to the clinical risks associated with over- or under-treatment, and recommended discussion of the situation with their managing doctor/s.

These programmes were generally appreciated by members of the participating medical schemes and by their doctors, and as a result, trustees of the schemes encouraged Medscheme to explore additional preventive health programmes that would benefit their members. Of several possibilities discussed, the one that captured the trustees' imagination was a screening programme for the presence of abdominal aortic aneurysm (AAA). Trustees had been drawn to this topic by media reports and corporate experiences of productive (often top-level) employees succumbing to rupture of a previously unrecognised aneurysm. Medscheme was therefore requested to review the literature and, if indicated, develop an evidence-based managed care pilot programme for the prevention of AAA-related morbidity and mortality. International literature emerging at the time was showing evidence of the cost effectiveness of mass screening, and the decision was taken to proceed with the pilot study after consultation with practising national experts in the fields of vascular surgery and radiology. Discussions took place with senior members of the Vascular and Radiological Societies, leading to the decision that the pilot study would focus on male subjects considered to be at



risk for AAA, i.e. over 60 years of age, current or ex-smokers, and with a history of hypertension and/or cardiovascular disease. Within the group of medical schemes administered by Medscheme, the pilot study was confined to six restricted (employer-based) medical schemes that had shown most interest in analysing the situation within their organisations.

Subjects and methods

While reported studies have included subjects as young as 50 years of age⁴ and as old as 80,⁵ the focus in the participating medical schemes was on preventing morbidity and mortality during later years of employment. Trustees and health risk managers therefore decided to selectively target men between the ages of 60 and 65 years. The participating medical schemes included three major manufacturing/production organisations, one construction company, a large retail sales and distribution network, and a major academic institution. Total membership for the schemes stood at 113 759 at the beginning of 2004 when the database was interrogated for eligible subjects.

The database search identified 2 187 age-eligible subjects who then received letters explaining what AAAs are, and indicating that even large aneurysms may be asymptomatic and undetected by patients and their doctors. The set of risk factors was also presented, and those who fulfilled the criteria for risk and who were not already being investigated or treated for AAA were invited to consult with their doctor for referral for abdominal ultrasound if deemed necessary. The Radiological Society had already advised its members of the study and requested that to contain costs, investigation should be confined to the abdominal ultrasound examination wherever possible. Onward referral to a vascular surgeon was requested in cases that required specialist opinion or follow-up, or in which surgery appeared to be necessary. As per the literature, aortic dilatation ≥ 3.0 cm was regarded as

being aneurysmal, with 3.0 - 4.5 cm considered small, 4.5 - 5.4 cm intermediate, and ≥ 5.5 cm large and probably in need of repair.⁶

The letter to targeted individuals included reply forms for radiologists and vascular surgeons. These forms captured the necessary provider and patient details and were returned to Medscheme by post, e-mail or fax. Radiologists and/or vascular surgeons were contacted if information was missing or patient follow-up was required. Analysis of the results involved simple descriptive statistics.

Results

Of the 2 187 beneficiaries who fell into the 60 - 65-year category (1.9% of participating scheme membership), 207 were referred for abdominal ultrasound (9.5% of those contacted). AAAs ≥ 3.0 cm were reported in 11 respondents (5.3% of those screened). Dilatation ≥ 3.0 cm was generally regarded by radiologists as being significant, although a small number in the 2.5 - 3.0 cm range were reported as being of concern and worthy of follow-up. Details of the aneurysms and associated ultrasound findings are given in Table I.

Early surgery was considered necessary in only 1 case of AAA, the rest being assigned to follow-up programmes according to the aortic diameter and estimated degree of risk. Unfortunately the case in which surgery was performed was found to be more serious and complicated than had appeared at the time of abdominal ultrasound. At operation the aneurysm was found to extend from the renal vessels to the aortic bifurcation, and the diameter was significantly larger than initially thought (7.5 cm rather than the report of 5.5 cm). Attempts at repair were followed by femoral artery thrombosis, limb amputation and renal failure, with the patient eventually succumbing. Total cost for the treatment of this patient at the

Table I. Study sample and results

Total membership of participating medical schemes (N)	113 759
Number eligible to receive letters (male, 60 - 65 years, active or past smoker, cardiovascular disease including hypertension, no known AAA)	2 187 (1.9% of membership of participating medical schemes)
Average age of group contacted	62.7 years
Number referred for screening	207 (9.5% of those contacted)
Number of aneurysms found	11 (5.3% of those screened)
Small	5
Intermediate	5
Large	1
Other pathology identified at time of screening:	73
Aorta tortuous/calcified/atheromatous	35
Renal cysts/calcification/hydronephrosis	12
Fatty liver/cysts/gallstones	19
Enlarged prostate	7



time of data collection was in excess of R350 000.

Taking the costs of the above case as well as those of data extraction and member communication (total \pm R17 500) and consultations, ultrasound examinations and referrals to vascular surgeons (total \pm R647 000), the approximate cost per contacted study subject was R450. As an annualised fee paid monthly by all members of the participating medical schemes, this translates to \pm R2 per member per month (pmpm). To these costs one would also have to add the cost of interventions for treatment of conditions found incidentally at the time of the AAA screen (e.g. cholecystectomy for gallstones) and the cost of follow-up and subsequent AAA-related surgery in the group. However, because this study only covered a 12 - 15-month period during which we made initial contact and then mainly recorded the presence or absence of aneurysms and any coexisting conditions, no other procedures were undertaken during the period of review. These important costs are therefore not included in this analysis.

For the most part, participants and their doctors were complimentary and appreciative of the trustees' interest and initiative in implementing this pilot study. Beneficiaries who screened negative were reassured by this knowledge, while those with an AAA were generally grateful for the warning and the chance to modify lifestyle in order to reduce cardiovascular risk. On the other hand, trustee and member perceptions of the programme were less positive in the case of the previously functional and apparently well individual who died following elective surgery. There were also concerns from some members above the 65-year age cut-off who, on hearing about the programme from colleagues, felt discriminated against and ignored by the medical scheme.

Discussion

Data produced over the past few years and summarised in Table II indicate that AAA affects between 4% and 8% of males over the age of 65 in a number of countries. Most AAAs are asymptomatic, but a percentage will dissect and/or rupture without warning. Less than 50% of patients with AAAs that rupture will reach hospital alive;⁷ emergency surgery in these patients not only costs \pm 70% more than elective surgery,⁸ but there is also an 8 - 10-fold increase in postoperative mortality risk.⁷ These statistics apply to the most severe cases of AAA; at the other extreme one has a majority of males who are either aneurysm-free or have aneurysms that will remain silent until death from other causes. Study data indicate that overall risk of rupture for AAAs picked up by screening is between 6% and 13% (Table II).

Large-scale randomised, controlled studies have been carried out to explore the cost effectiveness of abdominal ultrasound screening for AAA. Most of the studies have followed subjects for at least 4 - 5 years, while some have continued to report on outcomes for 10 - 13 years.^{4,8} In general, based on norms

such as overall reduction in AAA-related mortality, the cost of preventing one death or the cost per life-year gained, researchers and policy-makers have come out on the side of screening being cost effective, with increasing effectiveness demonstrated as the period of follow-up is extended.^{4,9} However it is important to appreciate that to save the lives of AAA victims, health care funders must be prepared for substantial increases in elective surgery rates. Several of the patients who undergo surgery would not otherwise have died an AAA-related death, while a small number would rupture anyway and not make it to hospital for treatment. Trustees of medical schemes that wish to introduce AAA screening therefore face a difficult decision, i.e. they must either load general membership with a contribution increase to cover a condition that affects < 5% of members, or they must cover the costs of the AAA screening programme by reallocating funds that are already being used to treat other (and more prevalent) conditions that affect this age group, e.g. coronary artery procedures and hip replacements. Our view is that in the medical schemes environment, if the health economic analyses had shown this to be a cost-minimising intervention then trustees would have no hesitation in proceeding with such a programme. However, as the health economic data have emerged, the cost implications are simply too great and AAA screening appears to be beyond the means of medical schemes at this time. In this pilot study the negative experience of an unexpected and costly death following elective surgery for an AAA only added to the sense that implementation of screening would be risky and not in the best interests of scheme reserves and solvency.

Based on the early results of screening studies that were emerging at the time of implementation of this pilot study, and in anticipation of fairly high costs of the AAA screening programme, we sought to reduce costs by studying only a sub-set of highest-risk members. Criteria for selection were discussed with practising experts in the fields of radiology and vascular surgery. By specifying multiple entry and eligibility criteria, others^{11,12} have demonstrated fairly good results (\pm 75% of aneurysms detected by selectively screening 20 - 50% of age-eligible subjects); however in our case we do not seem to have selected a sub-group with an AAA prevalence much higher than has been observed in large-scale screening studies from a number of countries (Table II). This implies either that the risk criteria lacked specificity or that members who went for screening did so because of a general interest in their health rather than concern about the presence of specific risk factors. Whatever the reason/s, the result is that to be effective in any future programme one would have to increase the numbers screened beyond the 9.5% screened in the pilot study. This would also add to the cost base, and this issue further discouraged trustees from implementing AAA screening as a routine benefit.



The third argument against future routine implementation of a screening programme for AAA arose out of the decision in the pilot phase to screen only within an age-eligible group (i.e. between 60 and 65). Trustees of employer-based medical schemes are always sensitive to negative perceptions, particularly if they come from senior employees within the organisation. As already stated, concerns were raised by some scheme members who were above the cut-off age of 65 and who resented the fact that they had not been included. Addressing this by extending the age limits for an AAA screening programme would again add to the cost and further reduce affordability.

The final issue as one explores the feasibility of a costly screening programme in the South African medical schemes industry relates to the nature of that environment. Clearly demonstrated by the longer-term follow-up studies of AAA screening is the increasing cost effectiveness over time,^{4,9} i.e. one spends the funds during the early post-screening phases and subsequently reaps the rewards of greater awareness and preventive interventions rather than costly emergency procedures for advanced catastrophic disease. However, medical schemes in South Africa typically have a short-term focus (often only 1 year) related to financial considerations, rather than a long-term perspective on the health status of their membership. Even with the reforms of the 1998 Medical

Table II. Summary of AAA screening data

Measures	Result	References
Number of subjects studied	4 404 - 67 800	4, 5, 7, 9
Age range of participants	50 - 83 years (mostly 65 - 75 years)	4, 5, 7, 9
Duration of follow-up	4 - 13 years (mostly ± 5 years)	4, 5, 7, 9
Prevalence of AAA	4 - 7.6%	4, 5, 6, 7, 9
Aneurysm diameter (cm)		
Small (3.0 - 4.4)	71%	6
Intermediate (4.5 - 5.4)	17%	
Large (≥ 5.5)	12%	
Aneurysm rupture risk (data mostly for ± 5 - year follow-up period)		
Small	3%	6
Intermediate	15%	
Large	65%	
Impact of AAA screening programmes		
Elective surgery rate	170 - 250% increase	7, 9, 10
Emergency surgery rate	50 - 75% decrease	7, 9
Rupture rate	49 - 55% decrease	4, 5
AAA-related death rate	42 - 75% decrease	4, 7, 9
Health economic analyses		
Number screened to prevent 1 death	325 - 710 (1 380 if screening from age 50)	4, 7, 9
Incremental costs (screening, follow-up, elective procedures)	176% increase	7
Cost per life-year gained	R300 000 plus at 5 years (converting US\$ and British £ to rands), decreasing to \pm R100 000 by 10 years	7, 9



Schemes Act that re-introduced minimum benefits and community-rating (everyone on the same benefit package pays the same rate, regardless of age or state of health), funders have competed for younger and healthier members. This strategy gives a lower community rate, and assists medical schemes in attracting members in the highly competitive open scheme environment in which brokers actively move members from one scheme to another. This short-termism permeates the entire private health care funding industry, as even employer-based schemes need to remain competitive against the much larger and aggressive open schemes. If they do not then brokers are more able to persuade union membership and other employees to move to an open scheme. The Risk Equalisation Fund (REF)¹ due to be implemented between medical schemes by the Department of Health in 2007 will reduce competition based on the selection of good risks. Medical schemes will pay equally into the REF according to beneficiary numbers, but will receive amounts according to the age and disease profile of their membership. The most successful schemes in future will be those that can most efficiently deliver health care to their members. However it will also be necessary to limit the turnover of members between medical schemes and to provide an enabling environment in which scheme trustees can make decisions based on the long-term health of their members. Only then will programmes that identify clinical risk and treat the conditions early make financial as well as clinical sense to the funders.

Conclusions

While literature published over the past 4 - 5 years has shown that screening for AAA significantly reduces AAA-related morbidity and mortality, this comes at a considerable cost which, at this time, would probably be unaffordable for most

medical schemes in South Africa. Perhaps a more important issue is that of the short-term orientation of health care funders. As long as attention is on short-term financial results rather than the long-term health of membership, programmes such as AAA screening are unlikely to receive much attention from medical schemes. The role of the REF in incentivising funders to consider cost-effective delivery of health care will help to alter the balance in favour of preventive care, but turnover of members between medical schemes will also need to be addressed.

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Accepted 25 October 2006.

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