



Leiden University
Medical Center

Time to move on, we should start treating the AAA patient rather than the aneurysm

Jan Lindeman MD, PhD



Concept NICE guidelines: Systematic review of survival following open or endovascular repair

Cohort studies

García-Madrid *et al.*³⁷

Diehm *et al.*³⁸

Lee *et al.*⁴⁶

Chahwan *et al.*⁴⁸

Sugimoto *et al.*⁵⁰

Mazzaccaro *et al.*⁵³

Huang *et al.*⁵⁴

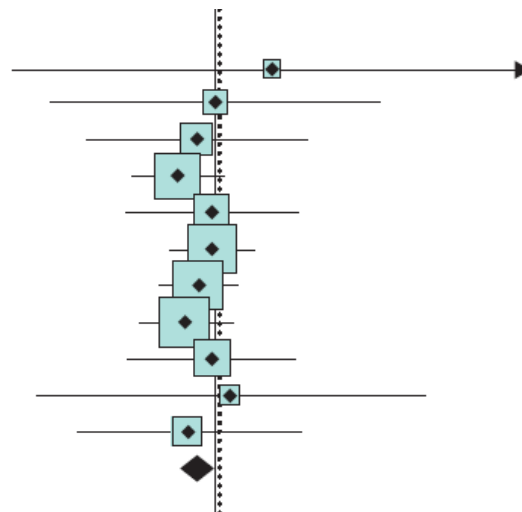
Lee *et al.*⁵⁵

Majd *et al.*⁵⁶

Arko *et al.*⁵⁷

Majd *et al.*⁶⁶

Subtotal ($I^2=0\%$, $P=0.995$)



1.22 (0.50, 2.98)

0.51

1.00 (0.57, 1.76)

1.19

0.94 (0.64, 1.37)

2.27

0.88 (0.75, 1.03)

5.96

0.99 (0.74, 1.33)

3.23

0.99 (0.86, 1.14)

6.34

0.94 (0.82, 1.08)

6.56

0.90 (0.77, 1.05)

5.95

0.99 (0.74, 1.32)

3.33

1.05 (0.54, 2.06)

0.88

0.91 (0.62, 1.34)

2.23

0.94 (0.88, 1.00)

38.45

Observational studies: confounding by indication

Table I. Baseline characteristics and unadjusted outcomes by aneurysm status

Variable ^a	iAAA (n = 4966)		
	Primary cases		<i>P</i> value
	EVAR (n = 3493)	OAR (n = 1457)	
Patient age, years	74 (69-79)	71 (66-76)	<.001
Octogenarians	858 (24.6)	154 (10.6)	<.001

Beherendt, J Vasc Surg 2017;66:1704-11

Relative survival

Epidemiological tool: based on the quotient of observed vs. expected survival (for a sex, age, period and area matched population)

- Addresses systematic differences in age between groups,
- Allows quantification of the impact of a disease/condition.

Table 1 Relative survival ratios (observed : expected survival) for endovascular and open surgical repair of intact abdominal aortic aneurysms			
	Relative survival ratio		
	3 years	5 years	10 years
EVAR	0.94 (0.92, 0.96)	0.91 (0.87, 0.94)	0.76 (0.67, 0.86)
OSR	0.96 (0.95, 0.98)	0.91 (0.88, 0.94)	0.76 (0.69, 0.85)

Values in parentheses are 95 per cent confidence intervals. EVAR, endovascular aneurysm repair; OSR, open surgical repair.

“Early” repairs



Full population including
those considered not
eligible for repair or in
whom AAA repair is
considered futile



	Small AAA (<5.5 cm)	Small AAA (<5.5 cm)	AAA (>5.5 cm)
Follow up	Intervention [95% CI] N=18,500	Surveillance [95% CI] N=1,864	Intervention [95% CI] N=131,925
1 year	0.97 [0.96 – 0.97]	1.00 [1.00 – 1.00]	-
3 years	0.97 [0.96 – 0.97]	0.98 [0.96 – 0.99]	0.94 [0.94 – 0.95]
5 years	0.84 [0.79 – 0.90]	0.70 [0.60 – 0.82]	0.90 [0.88 – 0.91]
10 years	0.62 [0.49 – 0.80]	0.65 [0.62 – 0.68]	0.76 [0.71 – 0.82]

Reference population = 1

Systematic Review data: by definition retrospective data

- Impact of recent changes in policies (shift towards EVAR-first; cardiovascular risk management) not adequately addressed
- Most papers included in the systematic review report aggregated data (information regarding sex and age differences missing)

National Swedish Registry Data

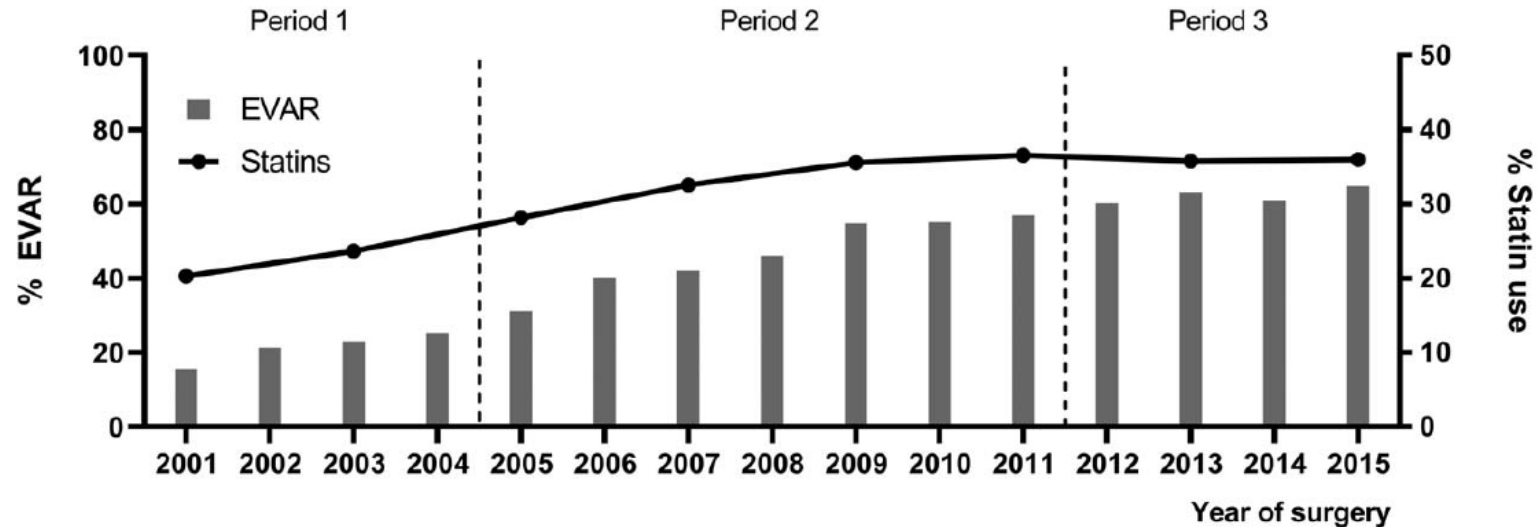
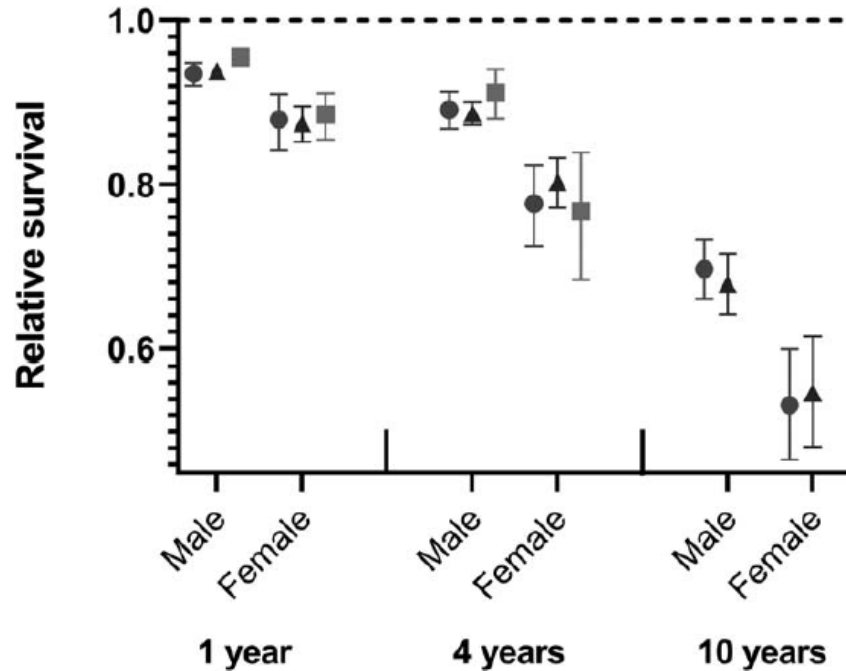


FIGURE 1. Developments in AAA management between 2001 and 2015. Percentage of EVAR procedures for patients with AAA repair and statin use for the general Swedish population. Percentage of open repair = 100% - percentage of EVAR. AAA indicates abdominal aortic aneurysm; EVAR, endovascular aneurysm repair.

National Swedish Registry Data



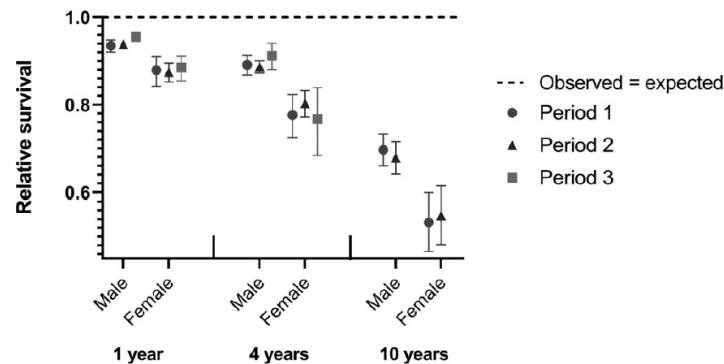
	Small AAA (<5.5 cm)	Small AAA (<5.5 cm)	AAA (>5.5 cm)
Follow up	Intervention [95% CI] N=18,500	Surveillance [95% CI] N=1,864	Intervention [95% CI] N=131,925
1 year	0.97 [0.96 – 0.97]	1.00 [1.00 – 1.00]	-
3 years	0.97 [0.96 – 0.97]	0.98 [0.96 – 0.99]	0.94 [0.94 – 0.95]
5 years	0.84 [0.79 – 0.90]	0.70 [0.60 – 0.82]	0.90 [0.88 – 0.91]
10 years	0.62 [0.49 – 0.80]	0.65 [0.62 – 0.68]	0.76 [0.71 – 0.82]

Bulder RMA et al. Ann Surg 2020; 272: 773-778

National Swedish Registry Data

Standardized Excess Mortality

5-years mortality	Males			Females		
Age (years)	<70	70-79	80+	<70	70-79	80+
N (number of AAA patients at risk)	3332	3691	1917	584	1042	785
Observed mortality in the AAA population (n)	545	1258	1245	109	426	521
Expected (population) mortality* (n)	216	617	707	23	108	199
Excess Mortality Rate for AAA patients	2.52	2,04	1,76	4,74	3,76	2,62



The actual time-bomb in AAA patients ticks.....

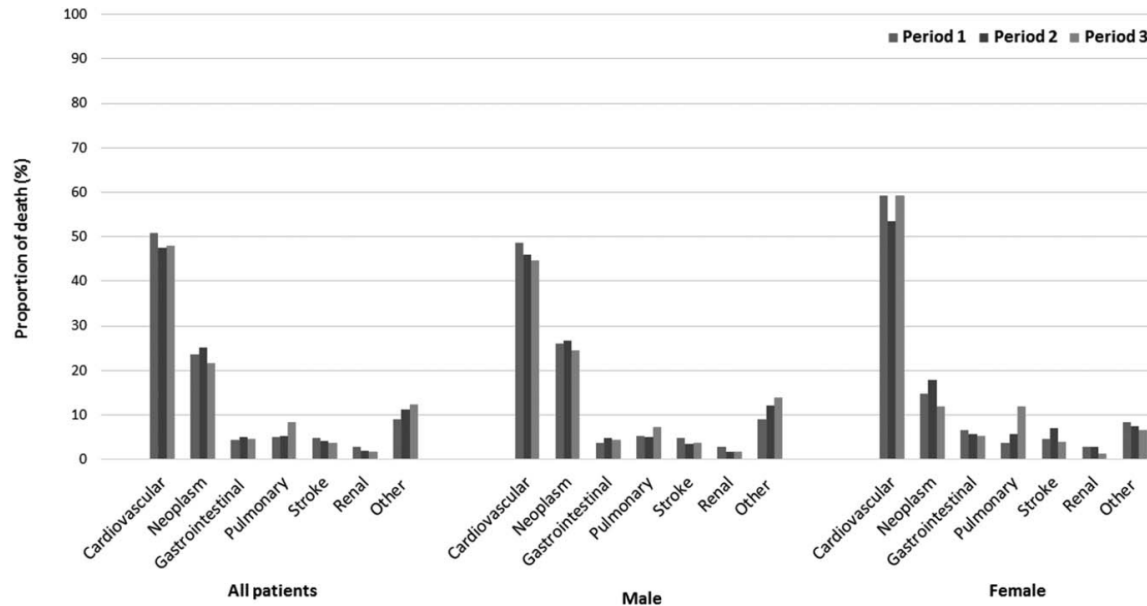
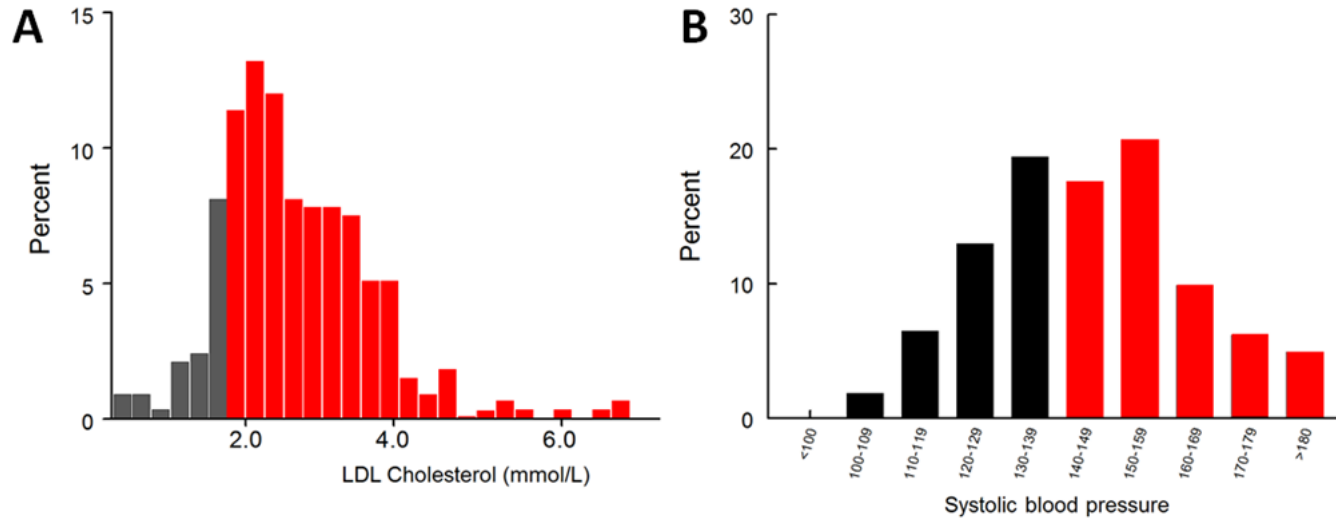


FIGURE 3. Long-term causes of death (proportions), including all patients who died after 90 d and within 4 yr after elective infrarenal AAA repair. AAA indicates abdominal aortic aneurysm.

The actual time-bomb in AAA patients ticks.....



Where is the bomb squad.....

Conclusions:

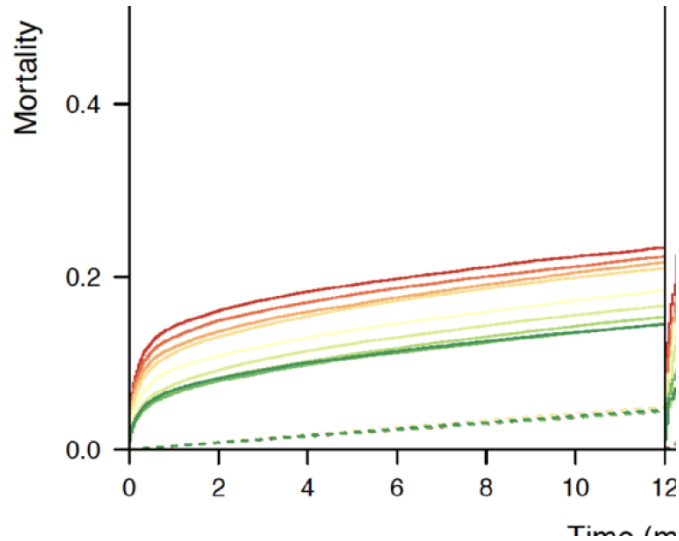
- An AAA identifies patients with an extremely compromised life-expectancy
- Essentially related to an increased cardiovascular risk
- No apparent long-term survival benefit of the changes in surgical and medical management over the past two decades.
- Inadequate CVD management in the majority of patients, but

The elephant in the room:

Cardiovascular risk management and overall survival.....

The elephant in the room:

Cardiovascular risk management and overall survival.....



Szumner, Circ Cardiovasc Qual Outcomes. 2019;12:e005879

Primary outcome measures: The average postponement of death as represented by the area between the survival curves.

Results: 6 studies for primary prevention and 5 for secondary prevention with a follow-up between 2.0 and 6.1 years were identified. Death was postponed between -5 and 19 days in primary prevention trials and between -10 and 27 days in secondary prevention trials. The median postponement of death for primary and secondary prevention trials were 3.2 and 4.1 days, respectively.

Kristensen, BMJopen 2015; 5:e007118

Conclusions:

- An AAA identifies patients with an extremely compromised life-expectancy
- Essentially related to an increased cardiovascular risk
- No apparent long-term survival benefit of the changes in surgical and medical management over the past two decades.
- But inadequate CVD management in the majority of patients, but CVD management has very limited effects on overall survival....

AAA: the challenges remain!!!

Acknowledgements

Ruth Bulder

Stephanie Tomee

Rebecka Hultgren and Mareia Talvitie

Participants and collaborators in the PHAST and TEDY trials (Jon Golledge)

Esther Bastiaannet (UZH Zurich)

