EPH135

Sex-stratified differences in cardiac interventions, complications and outcomes in the Netherlands between 2018 and 2023

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BACKGROUND

- Globally, sex disparities exist in the clinical presentation, prevalence, management, outcomes, and risk factors for cardiovascular diseases. Females often receive less intensive screening, are prescribed fewer treatments, and are less likely to undergo cardiac procedures as compared to males, all of which may lead to poorer outcomes.[1]
- Despite significant progress in implementing recommended care management strategies in primary and secondary care, there is limited research examining sex differences across aspects of cardiovascular disease prevention, treatments and outcomes.[2] Understanding sex-related differences is crucial for tailoring prevention strategies, diagnostic approaches, and treatments to optimize cardiac care.
- The PHARMO Data Network is a Dutch population-based network of electronic health care databases containing data from primary and secondary care settings and linked to national disease registries.[3] Exploration is ongoing to assess the linkage between the PHARMO Data Network and the Netherlands Heart Registration (NHR), which could provide deeper insights in the study of cardiovascular conditions.

OBJECTIVES

- Our aim was to describe the rate of observed complications and mortality, by sex and age, among patients receiving cardiovascular interventions in the Netherlands.

METHODS

- Data on heart and vascular figures in the Netherlands from 2018 – 2023 were extracted from the Hart & Vaatcifers analysis tool.[4] The underlying data comes from the NHR, which facilitates national registrations in collaboration with healthcare professionals and patient organizations to monitor and enhance cardiac care quality.
- Descriptive statistics were reported on complications and outcomes among patients receiving key cardiovascular interventions (see **Table 1**). Annual incidence of complications and outcomes were stratified by sex and age, as available.

Table 1. Summary of reported complications and outcomes, by intervention

Intervention	Complications	Outcomes
Cardiac ablation	Bleeding complication within 30 days, cardiac tamponade within 30 days, vascular complications within 30 days	*Not reported*
Cardiac surgery (CABG, AVR, CABG + AVR, isolated mitral valve surgery)	*Not reported*	30-day mortality, 1-year mortality
Pacemaker and ICD	Complication requiring intervention within 90 days, bleeding complication during admission, pneumothorax during admission	30-day mortality
PCI	*Not reported*	30-day mortality, 1-year mortality
TAVI	Cerebrovascular accident with residual injury with 30 days, implantation of a new permanent pacemaker within 30 days	30-day mortality

RESULTS

Overall, the rates of complications and mortality due to the intervention varied by sex and age.

Table 2. Total number of patients receiving cardiac intervention, by sex

	Cardiac ablation (N,%)	Cardiac surgery (N, %)	Pacemaker and ICD (N,%)	PCI (N,%)	TAVI (N,%)
Male	22,177 (66.1)	43,637 (77.3)	69,875 (63.9)	161,876 (72.8)	9,171 (55.9)
Female	11,276 (33.9)	12,810 (22.7)	39,326 (36.1)	59,963 (27.2)	7,112 (44.1)
TOTAL	**33,444**	**56,477**	**109,212**	**222,086**	**16,283**

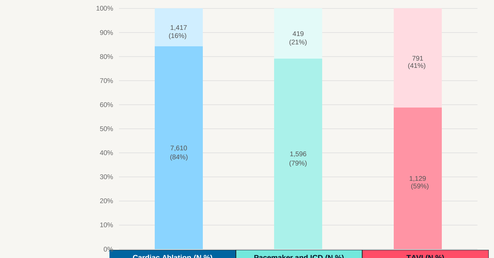
Table 3: Total number of patients receiving cardiac intervention, by age

Cardiac ablation		Pacemaker and ICD		PCI		TAVI	
Age	**(N,%)**	**Age**	**(N,%)**	**Age**	**(N,%)**	**Age**	**(N,%)**
18-64	17,718 (53)	**18-60**	12,155 (13)	**18-49**	15,736 (7)	**18-74**	3,278 (22)
65-74	12,656 (38)	**60-79**	50,208 (54)	**50-59**	44,105 (21)	**75-84**	8,288 (55)
≥75	3070 (9)	**≥80**	31,350 (33)	**60-69**	55,455 (26)	**≥85**	3,518 (23)
				70-79	67,125 (31)		
				≥80	31,673 (15)		

- Cardiac ablation is most performed in patients aged 18-64 (53%), whereas pacemaker and implantable cardioverter-defibrillator (ICD) interventions are most frequently performed in patients aged 65-74 (54%).
- PCI intervention and TAVI interventions are most frequently performed in patients >60 (75%).

Complications

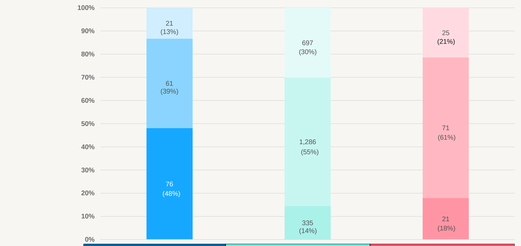
Figure 1. Sex distribution of patients with complications, following cardiac intervention



		Cardiac Ablation (N,%)	Pacemaker and ICD (N,%)	TAVI (N,%)
Male	Complication	7,610 (34.3)	1,596 (2.3)	1,129 (12.3)
	No complication	14,567 (65.7)	68,279 (97.7)	8,042 (87.7)
	Subtotal	**22,177 (100.0)**	**69,875 (100.0)**	**9,171 (100.0)**
Female	Complication	1,147 (12.6)	419 (1.1)	791 (11.1)
	No complication	9,850 (87.4)	38,907 (98.9)	6,321 (88.9)
	Subtotal	**11,267 (100.0)**	**39,326 (100.0)**	**7,112 (100.0)**

- For males undergoing cardiac ablation, 34.3% experienced complications within 30 days, compared to 12.6% of females.
- For pacemaker & ICD and PCI, rates of complication are reported low, for both female and males.

Figure 2. Age distribution of patients with complications, following cardiac intervention

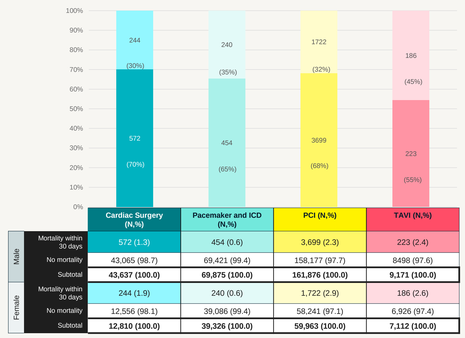


Cardiac Ablation		Pacemaker and ICD		TAVI	
Age group	**N (%)**	**Age group**	**N (%)**	**Age group**	**N (%)**
Complication	76 (0.4)		335 (2.8)		21 (0.6)
No complication	18-65 20,758 (99.6)	18-60	11,820 (97.2)	18-74	3,257 (99.4)
Sub-total	**20,834 (100.0)**		**12,155 (100.0)**		**3,278 (100.0)**
Complication	61 (0.3)		1,286 (2.6)		71 (0.9)
No-complication	65-74 22,869 (99.7)	60-79	48,922 (97.4)	75-84	8,217 (99.1)
Subtotal	**22,930 (100.0)**		**50,208 (100.0)**		**8,288 (100.0)**
Complication	21 (0.02)		697(2.2)		25 (0.7)
No-complication	<75 12,622 (99.8)	>80	30,653 (97.8)	>84	3,493 (99.3)
Subtotal	**12,643 (100.0)**		**31,350 (100.0)**		**3,518 (100.0)**

- Complication rate by intervention varied by age group.
- Cardiac ablation and pacemaker and ICD intervention showing the highest rate of complication for patients under 65, whereas TAVI shows the highest proportion of patients with complication aged 75-84.
- Across all age groups and interventions, patients <75 receiving cardiac ablation reported the lowest rate of complications following intervention at 0.02%.

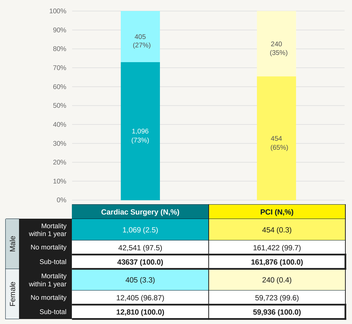
Mortality

Figure 3. Sex distribution of patients with mortality within 30 days of cardiac intervention



		Cardiac Surgery (N,%)	Pacemaker and ICD (N,%)	PCI (N,%)	TAVI (N,%)
Male	Mortality within 30 days	572 (1.3)	454 (0.6)	3,699 (2.3)	223 (2.4)
	No mortality	43,065 (98.7)	69,421 (99.4)	158,177 (97.7)	8498 (97.6)
	Subtotal	**43,637 (100.0)**	**69,875 (100.0)**	**161,876 (100.0)**	**9,171 (100.0)**
Female	Mortality within 30 days	244 (1.9)	240 (0.6)	1,722 (2.9)	186 (2.6)
	No mortality	12,556 (98.1)	39,086 (99.4)	58,241 (97.1)	6,926 (97.4)
	Subtotal	**12,810 (100.0)**	**39,326 (100.0)**	**59,963 (100.0)**	**7,112 (100.0)**

Figure 4. Sex distribution of patients with mortality within 1 year of cardiac intervention



		Cardiac Surgery (N,%)	PCI (N,%)
Male	Mortality within 1 year	1,069 (2.5)	454 (0.3)
	No mortality	42,541 (97.5)	161,422 (99.7)
	Sub-total	**43637 (100.0)**	**161,876 (100.0)**
Female	Mortality within 1 year	405 (3.3)	240 (0.4)
	No mortality	12,405 (96.87)	59,723 (99.6)
	Sub-total	**12,810 (100.0)**	**59,936 (100.0)**

- We observed low rates of 30-day mortality across all cardiac interventions for both males and females. For males undergoing cardiac surgery, mortality rate was 1.3% compared to 1.9% in females.
- Pacemaker and ICD intervention showed similar rate of 30-day mortality across sex, at 0.65% for male and 0.60% for female, a similar trend was seen for TAVI.
- PCI intervention showed a higher rate of 30-day mortality for females at 2.8%, compared to 1.6% in males.
- One-year mortality rates for cardiac surgery, were reported similarly across sex, with 2.5% of males (total N=43,637) dying within 1 year compared to 3.1% (N=405) of females (total N=12,810).
- A similar trend was seen with PCI intervention with 4.3% of males (N=161,876) dying in within 1 year compared to 5.1% of females.

Key: AVR: isolated aortic valve replacement; CABG: coronary artery bypass grafting; ICD: Implantable Cardioverter-Defibrillator; PCI: Percutaneous Coronary Intervention; TAVI; Transcatheter aortic valve implantation

CONCLUSIONS

- Despite males receiving higher number of cardiac intervention overall, similar rates of complications and mortality were reported across cardiac interventions between sex.
- Complication rate by intervention varied by age group, with younger adults (18-65) reporting more complications for cardiac ablation and pacemaker and ICD intervention, in contrast older adults reporting more complications following TAVI intervention.
- Further research, including adjustment for confounders, is needed to understand sex and age disparities. Richer clinical data – via linkages to the PHARMO Data Network – would allow for more complex analysis to be performed, including longer patient follow-up, comparative analysis, and associations between sex and age and complications and mortality.

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An electronic version of the poster can be viewed by scanning the QR code.