Achieving gender equality at the professional and patients level in invasive cardiology

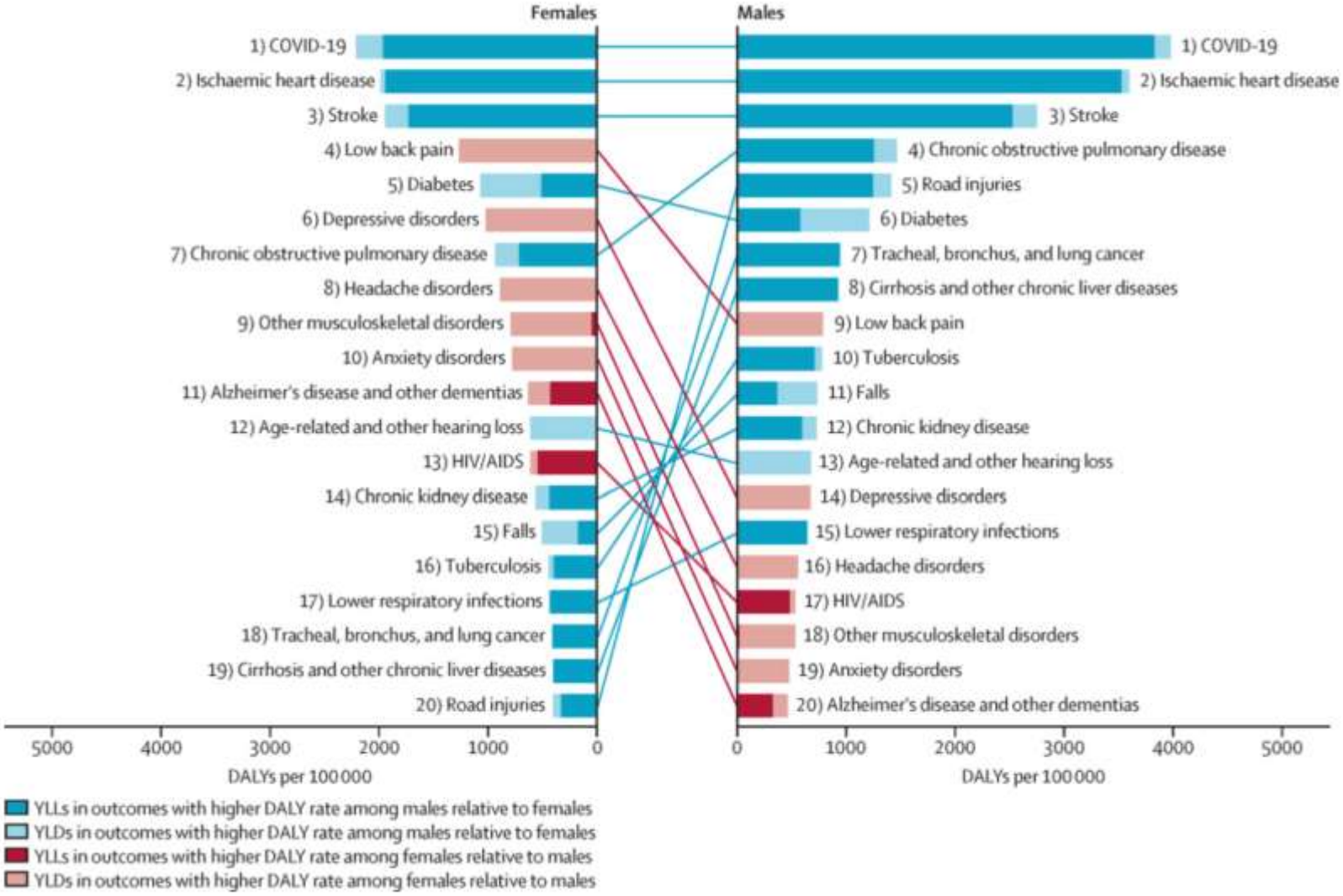
Marta Kaluzna-Oleksy
1st Department of Cardiology Uniersity of Medical Sciences in Poznan, Poland

EAPCI Gender and Disparities Committee

EAPCI
European Society of Cardiology

Patients

Differences across the lifespan between females and males in the top 20 causes of disease burden globally: a systematic analysis of the Global Burden of Disease Study 2021



Lancet Public Health 2024;9: e282–94

Global Burden of Cardiovascular Diseases and Risks, 1990-2022

George A. Mensah, MD,[a] Valentin Fuster, MD, PhD,[b,c] Christopher J.L. Murray, MD, DPhil,[d]
Gregory A. Roth, MD, MPH,[d,e] the Global Burden of Cardiovascular Diseases and Risks Collaborators*

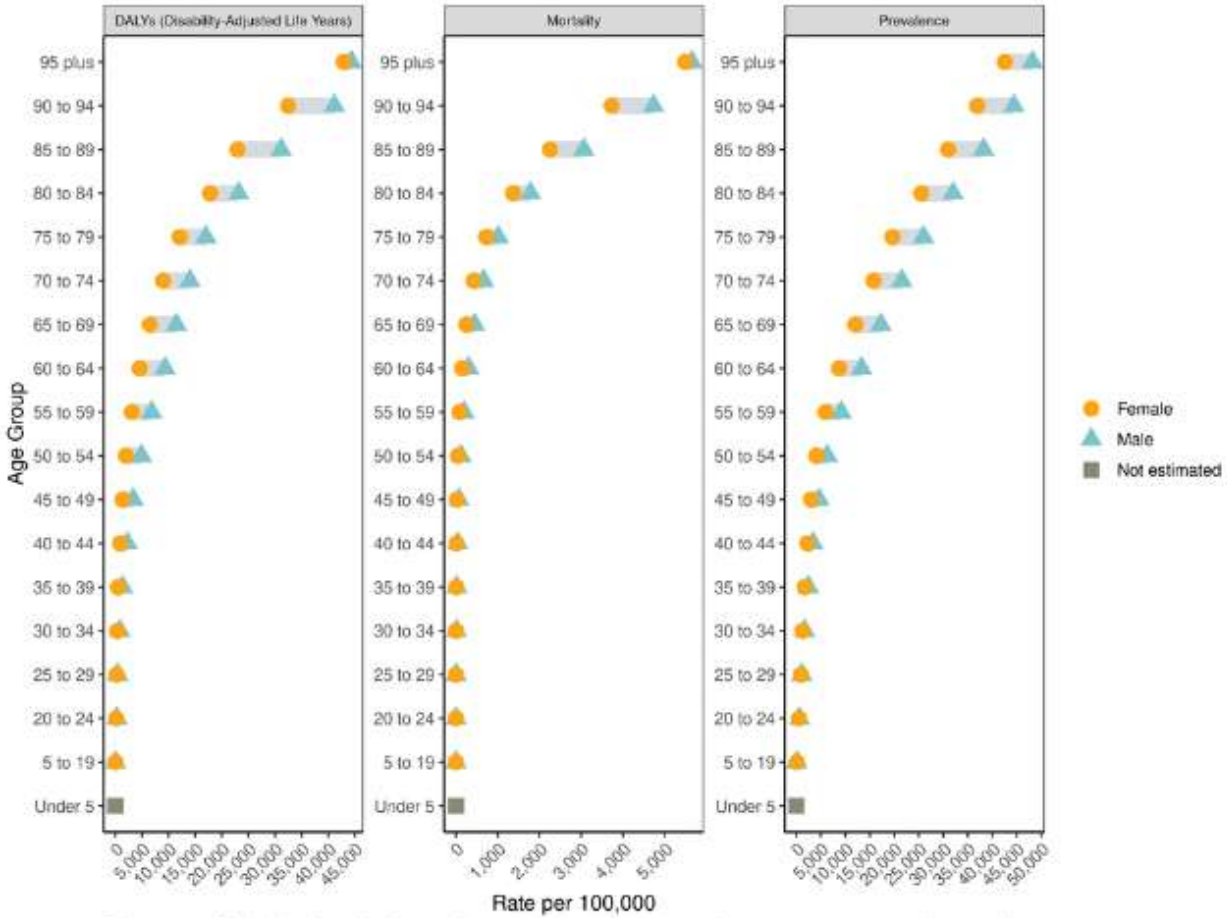


Figure 4. Global ischemic heart disease age-specific estimates per 100,000 by sex in 2022, difference in sex estimates indicated by gray bar

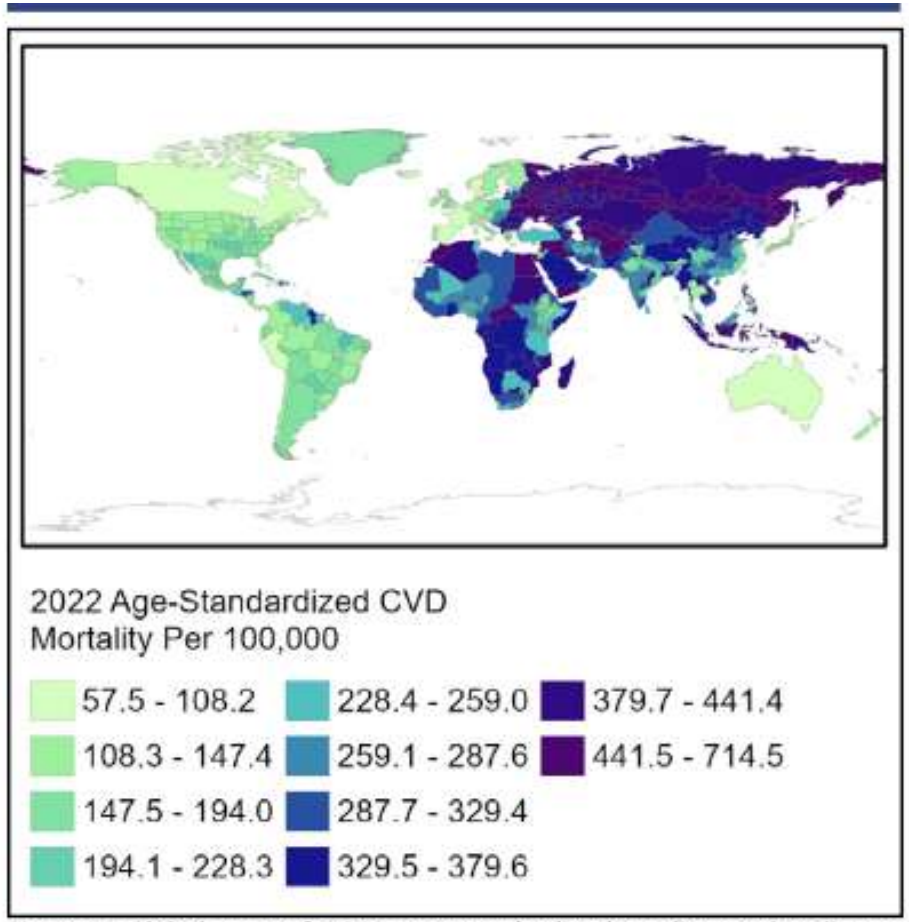


Figure 1. Global map of 2022 age-standardized cardiovascular disease mortality rate per 100,000 with quantile classification

JOURNAL OF THE AMERICAN COLLEGE OF CARDIOLOGY VOL. 75, NO. 14, 2020

PUBLISHED BY ELSEVIER

Long-Term Outcomes in Women and Men Following Percutaneous Coronary Intervention

Ioanna Kosmidou, MD, PhD,[a,b] Martin B. Leon, MD,[a,b] Yiran Zhang, MS,[a] Patrick W. Serruys, MD, PhD,[c,d] Clemens von Birgelen, MD,[e,f] Pieter C. Smits, MD,[g] Ori Ben-Yehuda, MD,[a,b] Björn Redfors, MD, PhD,[a,h,h] Mahesh V. Madhavan, MD,[a,h] Akiko Maehara, MD,[a,b] Roxana Mehran, MD,[a,i] Gregg W. Stone, MD[a,j]

ABSTRACT

BACKGROUND Studies examining sex-related outcomes following percutaneous coronary intervention (PCI) have reported conflicting results.

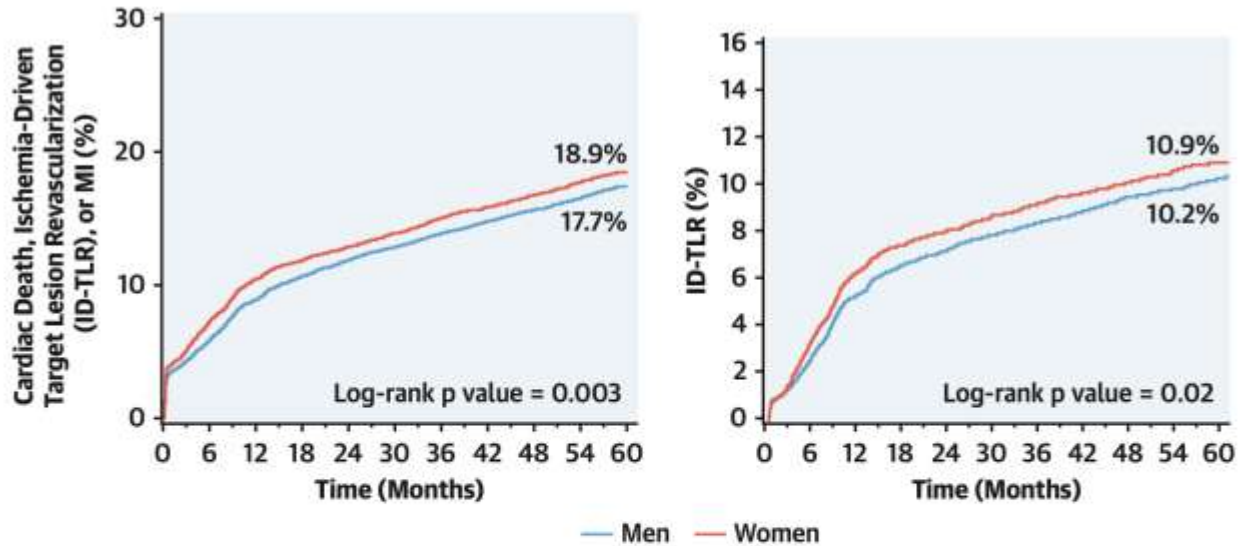
OBJECTIVES The purpose of this study was to examine the sex-related risk of 5-year cardiovascular outcomes after PCI.

METHODS The authors pooled patient-level data from 21 randomized PCI trials and assessed the association between sex and major adverse cardiac events (MACE) (cardiac death, myocardial infarction [MI], or ischemia-driven target lesion revascularization [ID-TLR]) as well as its individual components at 5 years.

RESULTS Among 32,877 patients, 9,141 (27.8%) were women. Women were older and had higher body mass index, more frequent hypertension and diabetes, and less frequent history of surgical or percutaneous revascularization compared with men. By angiographic core laboratory analysis, lesions in women had smaller reference vessel diameter and shorter lesion length. At 5 years, women had a higher unadjusted rate of MACE (18.9% vs. 17.7%; p = 0.003), all-cause death (10.4% vs. 8.7%; p = 0.0008), cardiac death (4.9% vs. 4.0%; p = 0.003) and ID-TLR (10.9% vs. 10.2%; p = 0.02) compared with men. By multivariable analysis, female sex was an independent predictor of MACE (hazard ratio [HR:]: 1.14; 95% confidence interval [CI:]: 1.01 to 1.30; p = 0.04) and ID-TLR (HR: 1.23; 95% CI: 1.05 to 1.44; p = 0.009) but not all-cause death (HR: 0.91; 95% CI: 0.75 to 1.09; p = 0.30) or cardiac death (HR: 0.97; 95% CI: 0.73 to 1.29; p = 0.85).

CONCLUSIONS In the present large-scale, individual patient data pooled analysis of contemporary PCI trials, women had a higher risk of MACE and ID-TLR compared with men at 5 years following PCI. (J Am Coll Cardiol 2020;75:1631-40)

CENTRAL ILLUSTRATION Percutaneous Coronary Interventions and Sex-Related Outcomes at 5 Years



	Women Events/Total	Women KM Rate	Men Events/Total	Men KM Rate	HR (95% CI)	p Value
Cardiac Death, ID-TLR, or MI	1,428/9,141	18.9%	3,388/23,736	17.7%	1.14 (1.01 to 1.30)	0.04
ID-TLR	823/9,141	10.9%	1,946/23,736	10.2%	1.23 (1.05 to 1.44)	0.009

Kosmidou, I. et al. J Am Coll Cardiol. 2020;75(14):1631–40.

Operative Outcomes of Women Undergoing Coronary Artery Bypass Surgery in the US, 2011 to 2020

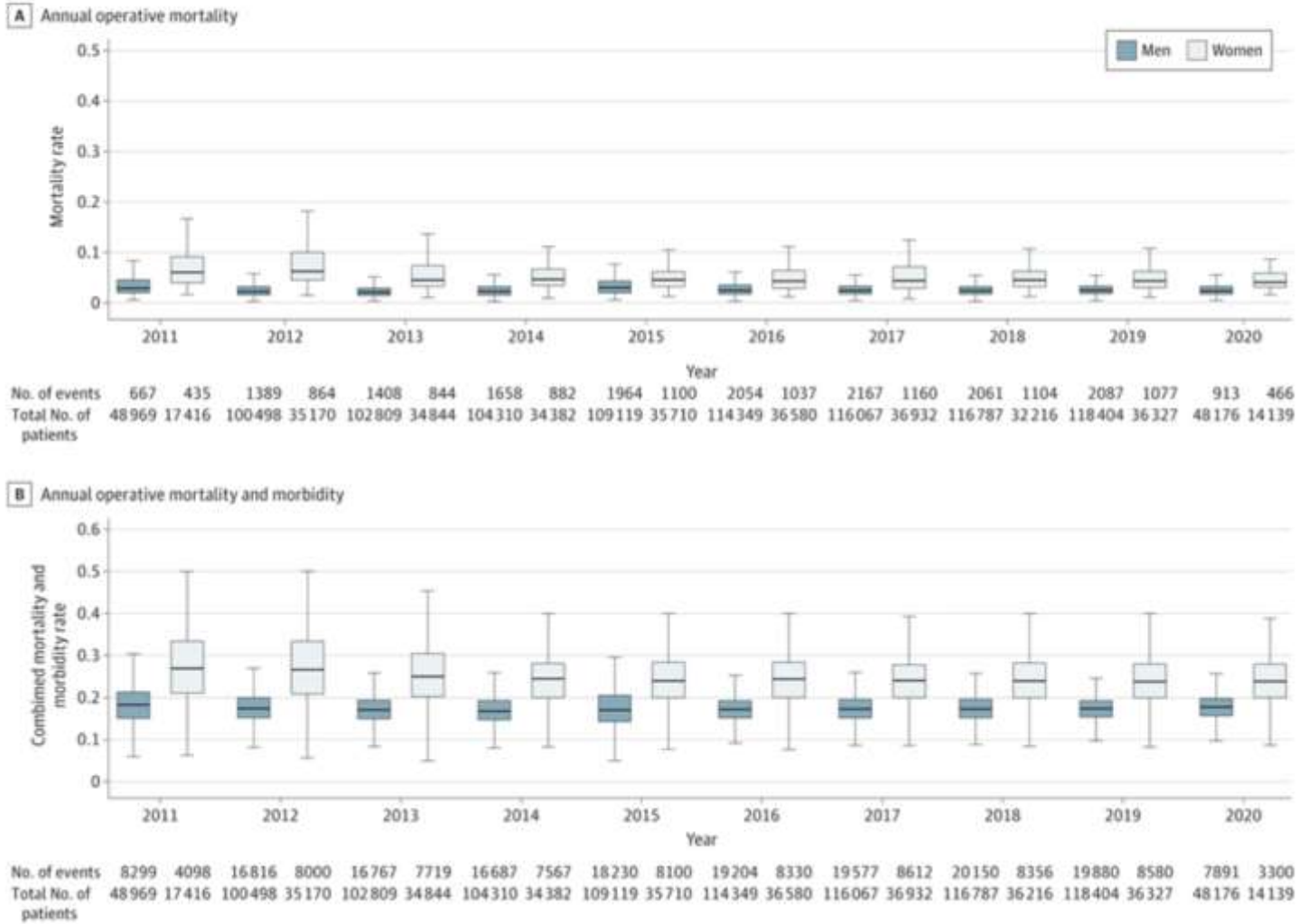
Mario Gaudino, MD, PhD, MSCE[1]; David Chadow, MD[1]; Mohamed Rahouma, MD[1]; et al

Author Affiliations | Article Information

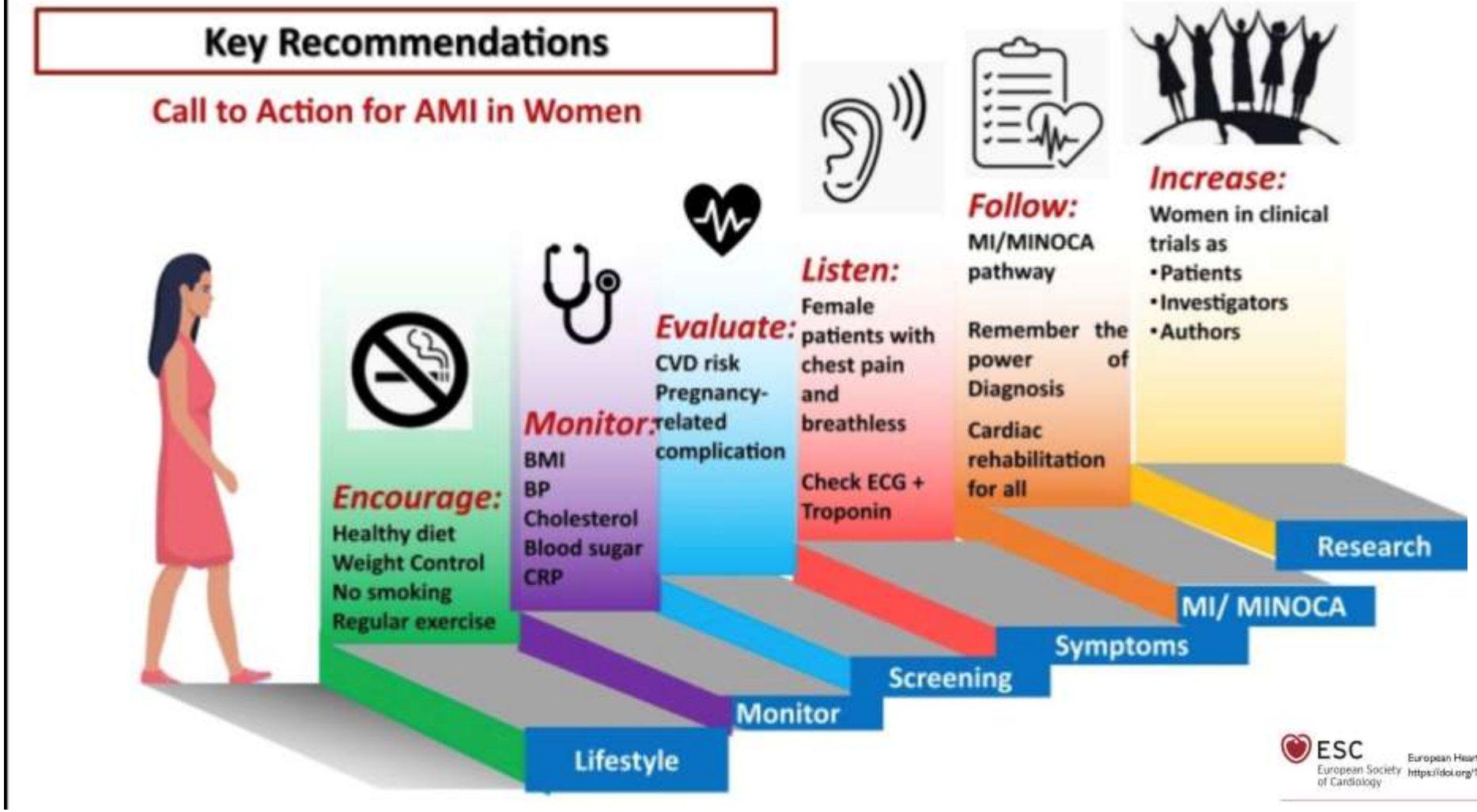
JAMA Surg. 2023;158(5):494-502. doi:10.1001/jamasurg.2022.8156

Conclusions and Relevance Women remain at significantly higher risk for adverse outcomes following coronary artery bypass grafting and no significant improvement has been seen over the course of the last decade. Further investigation into the determinants of operative outcomes in women is urgently needed.

Figure 1. Annual Operative Mortality by Sex and Annual Operative Mortality and Morbidity by Sex




Delays in Pathways of AMI Care for Women
Primary Care Physicians
Failure to diagnose and act on ECGs in women
Patients
Women take longer calling for help
Paramedic Assessment
Women are less likely to receive emergency transfer than men
ED Assessment
Women face delays in triage and delays in AMI care
Cardiologist- PPCI
Less likely to proceed to PPCI
Less likely to receive aspirin, statin or betablockers than male patients
In-Hospital Care
Women are less likely to be on guideline-directed medical therapy across all ages, particularly those younger than 55 years
Rehabilitation Care
Women are less likely be referred for rehabilitation care post AMI and less likely to complete the program

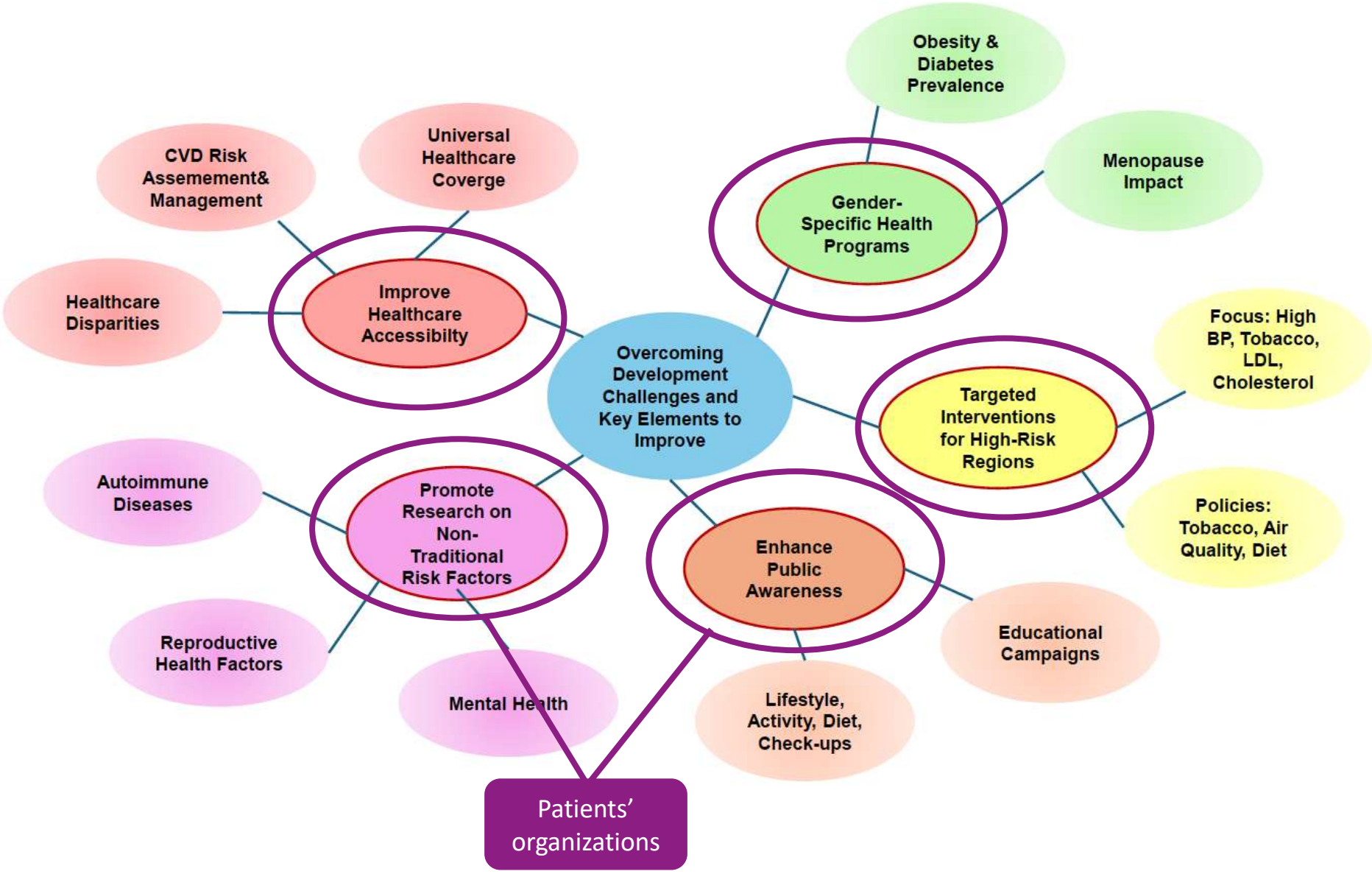


ESC European Society of Cardiology
European Heart Journal Open (2024) 4, oeae087
https://doi.org/10.1093/ehjopen/oeae087
REVIEW
Coronary artery disease

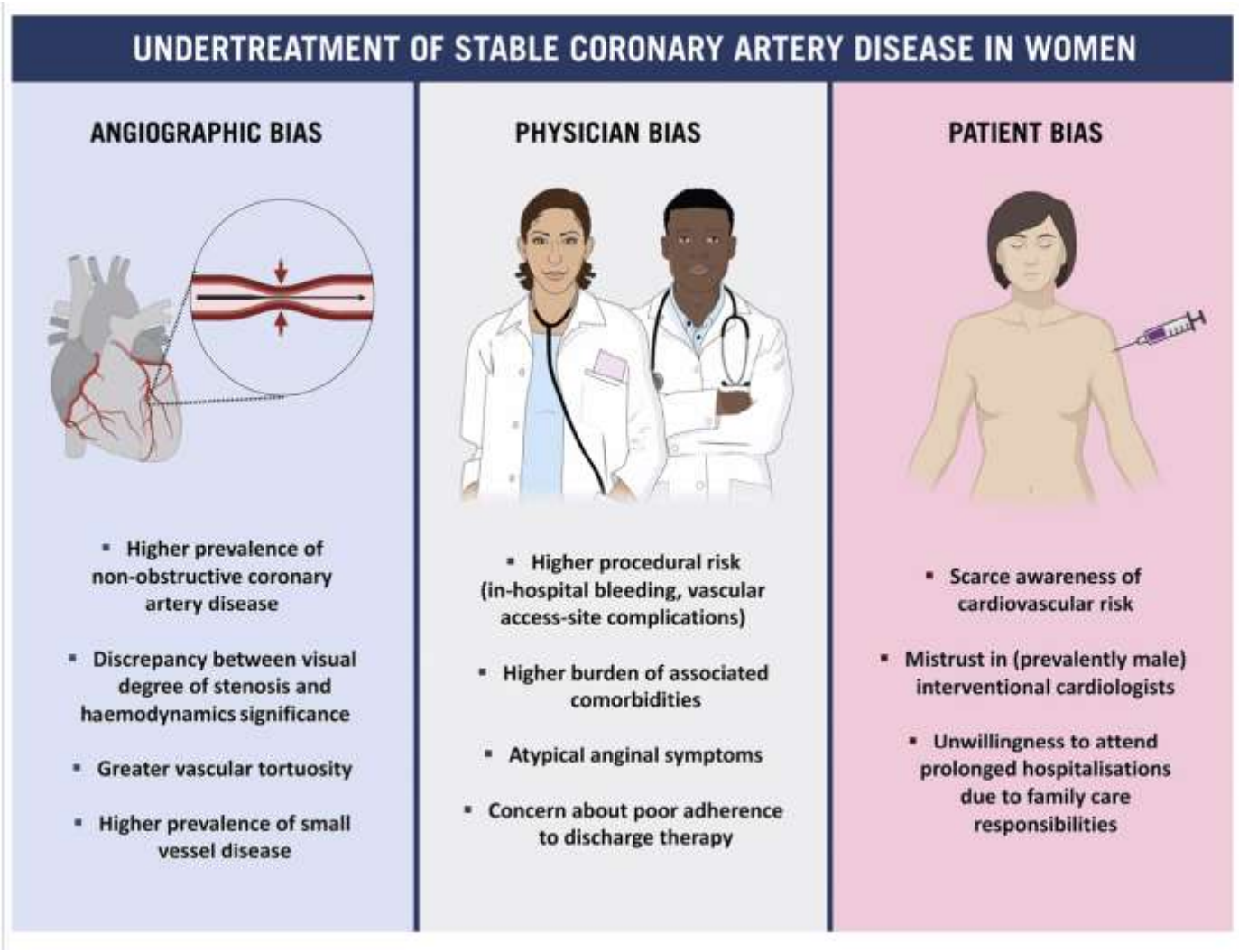
Call to action for acute myocardial infarction in women: international multi-disciplinary practical roadmap

Stephane Manzo-Silberman[1,2,*], Michal Hawranek[3], Shrilla Banerjee[4], Marta Kaluzna-Oleksy[5], Mirvat Alasnag[6], Valeria Paradies[7], Biljana Parapid[8,9], Pierre Sabouret[10], Agnieszka Wolczenko[11,12], Vijay Kunadian[13], Izabella Uchmanowicz[14], Jacky Nizard[1,15], Martine Gilard[16], Roxana Mehran[17], and Alaide Chieffo[18,19]

Healthcare providers as a link between different needs of female patients



Causes underlying the undertreatment of women with stable coronary artery diseas



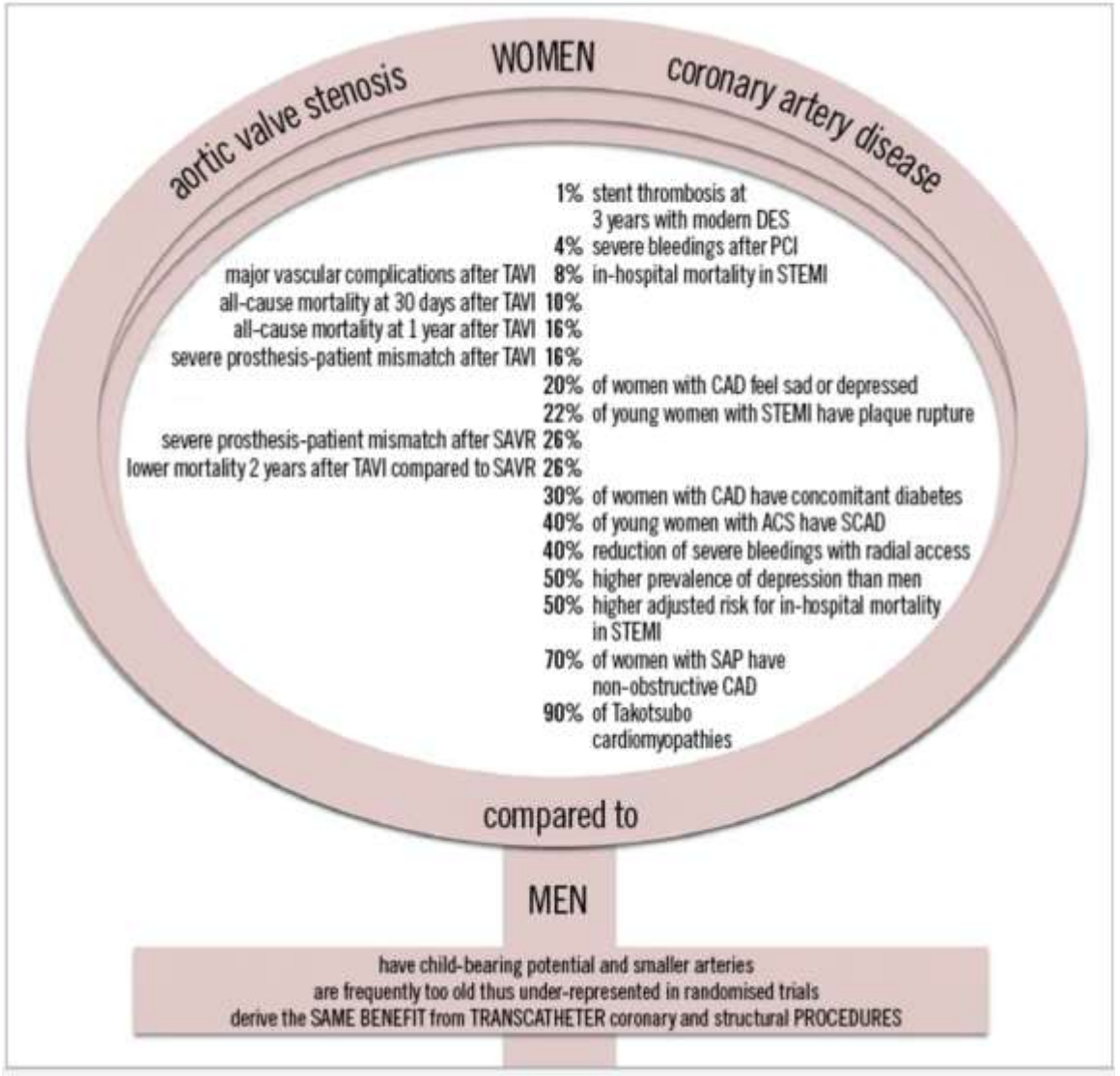
EuroIntervention 516 *2024;20:515-517, Roxana Mehran et al.*

Percutaneous coronary and structural interventions in women: a position statement from the EAPCI Women Committee

Possible differences in optimal management of ACS depending on the underlying plaque pathology
Determining sex-specific cut-off values for functional relevance of CAD against the background of pronounced microvascular dysfunction amongst women
Understanding of sex-specific outcomes to allow individualised revascularisation strategies in those with complex coronary artery disease
Understanding sex differences in outcomes following TAVI for aortic stenosis

What could be done to improve outcomes in women?

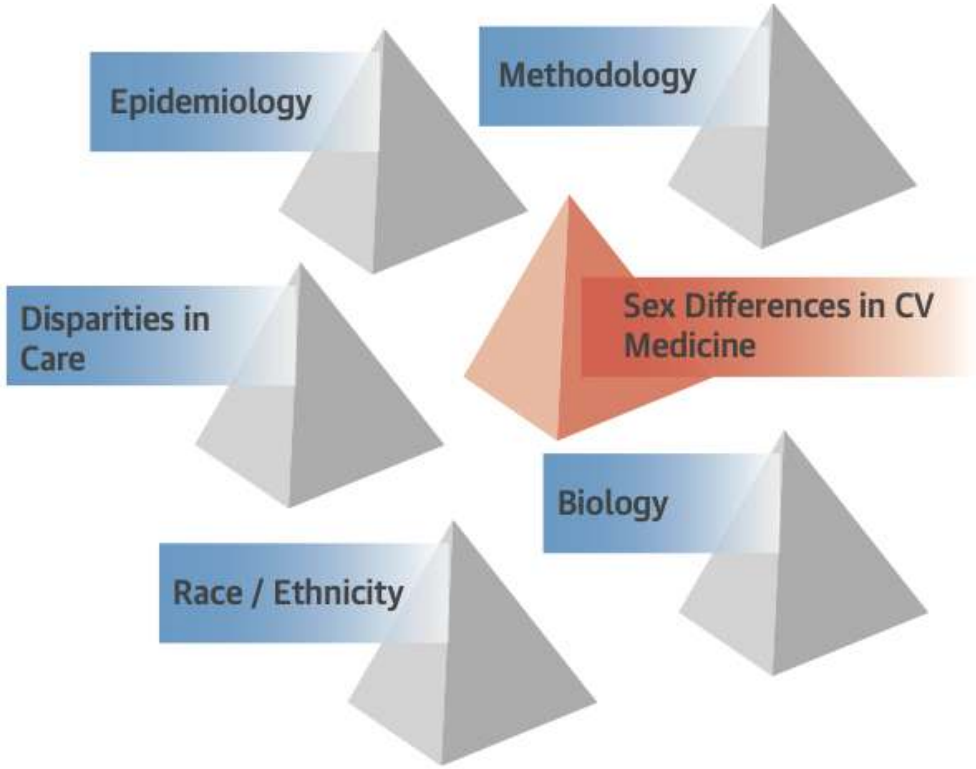
Larger use of adjunctive imaging tools to assist decision making in women
Sex-specific studies in STEMI patients to assess factors potentially driving mortality differences between sexes
Sex-specific studies in complex coronary artery disease to improve outcomes in the large and growing population of women
Future research in disease mechanisms specific to each sex in those with aortic stenosis and left atrial abnormalities allowing potential individualised interventions



DOI: 10.4244/EIJ-D-18-00225

Quality and Equitable Health Care Gaps for Women

Understanding Sex and Gender Differences Requires Novel Methodologic Approaches That Consider Disparities in Care, as Well as Epidemiological and Statistical Limitations Within the Comparative Subgroup of Women Versus Men



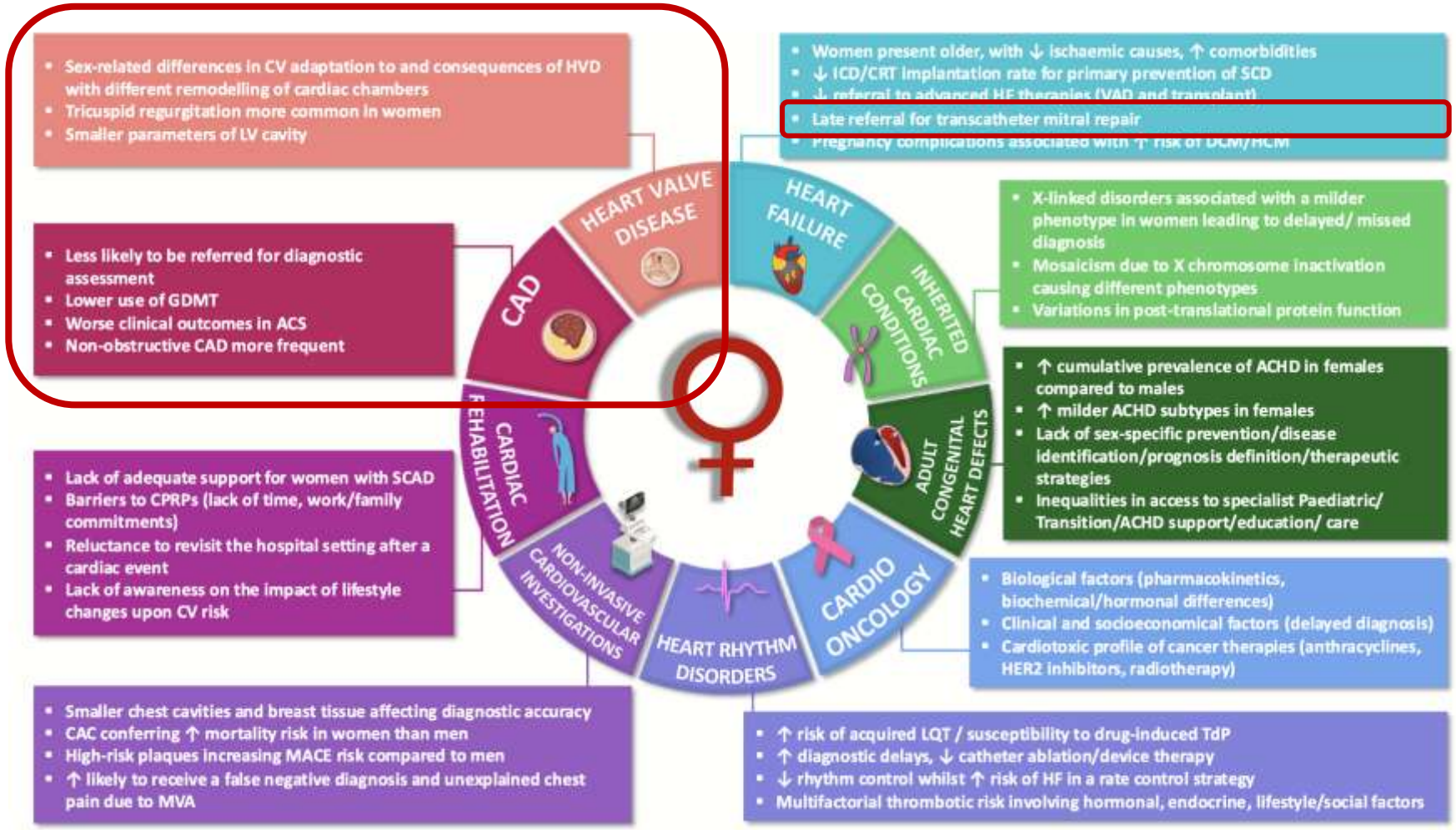
Novel Analytical Approaches
- Statistical Modeling
- Comparative Effectiveness
- Adherence to Guideline-Directed Care

Epidemiology
- Population Health & Implementation Science
- Traditional + Novel Biomarkers
- Racial and Ethnic Differences in CV Risk Factor Prevalence and Clinical Outcomes

Disparities
- Inequity of Care Related to Access, Adequacy of Insurance, Financial Hurdles Across Diverse Racial and Ethnic Female Subgroups

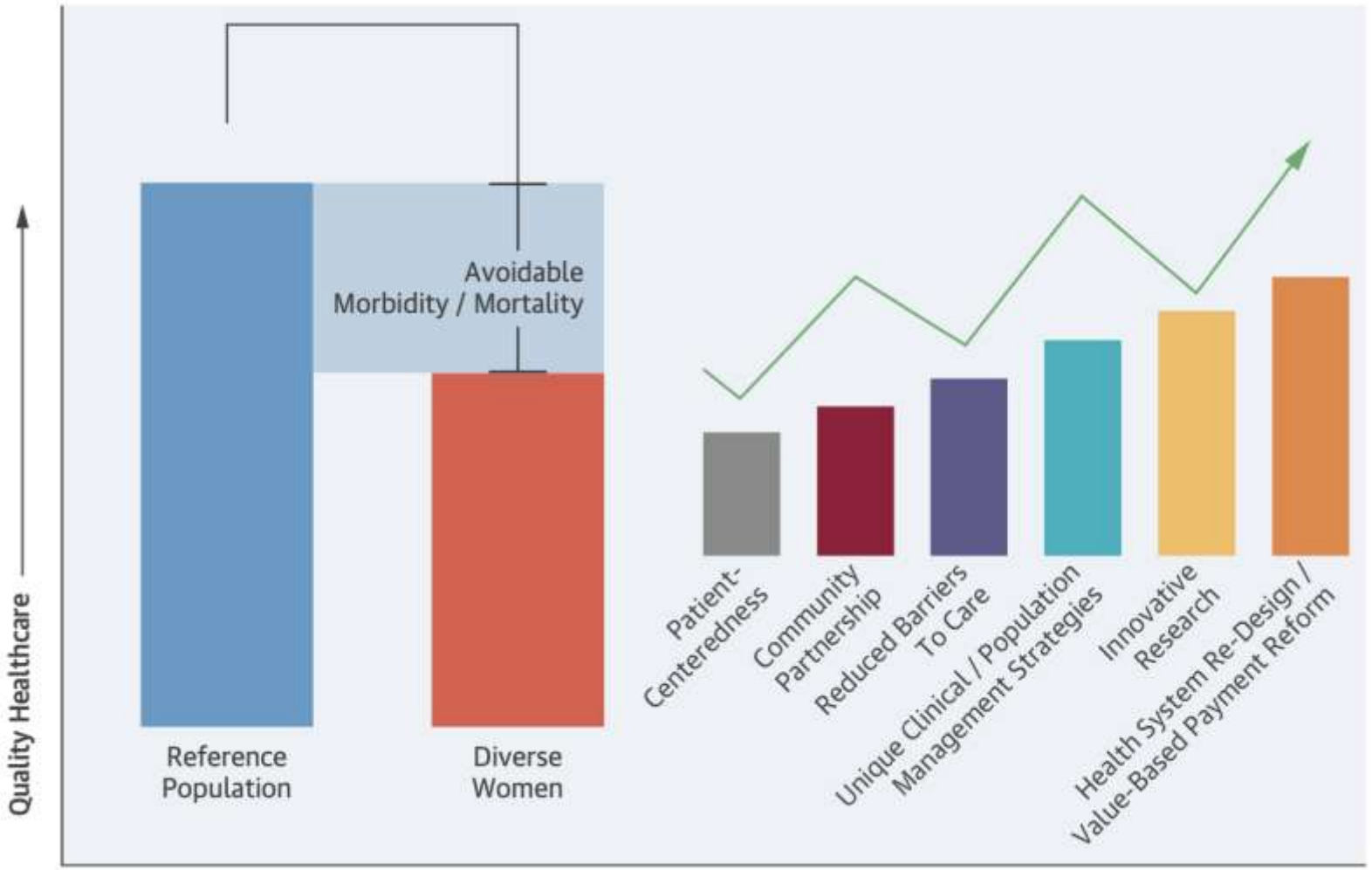
Shaw, L.J. et al. J Am Coll Cardiol. 2017;70(3):373–88.

Main factors contributing to sex differences across different subareas of cardiovascular disease



Tayal U, et al. Heart 2024;110:e4. doi:10.1136/heartjnl-2024-324625

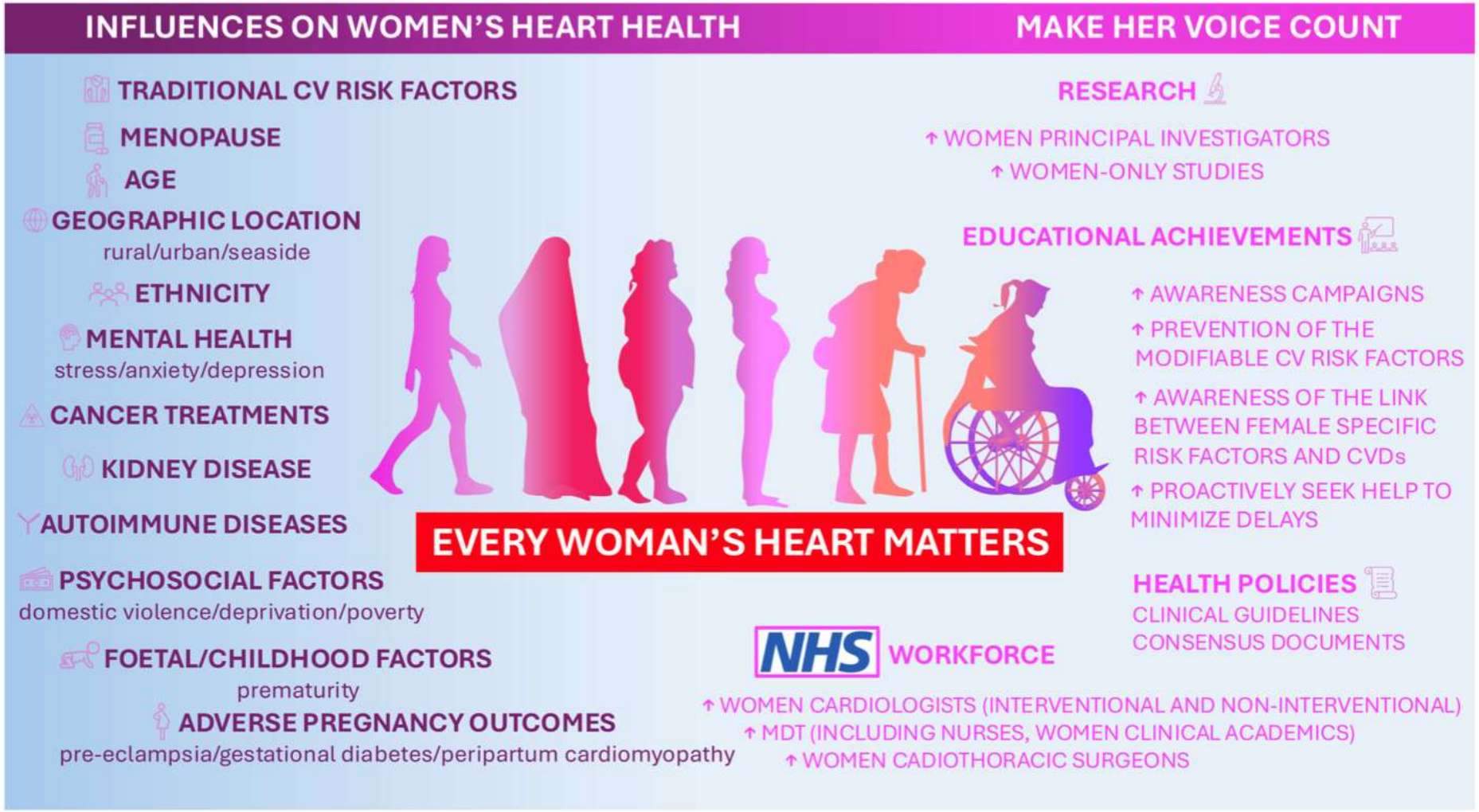
Achieving Equity in Quality of Care for Women



Shaw, L.J. et al. J Am Coll Cardiol. 2017;70(3):373–88.

Shaw, L.J. et al. J Am Coll Cardiol. 2017;70(3):373–88.

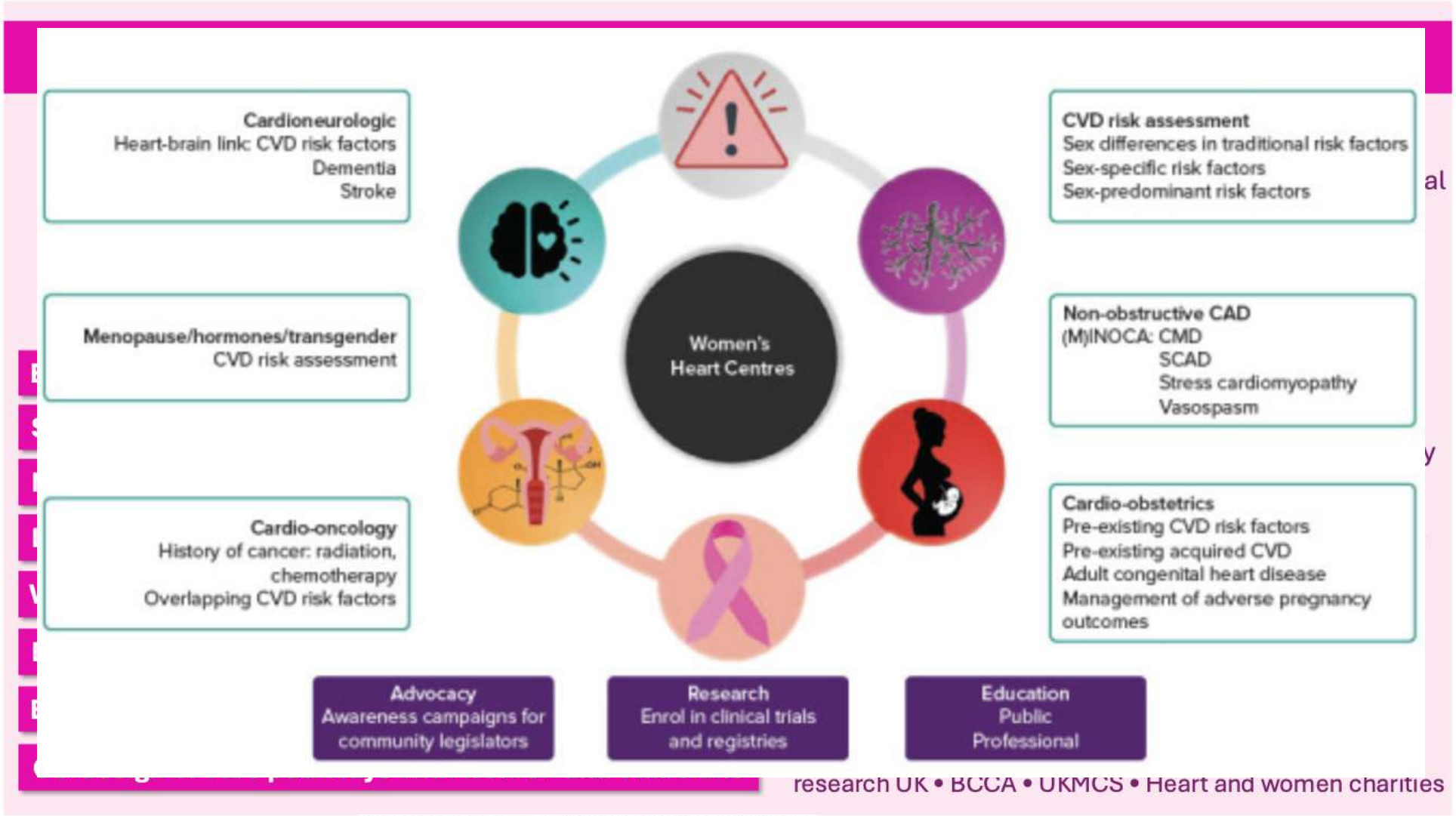
Factors influencing women's heart health and strategies to overcome sex disparities in cardiovascular care



Tayal U, et al. Heart 2024;110:e4. doi:10.1136/heartjnl-2024-324625

Advancing the access to cardiovascular diagnosis and treatment among women with cardiovascular disease: a joint British Cardiovascular Societies' consensus document

Specialised centers for Women's Hearts?



research UK • BCCA • UKMCS • Heart and women charities

Why We Need Specialised Centres for Women's Hearts: Changing the Face of Cardiovascular Care for Women

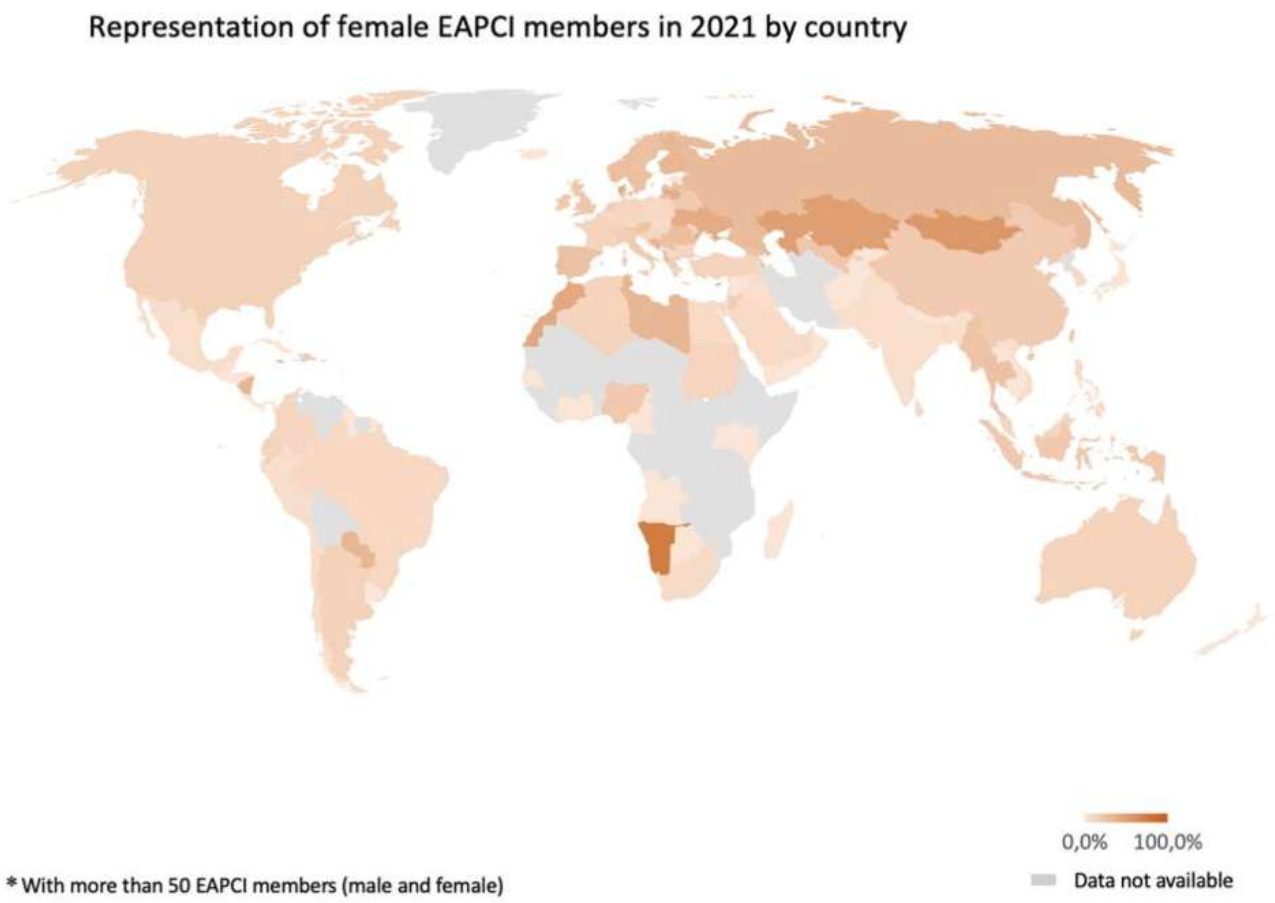
Martha Gulati, Cara Hendry, Biljana Parapid and Sharon L Mulvagh

Tayal U, et al. Heart 2024;110:e4. doi:10.1136/heartjnl-2024-324625

British Cardiovascular Society

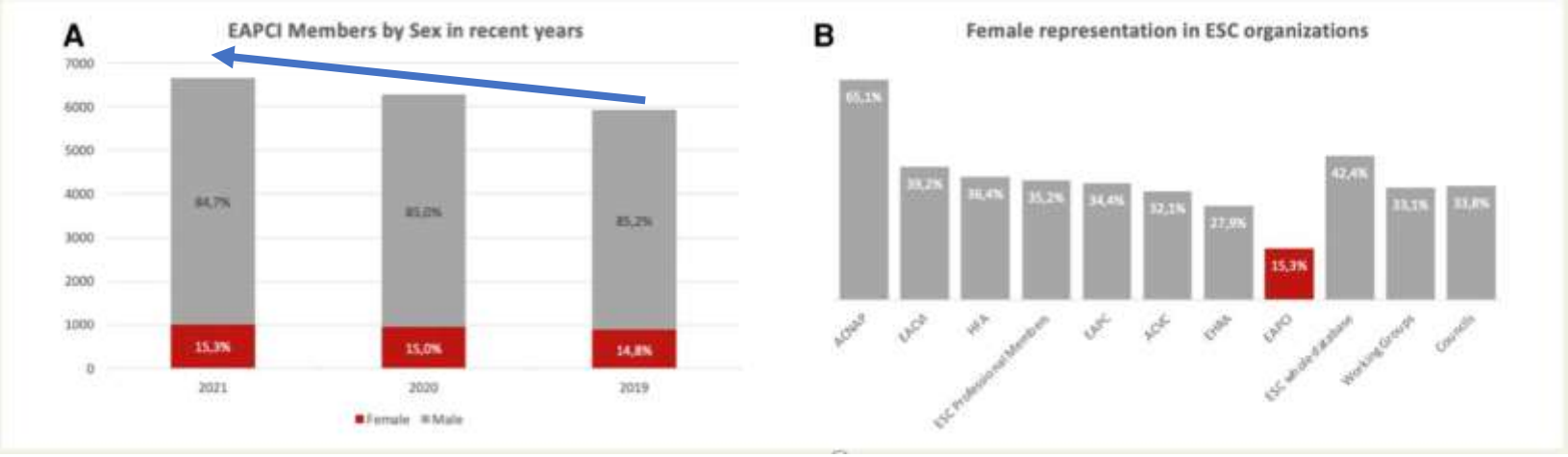
Representation of female EAPCI members in 2021 by country

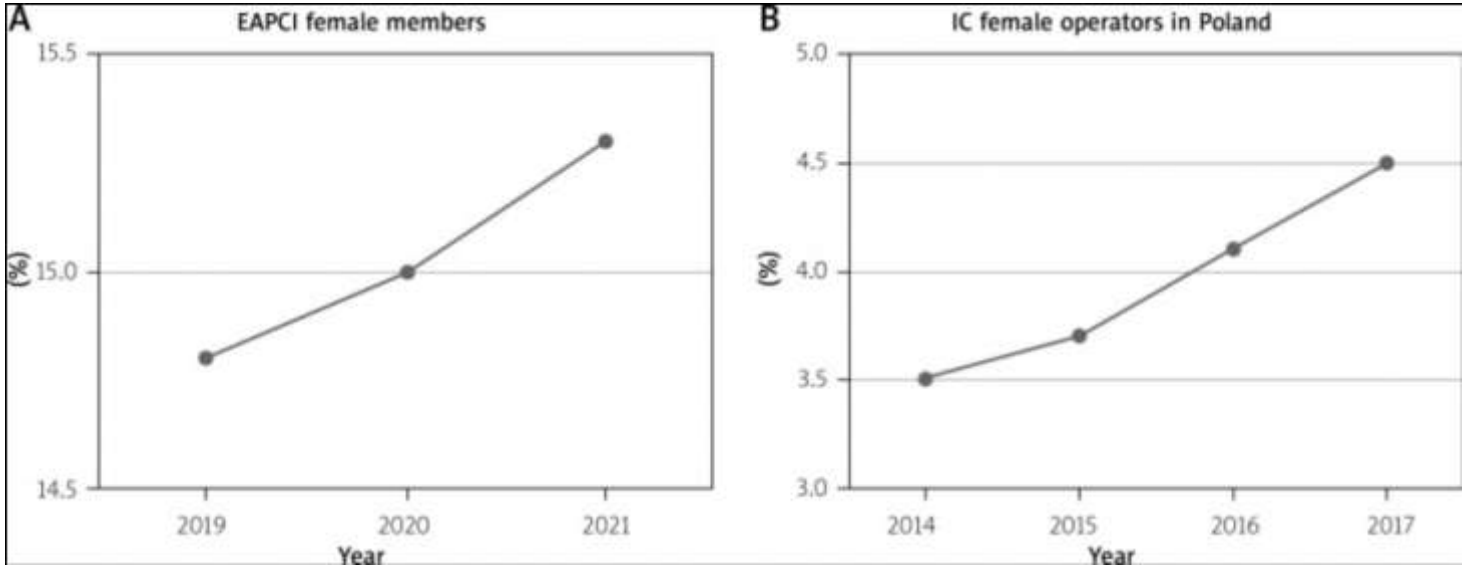
Country*	%
Austria	24,7
Australia	12,5
Belgium	7,8
Brazil	9,5
Bulgaria	11,8
Czech republic	9,3
Croatia	10,0
Denmark	38,2
Egypt	7,8
Finland	33,3
France	13,0
Germany	11,1
Greece	16,8
Hungary	9,1
Italy	17,3
India	4,4
Indonesia	19,8
Ireland	19,4
Lithuania	40,0
Malaysia	10,7
Mexico	5,1
Netherlands	18,3
Norway	28,1
Pakistan	6,0
Poland	9,5
Portugal	28,3
Romania	28,1
Russia federation	30,1
Saudi Arabia	7,8
Serbia	25,5
Spain	25,3
Switzerland	16,3
Sweden	25,8
Turkey	12,9
Ukraine	40,8
United Kingdom	21,6
United States of America	14,5



Eur Heart J, Volume 44, Issue 15, 14 April 2023, Pages 1301–1312,

Representation of female IC in European and National Societies





Postepy Kardiol Interwencyjnej. 2023 Jun;19(2):79-81.
Eur Heart J, Volume 44, Issue 15, 14 April 2023, Pages 1301–1312,

Women in Medicine: Addressing the Sex Gap in Interventional Cardiology

FIGURE 2 Distribution of Female Interventionalists Across Japan

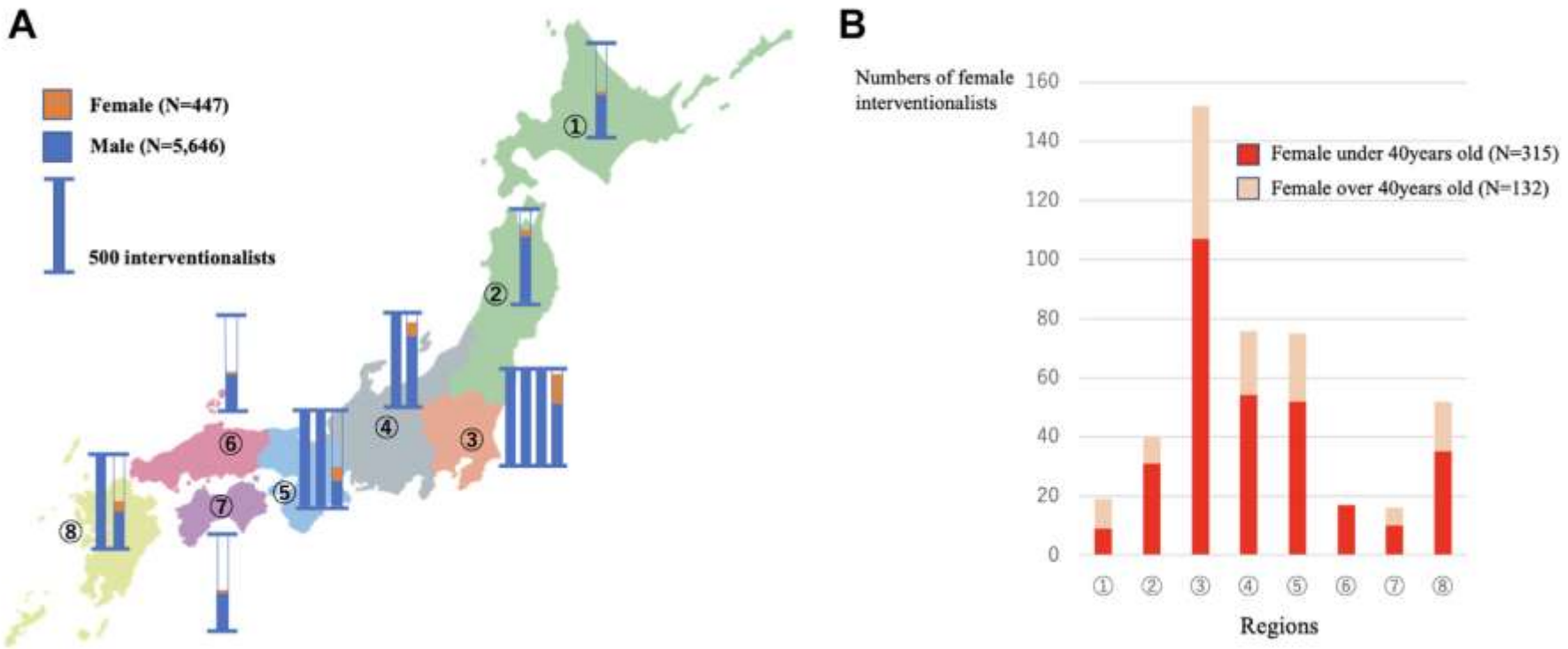
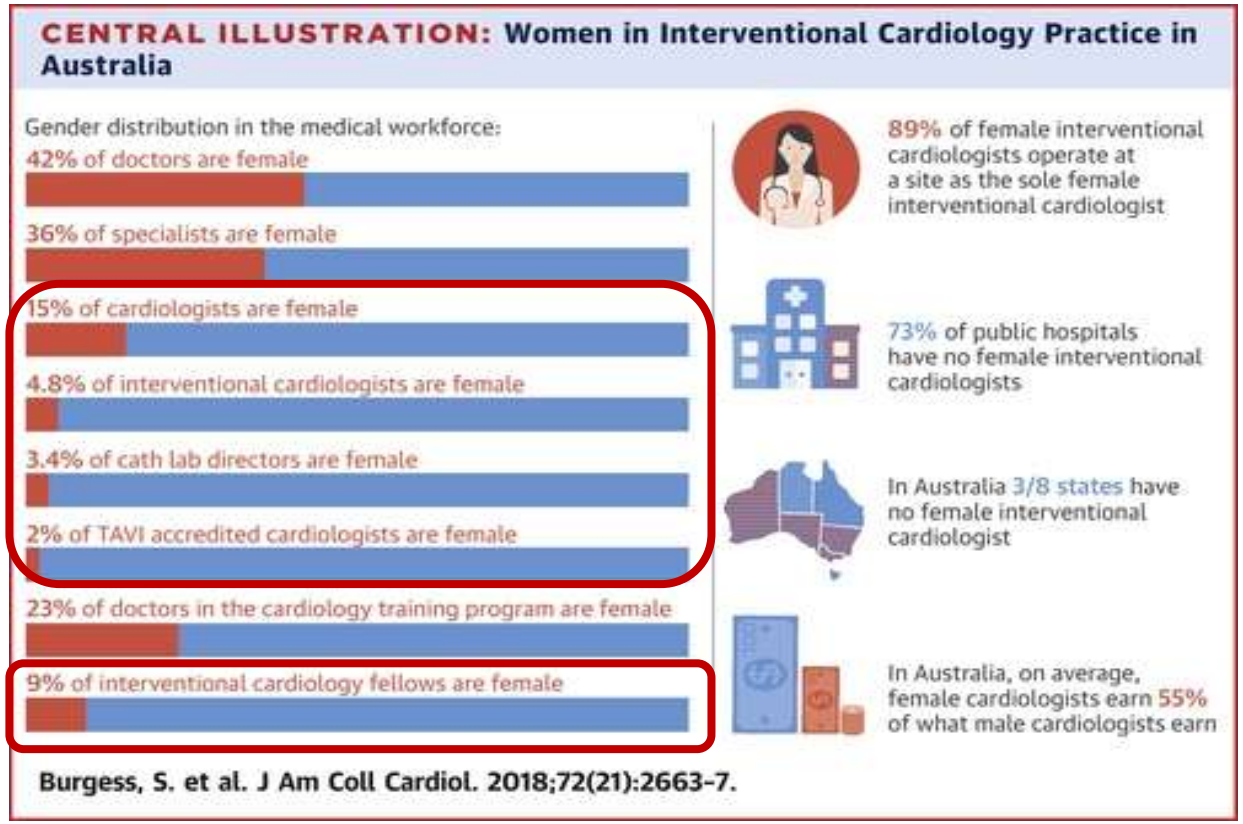


TABLE 5 Proportion of Female Interventionalists in Each Country

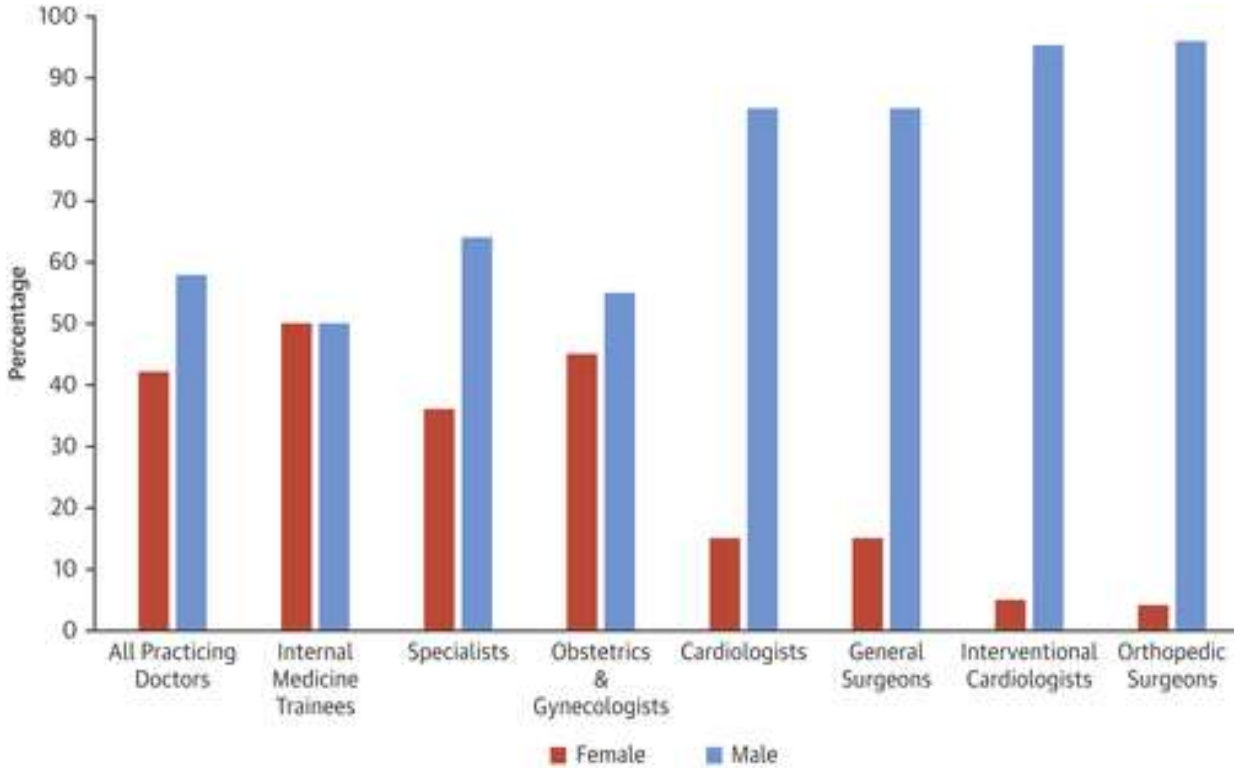
Country	Year	All Operators	Female Operators	PCI by All Operators	PCI by Female Operators
United States[21]	2015	3,248	240 (7.4)	NA	NA
Poland[8]	2014-2017	757	31 (4.1)	456,455	12,935 (2.8)
France[10]	2013	1,563	49 (3.0)	NA	NA
Australia and New Zealand[12]	2017-2018	398	19 (4.8)	NA	NA
Japan	2019-2021	6,093	447 (7.3)	669,379	35,211 (5.3)

JACC Asia, 4 (9) (2024), pp. 674-683

Women in Medicine: Addressing the Sex Gap in Interventional Cardiology



Practicing Doctors by Specialty and Sexin Australia and New Zealand



Sonya Burgess et al. *JACC* 2018; 72:2663-2667.

Does sex of operator affect the results of treatments?

CENTRAL ILLUSTRATION Gender Disparities in Interventional Cardiology and Percutaneous Coronary Intervention Outcomes by Female Operators

Study Population

PCIs in the J-PCI registry from Jan. 2019 to Dec. 2021

PCIs by 5,646 male operators
N = 634,168 (94.7%)

PCIs by 447 female operators
N = 35,211 (5.3%)

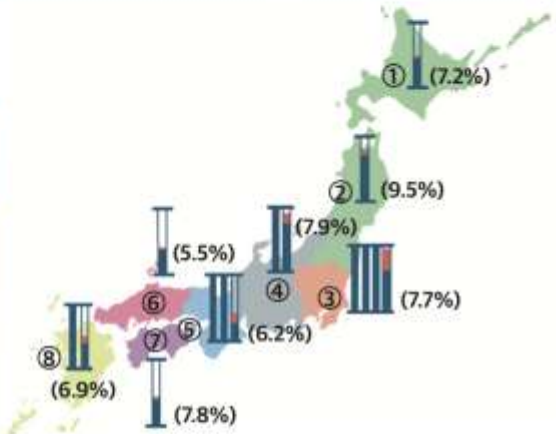
Practice Patterns by Female Operators

	Total Operators	Male Operators	Female Operators	*P* Value
STEMI, n (%)	118,597 (17.9)	111,562 (17.7)	7,035 (20.2)	0.001
Rotational atherectomy, n (%)	32,512 (4.9)	31,281 (4.9)	1,231 (3.5)	<0.001
Left main trunk, n (%)	39,120 (5.8)	37,401 (5.9)	1,719 (4.9)	<0.001

Multivariate Analysis on Outcomes by Female Operators

Outcomes	Adjusted HR (95% CI)	*P* Value
In-hospital mortality	0.90 (0.78-1.03)	0.12
Unsuccessful PCI	0.81 (0.72-0.90)	<0.001

A Distribution Map of Female Interventionalists in Japan



① Hokkaido ② Tohoku ③ Kanto
④ Chubu ⑤ Kinki ⑥ Chugoku
⑦ Shikoku ⑧ Kyushu

(Percentage of female interventionalists)

■ Female (N = 447)
■ Male (N = 5,646)
I 500 Interventionalists

Conclusions

Although women are still underrepresented in interventional cardiology and perform a lower percentage of PCIs in Japan, our study finds that the practice patterns and outcomes of PCIs performed by female operators are comparable to those of their male colleagues. These findings underscore the importance of promoting gender diversity in interventional cardiology, as it has the potential to enhance patient access to care and ensure equitable outcomes for all patients.

Takahashi S, et al. JACC Asia. 2024;4(9):674-683.

JACC Asia, 4 (9) (2024), pp. 674-683

The DISCO study—Does Interventionalists' Sex impact Coronary Outcomes?

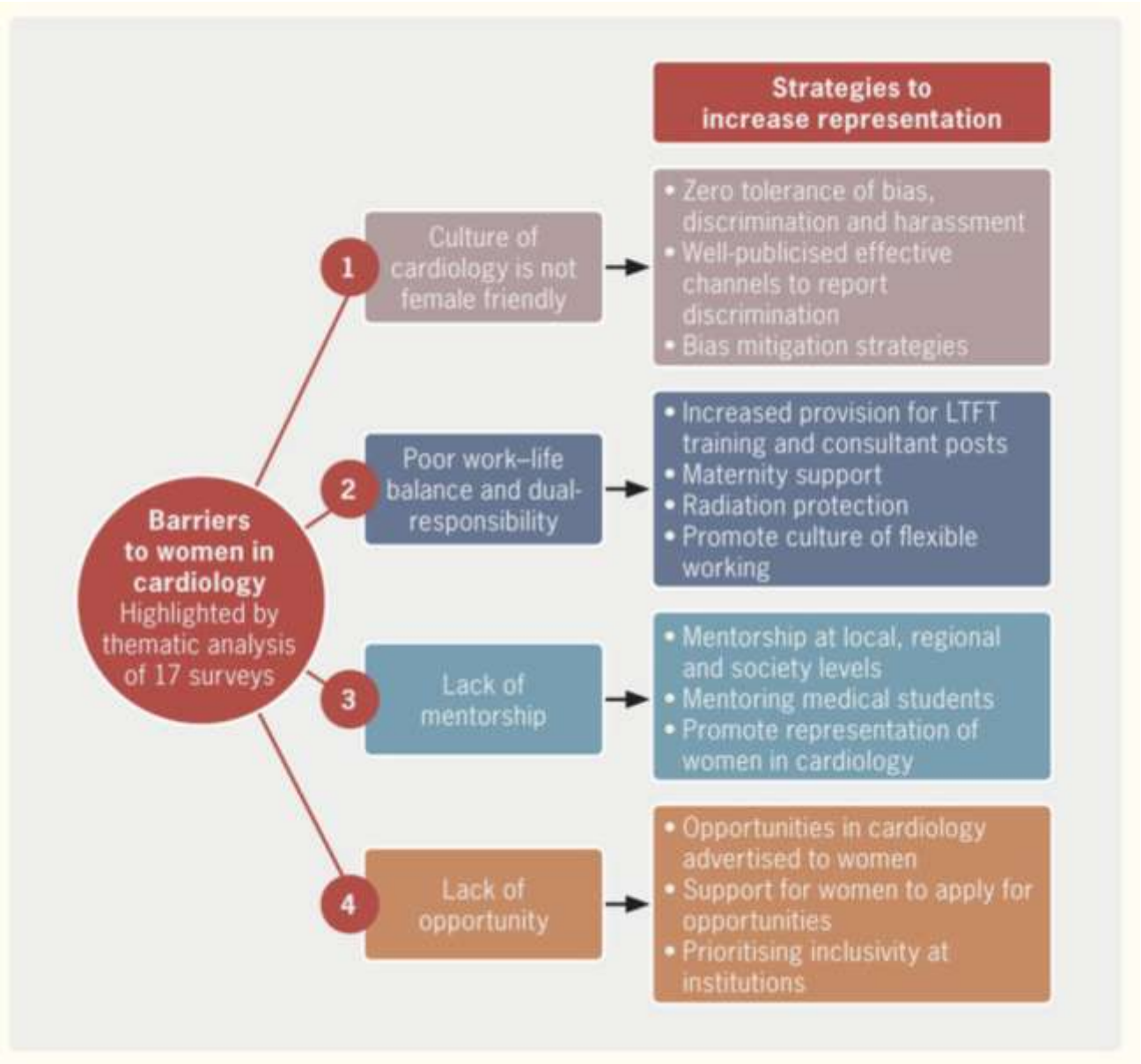
Prasanthi Yelavarthy MD, Milan Seth MS, Elizabeth Pielsticker MD, Cindy L. Grines MD, Claire S. Duvernoy MD, Devraj Sukul MD, Hitinder S. Gurm MBBS

First published: 17 May 2021
https://doi.org/10.1002/ccd.29774

Conclusions

We found no significant differences in risk-adjusted in-hospital outcomes between PCIs performed by female versus male interventional cardiologists in Michigan. Female interventional cardiologists more frequently performed PCI rated as appropriate and had a higher likelihood of prescribing guideline-directed medical therapy.

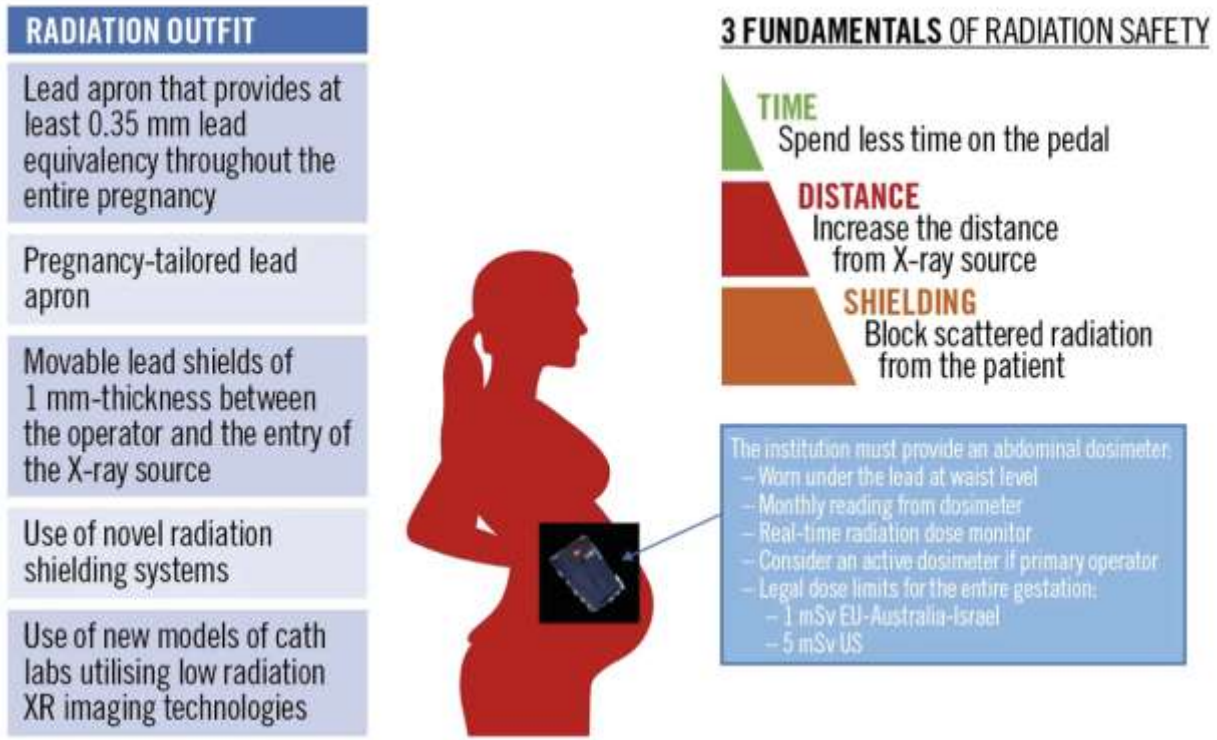
Reasons and resolutions for sex inequality among cardiologists and cardiology trainees



Br J Cardiol. 2023 May 2;30(2):13. doi: 10.5837/bjc.2023.013

Radiation safety

Radiation protection for healthcare professionals working in catheterisation laboratories during pregnancy: a statement of the European Association of Percutaneous Cardiovascular Interventions (EAPCI) in collaboration with the European Heart Rhythm Association (EHRA), the European Association of Cardiovascular Imaging (EACVI), the ESC Regulatory Affairs Committee and Women as One



- Fear of foetal exposure to ionising radiation during pregnancy remains a barrier for women who wish to pursue a career in interventional cardiology
- International expert commission recommendations and European directives clearly state that pregnant women can continue to work in an ionising radiation environment providing that the foetus does not exceed certain dose thresholds
- This would help to facilitate the continuation of interventional work during pregnancy and go towards eliminating this cause of gender inequity in invasive cardiology subspecialities

adapted from Women as One https://rad.womenasone.org)

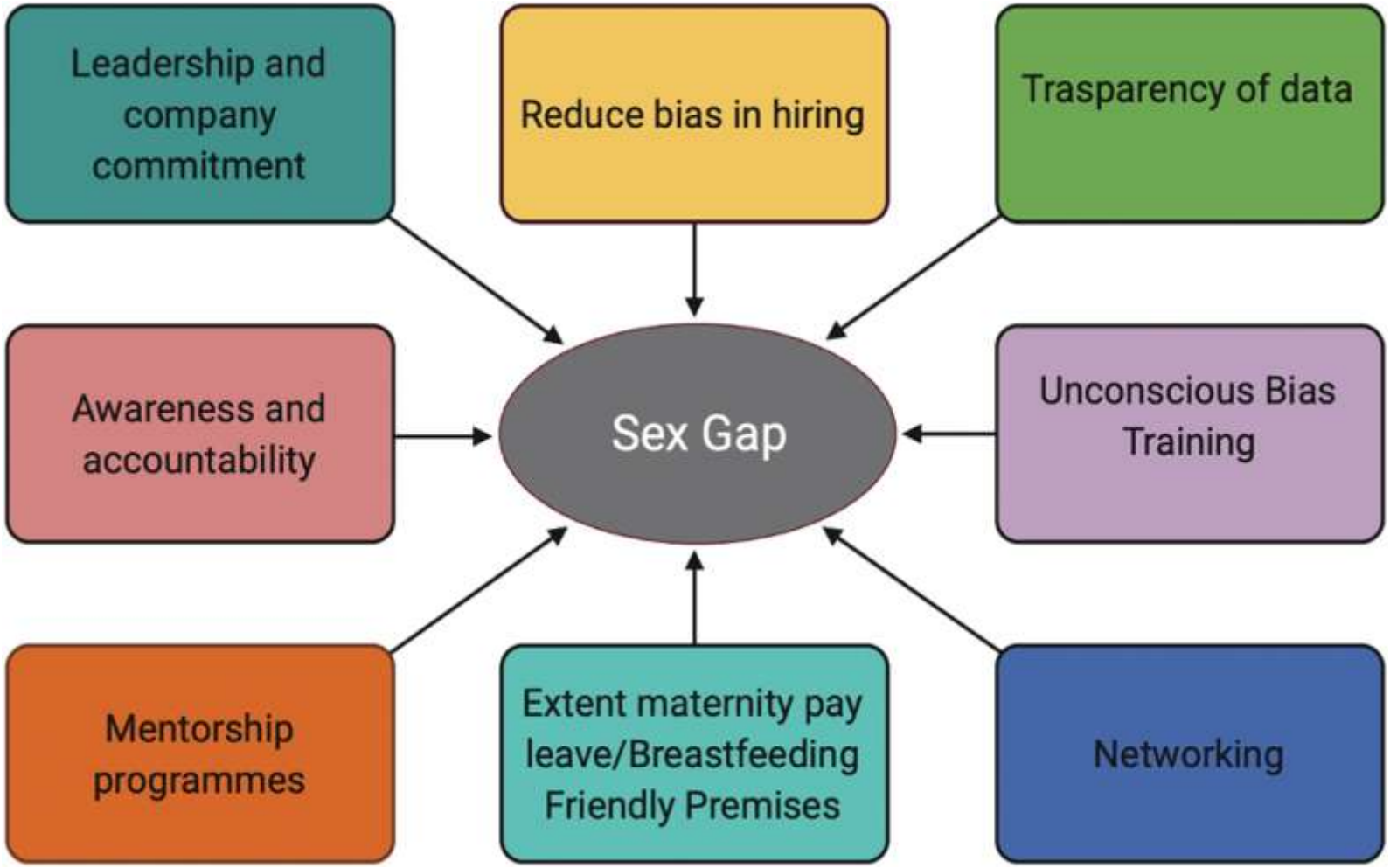
DOI: 10.4244/EIJ-D-22-00407

LIBRA Poster campaign on the importance of a balanced lifestyle and gender equality

LIBRA project

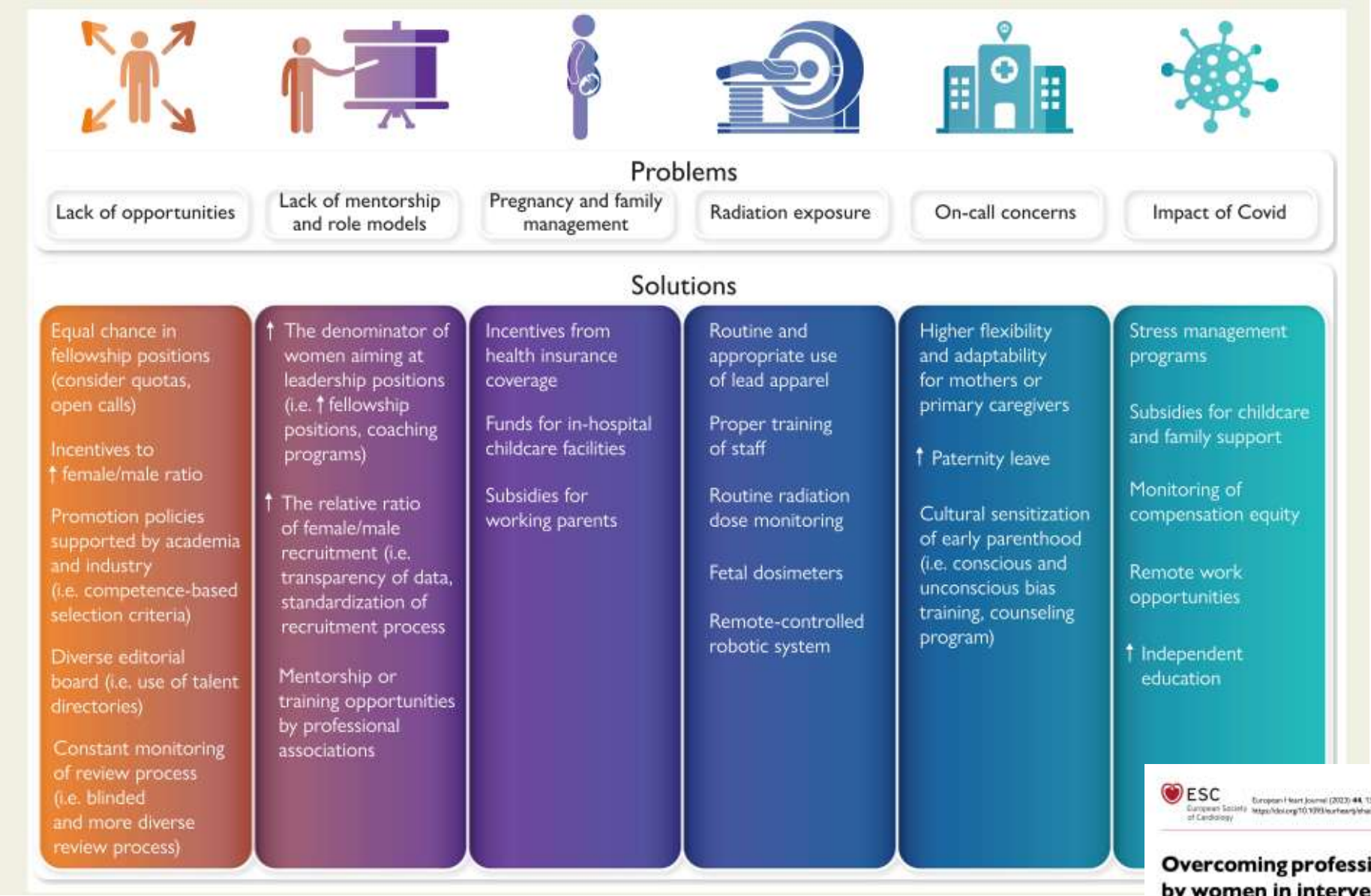
https://zenodo.org/records/2608903#.YZtutPqZOUk

Approaches to closing the industry sex gap



Eur Heart J, Volume 44, Issue 15, 14 April 2023, Pages 1301–1312, https://doi.org/10.1093/eurheartj/ehad053

Proposal of a point-by-point solution

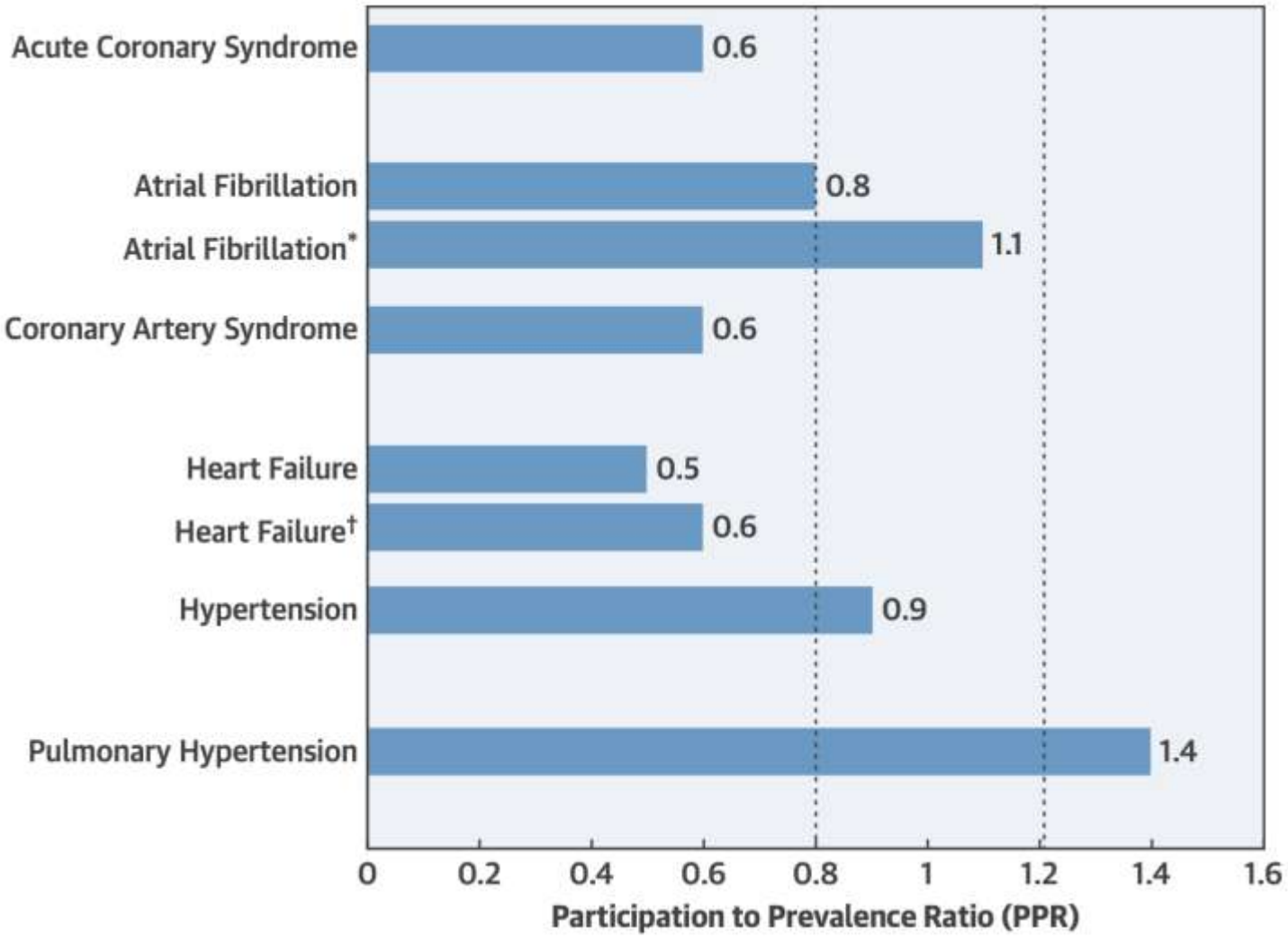



ESC European Society of Cardiology

SPECIAL ARTICLE
Interventional cardiology

Overcoming professional barriers encountered by women in interventional cardiology: an EAPCI statement

Participation of women in CVD trials (2005-2015) by tacking into account the prevalence of the disease in women



Scott, P.E. et al. J Am Coll Cardiol. 2018;71(18):1960–9

Interventions to Address the Low Inclusion of Women in Trials and to Obtain Women-Specific Results

Pitfalls in Drug Clinical Trials	Proposed Interventions
Knowledge and awareness of sex and gender	
Knowledge gap in terminology, use of sex and gender as synonymous	Clarify the use of the terms *sex* and *gender* though educational intervention among health providers, researchers, and general population
Pre-screening/screening	
Gender-related barriers for screening Day care Elderly Access to care	Promote awareness on gender-dimension Policies to support women in day-life (e.g., adequate child care during time spent as a research participant, assistance for elderly included in the study)
Inclusion male-pattern criteria	Inclusion criteria that consider sex differences in pathophysiology Age Glomerular filtration rate Body size Biomarkers/diagnostic criteria
Study methodology/analysis of data	
No adjustment for relevant covariates Sample size lead to unpowered results	Pre-specified subgroup analyses Adjusted analyses with term for sex*drug interaction in all trials Adequate power for efficacy and safety analyses
Editorial policy/research output dissemination	
Lack of specific editorial requirements for sex-specific reporting in clinical trials	Journal-specific checklist for sex-specific reporting (i.e., specify the number of women in the trial, all primary and secondary endpoints by sex, discuss generalizability in both sexes)

Closing the gaps in clinical trial

Step 1. Acknowledge that gender inequity exists and needs to be addressed

Step 2. Undertake gender data analysis

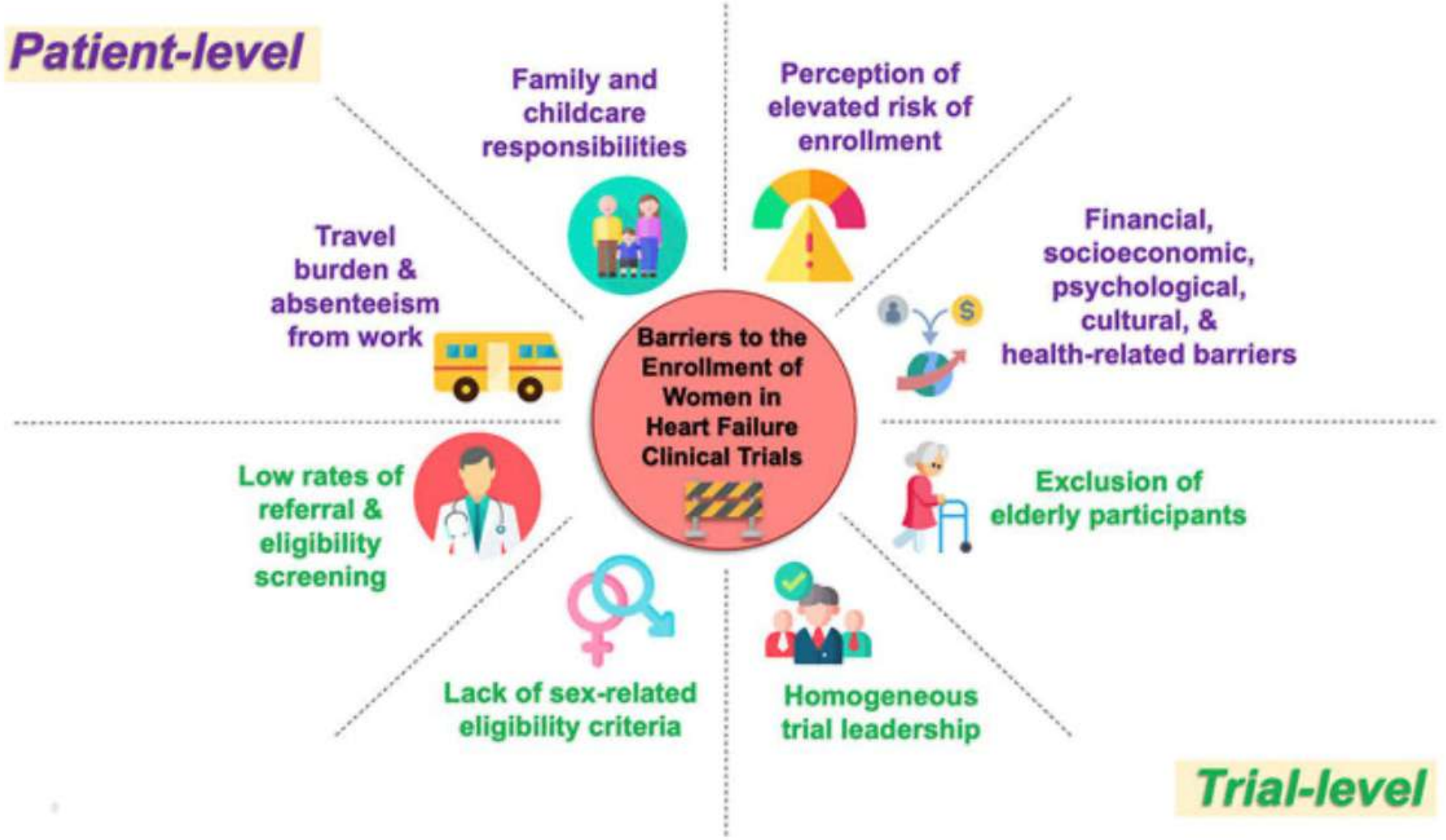
Step 3. Create a transparent selection process for committees

Step 4. Develop an organizational policy in gender equity, diversity and inclusion

Step 5. Implement intentional strategies to increase women and under-represented groups in committees

Step 6. Create a clear pathway to trial leadership

Barriers to the enrollment of women in clinical trials



Am Heart J Plus. 2022 January ; 13: . doi:10.1016/j.ahjo.2022.100093

https://www.fda.gov/consumers/diverse-women-clinical-trials/women-clinical-trials-resources-researchers-and-health-professionals#Diverse%20Women%20in%20Clinical%20Trials%20Campaign

Take-Home Message: Achieving Gender Equality in Invasive Cardiology

1. **Gender Equality is Essential:**
   Achieving gender equality benefits both professionals and patients, fostering a more inclusive and effective healthcare system.
2. **Professional Disparities Persist:**
   Addressing barriers for women in leadership, mentorship, and career advancement in cardiology is crucial for progress.
3. **Patients Deserve Equitable Care:**
   Reducing sex biases in diagnosis, treatment, and access to care is key to improving patient outcomes.
4. **Clinical trials:**
   Given differences in pathophysiology, clinical presentation, and outcomes of cardiovascular disease in men and women, adequate participation of women is important to allow examination of possible gender differences in treatment response.
5. **Strategies Work:**
   Implementing mentorship programs, diversity policies, gender-sensitive training, and tailored treatment guidelines can make a significant impact.
6. **Collaboration is Key:**
   A collective effort from healthcare professionals, institutions, and policymakers is necessary to drive sustainable change.

- **Call to Action:** Commit to creating a gender-inclusive environment in invasive cardiology to enhance equity, innovation, and healthcare outcomes.