



L'ADULTO CON CARDIOPATIA CONGENITA OGGI. IPERTENSIONE ARTERIOSA POLMONARE NELLA POPOLAZIONE ACHD

Aula Magna
AO SS Antonio e
Biagio e Cesare Arrigo
Via Venezia 16

Alessandria
17 APRILE
2023



Il paziente adulto con cardiopatia congenita, chiamato comunemente GUCH, o più correttamente ACHD, è apparentemente semplice o molto complesso, come possono essere le cardiopatie congenite. Tutte le cardiopatie congenite sono malattie croniche e questi pazienti vanno seguiti a vita. Per conoscere e gestire in modo adeguato il paziente ACHD è necessario essere formati sulle cardiopatie congenite, sapere come queste evolvono nell'età adulta e conoscere le comorbidità del paziente non congenito. L'adulto con cardiopatia congenita infatti non è "solo cuore". La fisiopatologia, talora ostica, che rende le cardiopatie congenite così affascinanti nel neonato, non si ritrova quasi più nel paziente adulto, sia corretto che palliato. Siamo piuttosto di fronte a gruppi di problematiche in cui si situano i pazienti affetti dalle principali cardiopatie. L'ipertensione arteriosa polmonare è una delle possibili gravi conseguenze delle cardiopatie congenite. Riconoscerla precocemente può cambiare la storia clinica di questi pazienti. È quindi indispensabile che anche il cardiologo dell'adulto acquisisca le conoscenze fondamentali per accogliere questa popolazione in aumento.



RESPONSABILI SCIENTIFICI:

Gabriella Agnoletti, Giuseppe Alberto Annoni,
Gianfranco Pistis

15.30 Introduzione G. Pistis

15.35 Il paziente adulto con cardiopatia congenita oggi G. Agnoletti

16.00 L'ipertensione arteriosa polmonare nell'adulto
con cardiopatia congenita G.A. Annoni

16.30 Esperienze di real life nella pratica clinica quotidiana
G. Agnoletti, G.A. Annoni, F. Cairello, G. Pistis

17.00 Tavola rotonda

17.30 Chiusura dei lavori

IL PAZIENTE ADULTO CON CARDIOPATIA CONGENITA OGGI

G AGNOLETTI

GLI INGREDIENTI

- PERCHÈ NON CHIAMARLI PIU' GUCH
- CERTIFICAZIONE ACHD
- INVECHIAMENTO DELLA POPOLAZIONE
- MALATTIA E MORTALITA
- TAVI
- TRAPIANTO (IN FONTAN)
- NUOVI SCORES
- DIVERSI?
- IL DIA



PERCHE' ACHD?



- NON SONO PIU' "BAMBINI CRESCIUTI"
- GUCH SOMMERVILLE FINE ANNI 80
- ISACHD 1992
- SPECIALISTI ACHD
- CERTIFICAZIONE ACHD (2 ANNI POST SPECIALITA)
- **CENTRI GUCH:** NAZIONALE: OGNI 3-10 ML, REGIONALE OGNI 2 ML



European Heart Journal (2010) **31**, 2915–2957
doi:10.1093/eurheartj/ehq249

ESC GUIDELINES

CME† ESC Guidelines for the management of grown-up congenital heart disease (new version 2010)

The Task Force on the Management of Grown-up Congenital Heart Disease of the European Society of Cardiology (ESC)

Endorsed by the Association for European Paediatric Cardiology (AEPC)

ESC GUIDELINES



European Heart Journal (2021) **42**, 563–645
doi:10.1093/eurheartj/ehaa554

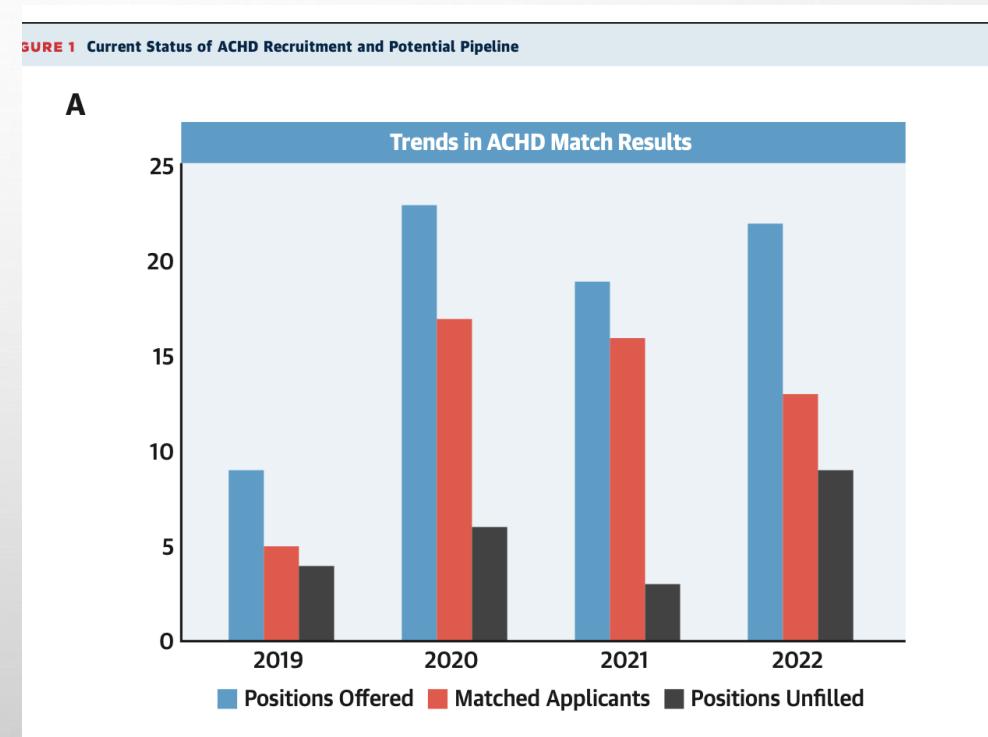
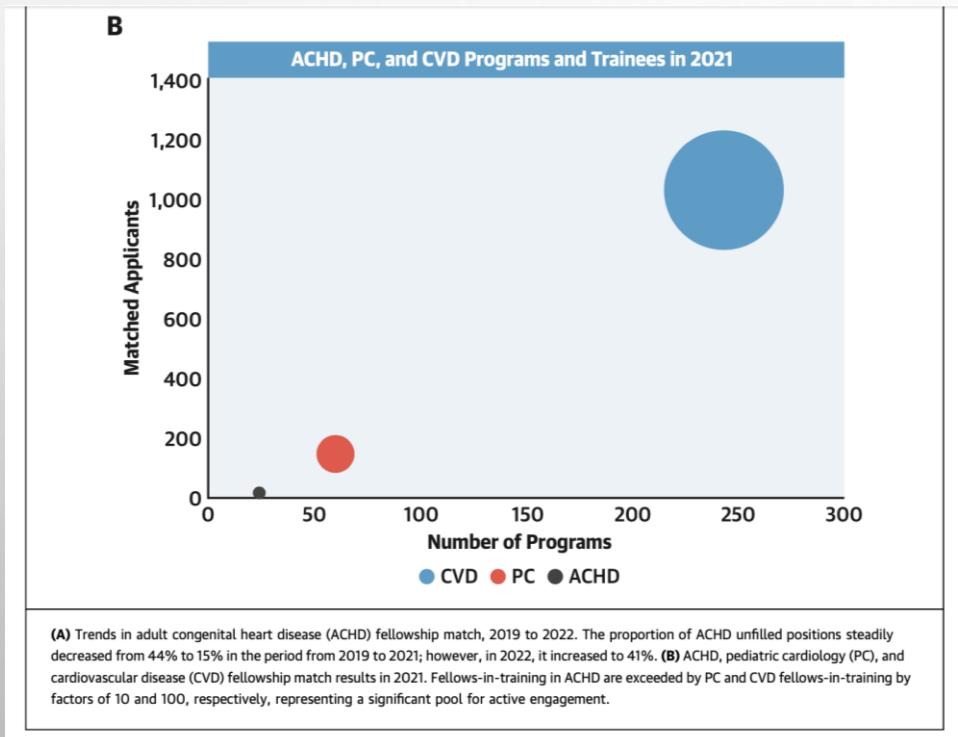
2020 ESC Guidelines for the management of adult congenital heart disease

The Task Force for the management of adult congenital heart disease of the European Society of Cardiology (ESC)

Endorsed by: Association for European Paediatric and Congenital Cardiology

ACHD TRAINING

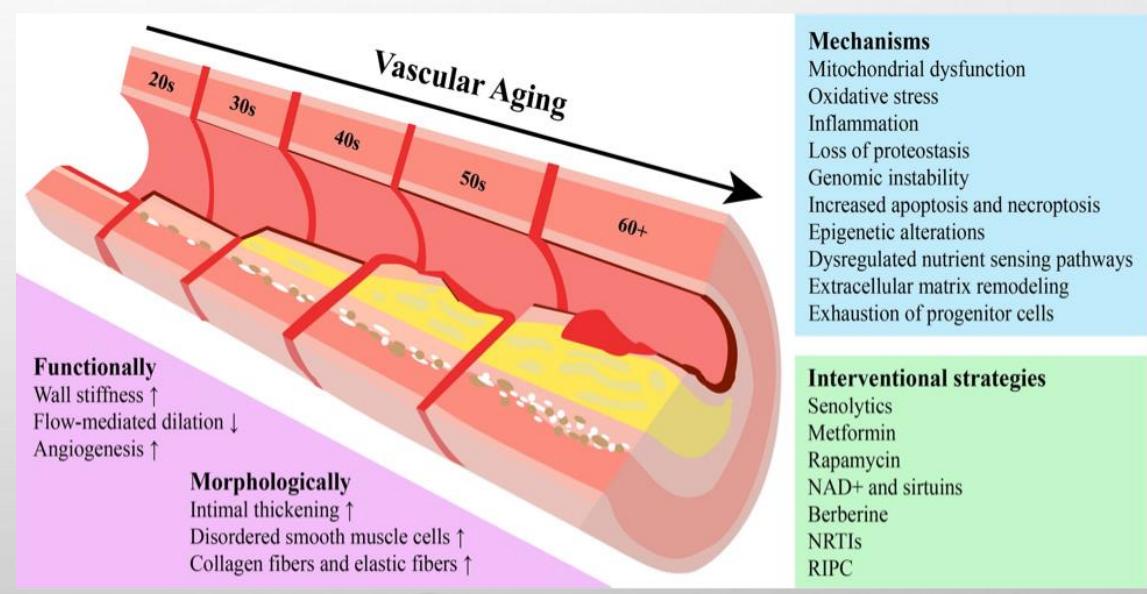
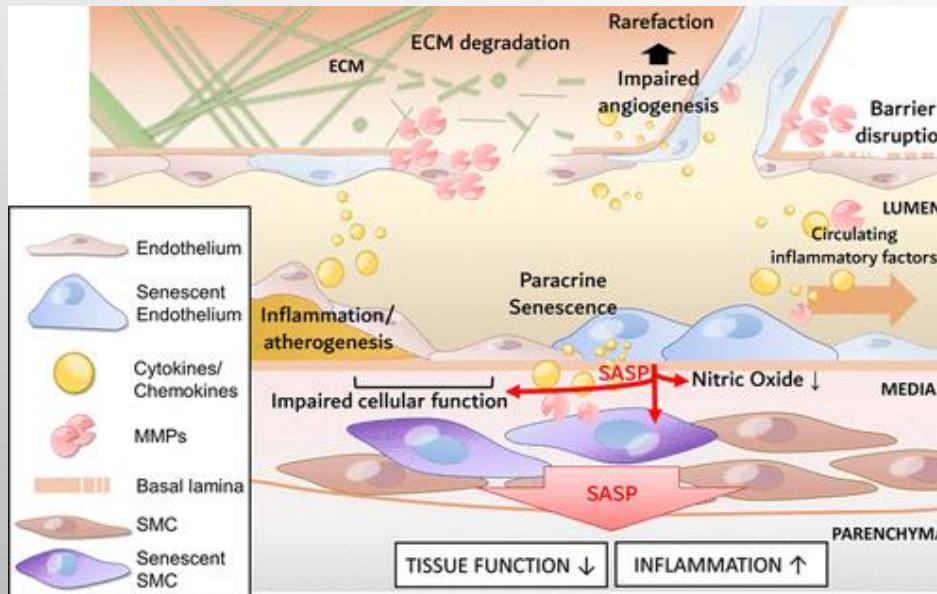
- CHD: IL PIU' COMMUNE DIFETTO CONGENITO (9/1000)
- IL 90% DI MORTALITA SI E TRASFORMATO NEL 90% DI SOPRAVVIVENZA
- ENORME MANCANZA DI SPECIALISTI



VASCULAR AGING E EVA (EARLY VASCULAR AGING)

UN UOMO È VECCHIO QUANTO LE SUE ARTERIE

GLI ACHD INVECCHIANO
HANNO PRECOCEMENTE LE MALATTIE DELLA VECCHIAIA
TUMORI-POLMONITE-M CARDIOVASCOLARI





ACCELERATED CARDIAC AGING

REVIEW

published: 26 May 2022
doi: 10.3389/fcvm.2022.892861



Accelerated Cardiac Aging in Patients With Congenital Heart Disease

Dominga Iacobazzi, Valeria Vincenza Alvino, Massimo Caputo and Paolo Madeddu*

Bristol Medical School, Faculty of Health Sciences, University of Bristol, Bristol, United Kingdom

- Cardiac aging
- Senescence
- Proinflammatory state
- Repeated stress

CHF nel 25% of ACHD by the age of 30

NOT limited to complex CHD

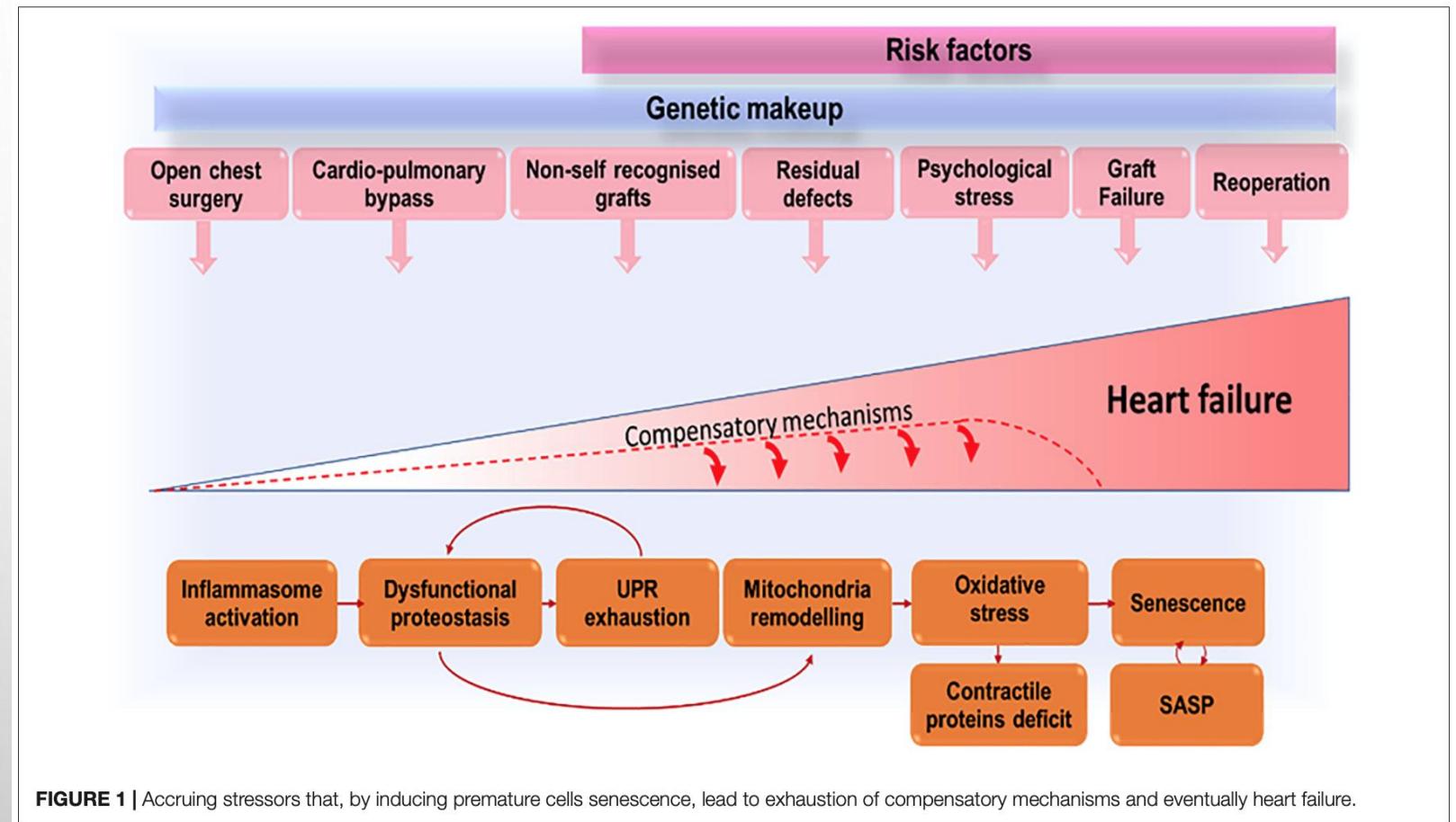
Conventional treatment unsupported by clinical evidence

CHF DIVERSA E REFRATTARIA

L'ETÀ È IL MAGGIOR FATTORE DI RISCHIO DELLE MALATTIE CARDIOVASCOLARI



LA STORIA SI RIPETE



VASCULAR AGING

Review Article



Vascular aging in adult congenital heart disease-a narrative review

Tomoaki Murakami

Cardiovascular Diagnosis and Therapy, Vol 12, No 4 August 2022

CIANOSI

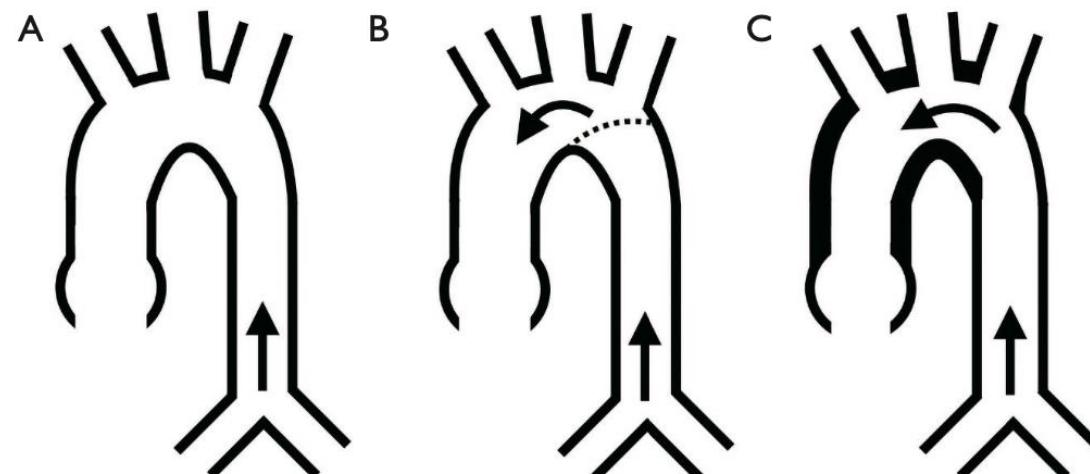


Figure 5 Possible origins of the reflected pressure wave. (A) Normal aorta. (B) Repaired aortic coarctation. (C) Cyanotic heart disease. Arrow indicates the reflected pressure wave.



NON SOLO CUORE

Review Article



Vascular aging in adult congenital heart disease-a narrative review

Tomoaki Murakami

Department of Pediatrics, Sapporo Tokushukai Hospital, Sapporo, Japan

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Cardiovasc Diagn Ther 2022

- M METABOLICA
- M ISCHEMICA
- AORTOPATIA
- IPERTENSIONE ARTERIOSA (OVERLOAD, CIANOSI, SHUNTS, RV SISTEMICO)
- M CEREBROVASCOLARE
- M RENALI (CIANOSI , CCH)
- AUMENTATA MORTALITA PER M ACQUISITE

E LA PREVENZIONE!

TANTO PIU IMPORTANTE IN QUANTO:

- RISCHIO PIU ALTO CHE NELLA POPOLAZIONE SENZA CC
- LIMITAZIONE ALL ESERCIZIO FISICO
- COARTAZIONE, CAD, IPERTENSIONE

Current Atherosclerosis Reports (2022) 24:509–514
<https://doi.org/10.1007/s11883-022-01034-6>

EVIDENCE-BASED MEDICINE, CLINICAL TRIALS AND THEIR INTERPRETATIONS (K.
NASIR, SECTION EDITOR)

Cardiovascular Prevention Among Young Adults with Congenital Heart Disease

Matthew R. Lippmann¹ · Ami B. Bhatt²



DISAGIO PSICOLOGICO E SOCIALE

 frontiers | Frontiers in Pediatrics

ORIGINAL RESEARCH
published: 21 June 2022
doi: 10.3389/fped.2022.906385



Anxiety and Depression in Adults With Congenital Heart Disease

Corinna Lebherz^{1*}, Michaela Klemm¹, Katrin Brehmer^{1,4}, Gunter Hildebrandt¹, Hedwig Hövels-Gürich^{5,6}

¹ Department of Cardiology, University Hospital RWTH Aachen, Aachen, Germany, ² Department of Oncology, Hematology and Palliative Care, University Hospital RWTH Aachen, Aachen, Germany, ³ Department of Psychology, University of Cologne, Cologne, Germany, ⁴ Institute of Psychology, University of Cologne, Cologne, Germany, ⁵ Department of Cardiology, University Hospital RWTH Aachen, Aachen, Germany, ⁶ Institute of Psychology, University of Cologne, Cologne, Germany

 frontiers | Frontiers in Cardiovascular Medicine

SYSTEMATIC REVIEW
published: 10 June 2022
doi: 10.3389/fcvm.2022.870474



Health and Well-Being in Surviving Congenital Heart Disease Patients: An Umbrella Review With Synthesis of Best Evidence

Lucia Cocomello^{1*}, Kurt Taylor¹, Massimo Caputo², Rosie P. Cornish¹ and Deborah A. Lawlor¹

¹ MRC Integrative Epidemiology Unit, Population Health Sciences, Bristol Medical School, University of Bristol, Oakfield House, Bristol, United Kingdom, ² Bristol Heart Institute, Bristol, United Kingdom

<https://www.frontiersin.org/articles/10.3389/fcvm.2022.870474/full>

 ESC European Society of Cardiology

European Journal of Cardiovascular Nursing (2022) **00**, 1–5
<https://doi.org/10.1093/eurjcn/zvac049>

RESEARCH LETTER

COVID-19 impact on adults with congenital heart disease

Jill M. Steiner ^{1,2,*}, Andrea Corage Baden ¹, Erin Abu-Rish Blakeney ¹, Vea Freeman¹, Karen K. Stout ¹, Abby R. Rosenberg ^{1,2,5}, Ruth A. Engelberg ^{1,2,6}, and J. Randall Curtis ^{1,2,6}

 Journal of
Clinical Medicine

Article

Assessment of the Psychological Situation in Adults with Congenital Heart Disease

Caroline Andonian ^{1,2,*}, Jürgen Beckmann ^{2,3}, Peter Ewert ¹, Sebastian Freilinger ¹, Harald Kaemmerer ¹, Renate Oberhoffer-Fritz ^{1,2}, Martin Sack ⁴ and Rhoia Neidenbach ¹

¹ Department of Pediatric Cardiology and Congenital Heart Disease, German Heart Center Munich, Technical University Munich, 80636 Munich, Germany, ewert@dhm.mhu.de (P.E.).



FRAILTY

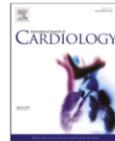
International Journal of Cardiology 363 (2022) 30–39

Contents lists available at ScienceDirect



International Journal of Cardiology

journal homepage: www.elsevier.com/locate/ijcard



Rationale, design and methodology of APPROACH-IS II: International study of patient-reported outcomes and frailty phenotyping in adults with congenital heart disease



APPROACH-IS-II



Fig. 2. Geographic distribution of the APPROACH-IS II participating centers.

Yellow dots indicate centers that are participating in Part 1 and Part 2 of the study ($n = 21$). Pink dots indicate centers that are participating in Part 1 only ($n = 32$). (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)



Gli studi multicentrici sovranazionali
iniziano dopo gli anni 2000

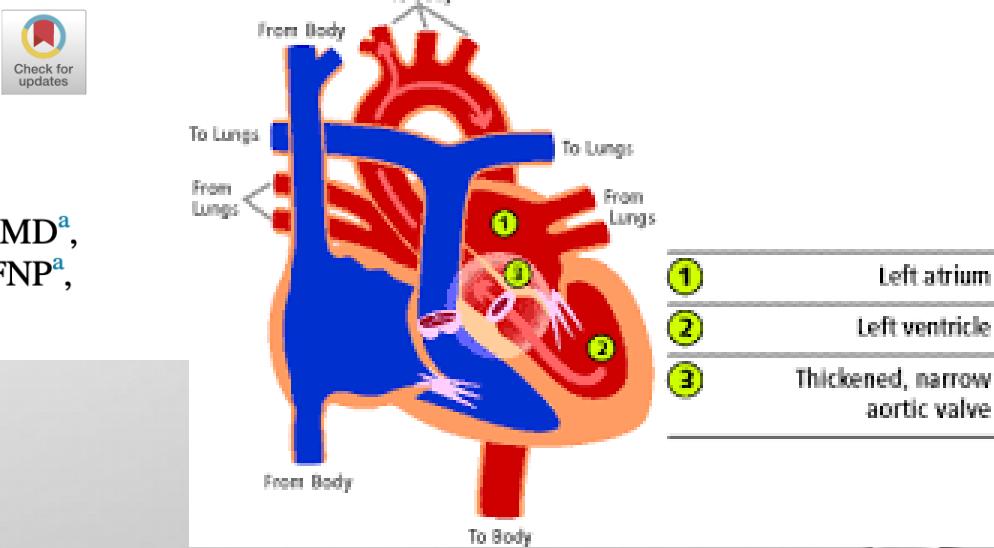
E POICHE SONO FRAGILI E INVECCHIANO PRIMA MENO CHIRURGI, PIU INTERVENTISTI

- TAVI E NON SOLO NEL PAZIENTE ACHD: BAMBINI ADOLESCENTI E GIOVANI ADULTI

Transcatheter and Surgical Aortic Valve Implantation in Children, Adolescents, and Young Adults With Congenital Heart Disease

Dwight M. Robertson, DO^{a,b,*}, Dana M. Boucek, MD^a, Mary Hunt Martin, MD^a, Robert G. Gray, MD^a, Eric R. Griffiths, MD^c, Aaron W. Eckhauser, MD^c, Zhining Ou, MS^d, Linda M. Lambert, MSN-cFNP^a, Richard V. Williams, MD^a, and S. Adil Husain, MD^c

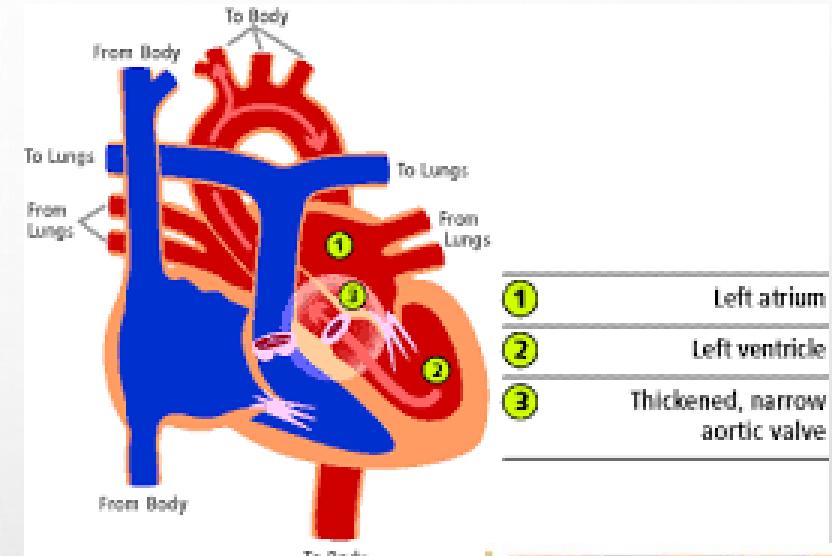
Am J Cardiol 2022



MA ANCHE SITUAZIONI PIU COMPLESSE

LA SVA DEL PAZIENTE ACHD E DIVERSA DALLA SVA DEL PAZIENTE ANZIANO

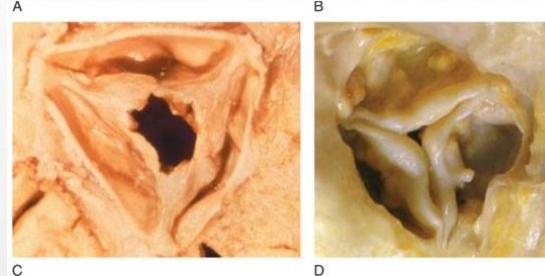
- VALVOLA (MONO-BI-TRI, TESSUTO ACCESSORIO...)
- ANELLO (IPOPLASIA, LESIONI SOVRA-SOPRAANULARI)
- VENTRICOLE (FIBROELASTOSI, IPOPLASIA, IPERTENSIONE POLMONARE, TROMBO)
- M ASSOCIATE (LE LESIONI DEL CUORE SX SI ASSOCIANO)
- PREGRESSI INTERVENTI



SAVR VS TAVI

ESPERIENZA SALT LAKE

- 30 SAVR E 17 TAVI
- ETA' 10-21 ANNI
- FU 3.8 E 1.5 AA
- OUTCOME SIMILE IN TERMINI DI LIBERTA' DA STROKE ENTRO 6 MESI,
RIOSPEDALIZZAZIONE ENTRO 30 GG E DECESSO
- PIU LUNGA DEGENZA IN SAVR, PIU RISCHIO DI REINTERVENTO IN TAVI



Edwards valve
(Sapien 3)



Medtronic valve
EvolutR

TRAPIANTO CARDIACO



ORIGINAL CONTRIBUTION

Observations and Single-Center Outcomes in Orthotopic Heart Transplant for Patients With Adult Congenital Heart Disease: A Call for Equity and Parity

Joshua Rezkalla^{a*}, Megan Kamath^b, and Leigh Reardon^c

^aDepartment of Medicine-Pediatrics, David Geffen School of Medicine, University of California Los Angeles, Los Angeles, California;

^bAhmanson/UCLA Cardiomyopathy Center, Los Angeles, California; and ^cAhmanson/UCLA Adult Congenital Heart Disease Center, Los Angeles, California

- Selezione
- Criteri non uniformi
- Timing (messa in lista tardiva)
- Disfunzione multiorgano
- Indicazioni all'assistenza meccanica
- Carenza di chirurghi congenitalisti

4

REZKALLA, KAMATH, REARDON ET AL

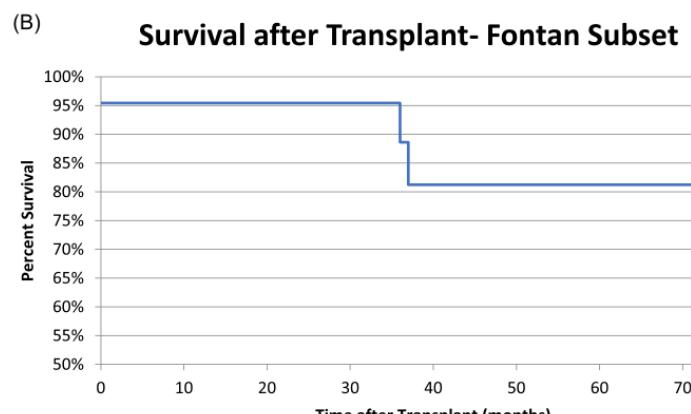
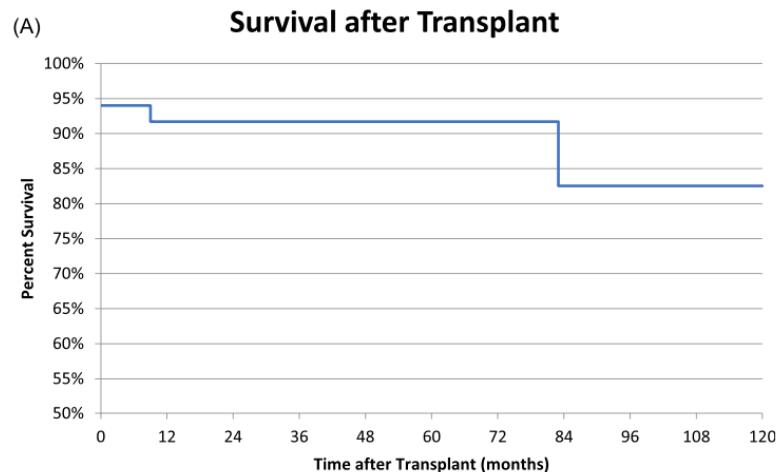


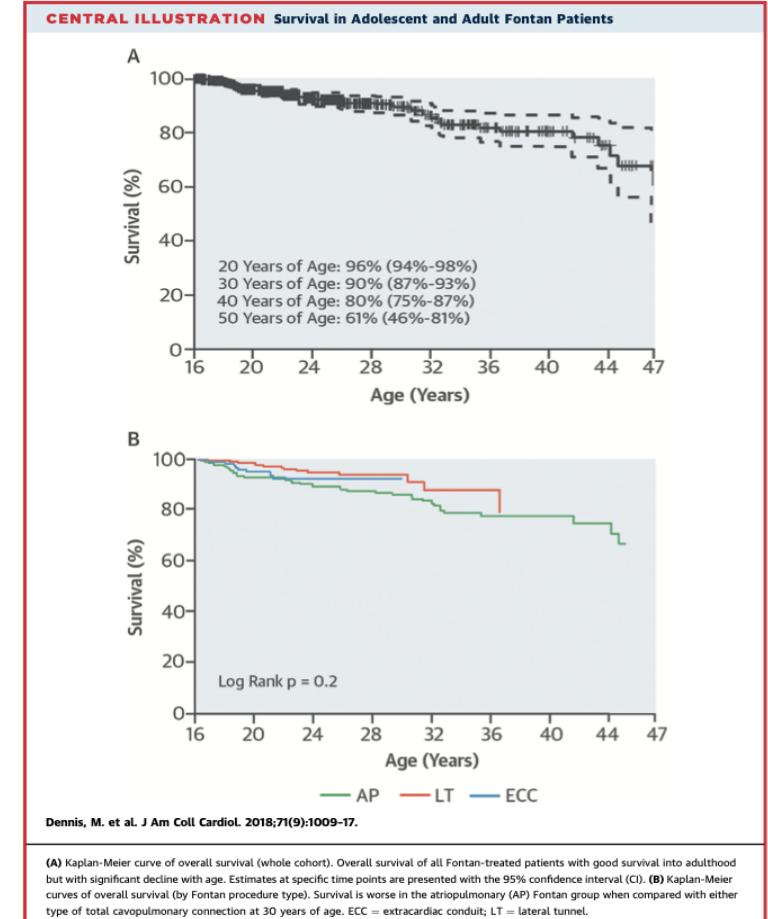
Figure 1. Kaplan Meier survival of ACHD patients undergoing heart transplantation +/- other organ transplantation as needed for (A) all ACHD patients and (B) patients palliated by the Fontan circulation.

TRAPIANTO IN FONTAN

ANZFR

201 atriopolmonari
482 cavopolmonari totali

- PRIMA FONTAN 1971
- PRIMA DCPT (MARCELLETTI) 1990
- SOPRAVVIVENZA AI 30 AA 90%, AI 40 AA: 80%
- IL 60% HA AVUTO UN EVENTO GRAVE ENTRO I 40 ANNI
- E QUINDI TRAPIANTO ????



(8%) had a pulmonary embolism. Only 1 patient had multiple thromboembolic events.
required a second reintervention (median age 9.8 years [range 3.1 to 15.7 years]). PLE occurred in 11 patients (2%) at a median age of 12 years (range 3.4 to 15.3 years).

The median age at reintervention was 8 years (range 1.7 to 15.9 years), and 51 (7%) patients

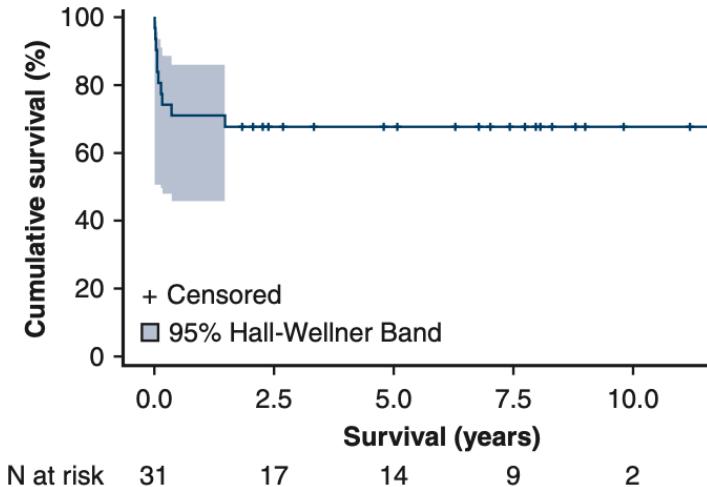
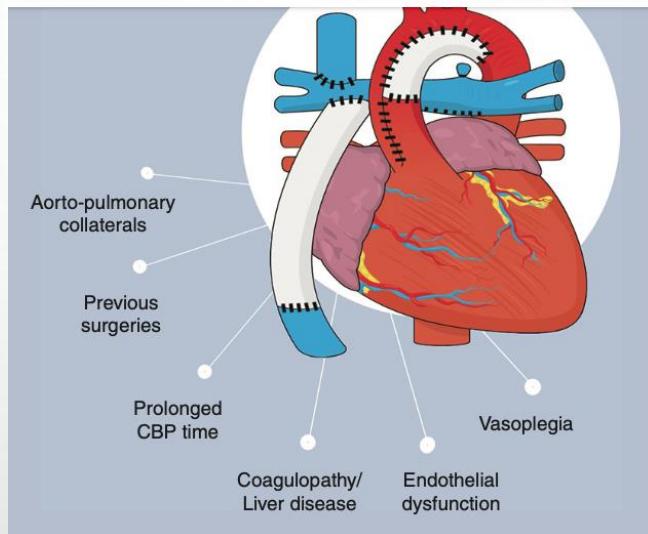
TRAPIANTO IN FONTAN

CONGENITAL: FONTAN

Improving outcomes for transplantation in failing Fontan—what is the next target?

 Check for updates

Barbara Cardoso, MD,^a Andras Kelecsenyi, MD,^b Jonathan Smith, MB ChB, MRCP (UK), FRCA,^{b,c} Katrijn Jansen, MD,^{a,c} Fabrizio De Rita, MD,^{a,c,d} Mohamed Samy Nassar, MD, FRCS,^{a,c,e} and Louise Coats, MBBS, PhD^{a,c}



- Sopravvivenza a 30 gg, 1 e 5aa : 81%, 71%, e 67%.
- Prima causa di morte: sanguinamento intraoperatorio
- 77.4% danno renale postoperatorio CHE NECESSITA TRAPIANTO

SCORES DI RISCHIO



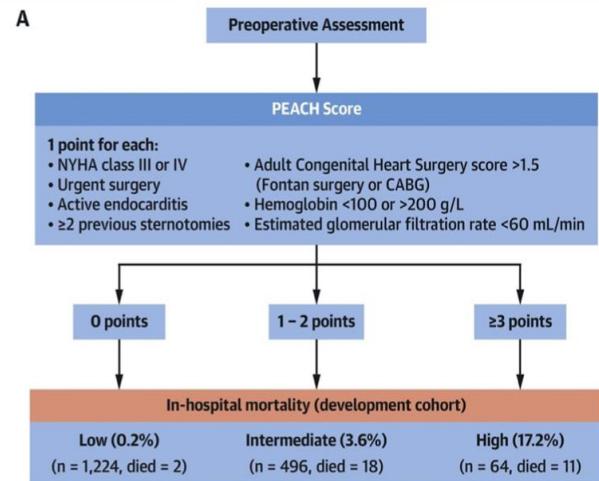
Table 3
A Brief Comparison of Major Perioperative Risk Models in Adult Congenital Heart Disease

Score System	Score Basis	Advantages	Disadvantages
PEACH Score	Patient- and procedure-specific factors specifically validated factors related to patients with ACHD and procedures in an ACHD cohort	Specifically validated in ACHD population, easy to calculate, validated against an external cohort	Recently developed, not yet validated by other groups, excludes some likely important factors due to lack of data, limited number of events in cohort
EuroSCORE I & II	Patient-specific factors based on an adult cardiac surgery cohort	Based on large dataset	The design of the score specifically excluded patients with ACHD. Most procedures used to create the dataset are not common for the ACHD population
ACHS Score	Procedure-specific risk score	Simple to calculate	Ignores patient-specific risk factors
GUCH Score	Super-score of other pediatric CHD risk models		Not yet externally validated. Complicated to calculate
ACAP Score	Anatomy and physiology of the patient	Outperforms ACHS score, simple to calculate	Ignores other patient-specific risk and procedure-specific risk factors. Has yet to be externally validated

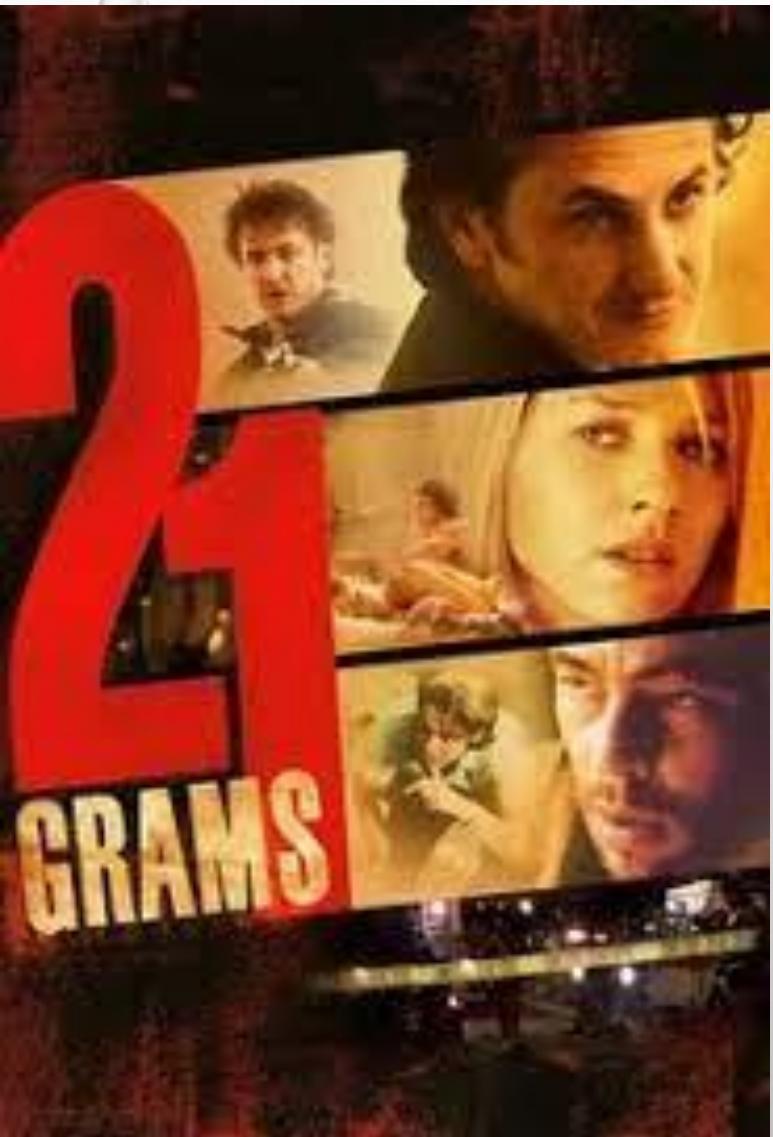
Abbreviations: ACHD, Adult Congenital Heart disease; ACHS, Adult Congenital Heart Surgery; GUCH, Grown-Ups with Congenital Heart disease; PEACH, Perioperative Adult Congenital Heart Disease; EuroSCORE, European System for Cardiac Operative Risk Evaluation.

- ACAP
- GUCH
- ACHS
- EUROSORE I & II
- PEACH

CENTRAL ILLUSTRATION: The PEACH Score: Risk Score Calculation, Predicted and Observed In-Hospital Mortality



IL PESO DELL'ANIMA



Where Adults with Congenital Heart Disease Die: Insights from the CDC-WONDER Database



ESC

European Heart Journal (2022) 00, 1–10
European Society of Cardiology <https://doi.org/10.1093/eurheartj/ehac484>

FAST TRACK CLINICAL RESEARCH

Congenital heart disease

Last year of life of adults with congenital heart diseases: causes of death and patterns of care

Liesbet Van Bulck ^{1,2}, Eva Goossens ^{1,3}, Lucas Morin ^{4,5}, Koen Luyckx ^{6,7},
Fouke Ombelet ^{1,8,9}, Ruben Willems ¹⁰, Werner Budts ^{11,12},
Katya De Groote ¹³, Julie De Backer ¹⁴, Lieven Annemans ¹⁰,
Stéphanie Moniotte ¹⁵, Michèle de Hosson ¹⁴, Arianne Marelli ¹⁶,

EDITORIAL .CODAC consortium



ESC

European Heart Journal (2022) 00, 1–3
<https://doi.org/10.1093/eurheartj/ehac492>

A view from the end: what the last year of life can teach us about palliative care on the adult congenital heart disease journey

Jill M. Steiner ^{1*} and James N. Kirkpatrick²

¹Division of Cardiology, Department of Medicine & Cambia Palliative Care Center of Excellence, University of Washington, 1959 NE Pacific St., HSB C502, Box 356422 Seattle, WA 98195, USA; and ²Division of Cardiology, Department of Medicine & Department of Bioethics and Humanities, University of Washington, 1959 NE Pacific St., Seattle, WA 98195, USA

LA POPOLAZIONE ACHD INVECCHIA, HA COMORBIDITA E MUORE, GIOVANE



European Society
of Cardiology

European Heart Journal (2022) **00**, 1–3
<https://doi.org/10.1093/euroheartj/eac492>

EDITORIAL

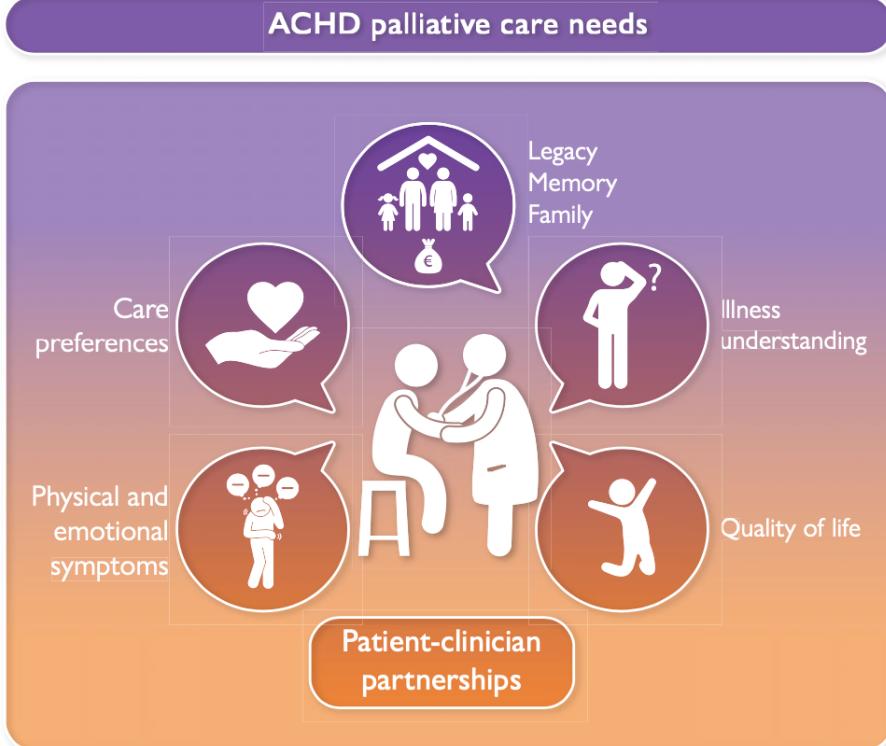
A view from the end: what the last year of life can teach us about palliative care on the adult congenital heart disease journey

Jill M. Steiner * and James N. Kirkpatrick²

¹Division of Cardiology, Department of Medicine & Cambia Palliative Care Center of Excellence, University of Washington, 1959 NE Pacific St., HSB C502, Box 356422 Seattle, WA 98195, USA; and ²Division of Cardiology, Department of Medicine & Department of Bioethics and Humanities, University of Washington, 1959 NE Pacific St., Seattle, WA 98195, USA

LA MORTALITA

Graphical Abstract

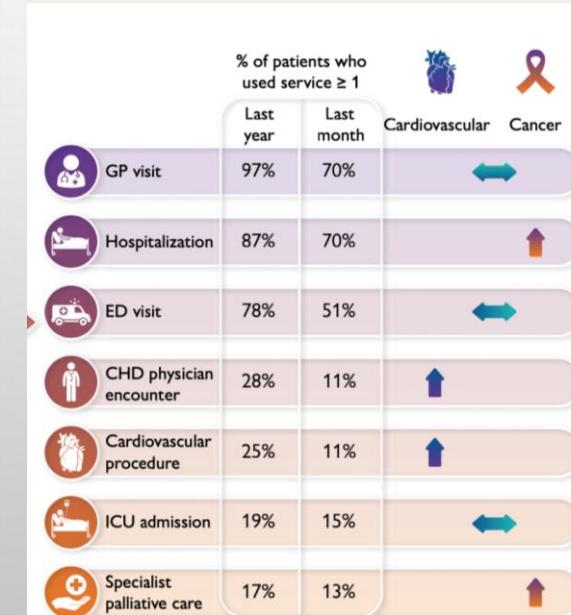
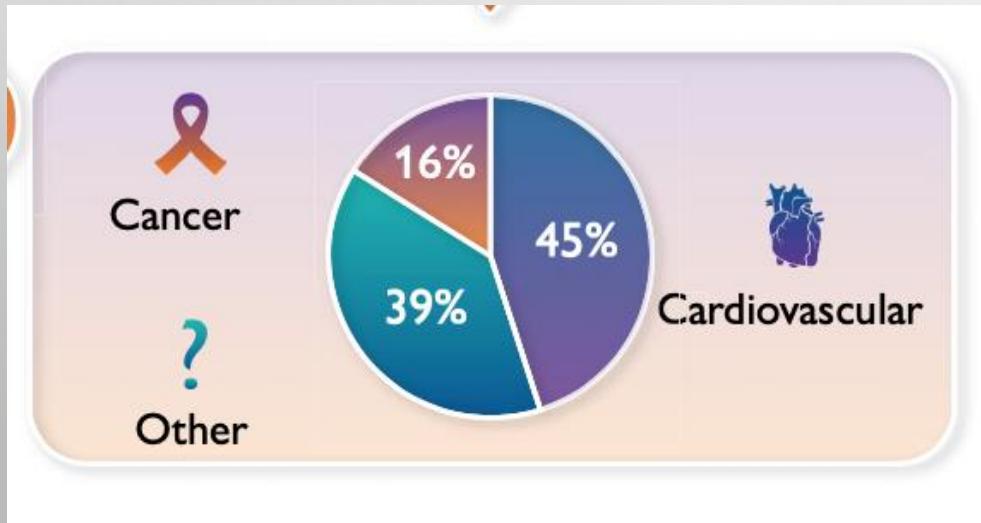


Palliative care needs in adult congenital heart disease and areas for future research.

MORTALITA

DOVE SONO GLI SPECIALISTI ACHD?

- GLI ACHD MUOIONO IN OSPEDALE (64% VS 46% -POPOLAZIONE GENERALE)
- 390 PTS: 45% CAUSA CARDIOVASCOLARE [EUR J CARDIOL22 \(BELGA\)](#)
- ULTIMO ANNO DI VITA OSPEDALIZZAZIONE: 87% , 78% DEA, 19% ICU, 17% CURE PALLIATIVE DI CUI IL 4% DEI DECESSI PER CAUSA CARDIOVASCOLARE



ESC European Society of Cardiology European Heart Journal (2022) 00, 1–10 <https://doi.org/10.1093/eurheartj/ejac484>

FAST TRACK CLINICAL RESEARCH
Congenital heart disease

Last year of life of adults with congenital heart diseases: causes of death and patterns of care

Liesbet Van Bulck ^{1,2}, Eva Goossens ^{1,3}, Lucas Morin ^{4,5}, Koen Luyckx ^{6,7}, Fouke Ombelet ^{1,8,9}, Ruben Willems ¹⁰, Werner Budts ^{11,12}, Katy De Groot ¹³, Julie De Backer ¹⁴, Lieven Annemans ¹⁰, Stéphane Moniotte ¹⁵, Michèle de Hosson ¹⁴, Arianne Marelli¹⁶, Philip Moons ^{1,17,18*}, and BELCODAC consortium

LA PARADOSSALE FORZA DELLA FRAGILITÀ



ACHD

PIU' UMANI DEGLI UMANI?

PUBBLICAZIONE ESC SU COVID INCLUDONO PARTI SCRITTE DAI PAZIENTI

Graphical Abstract

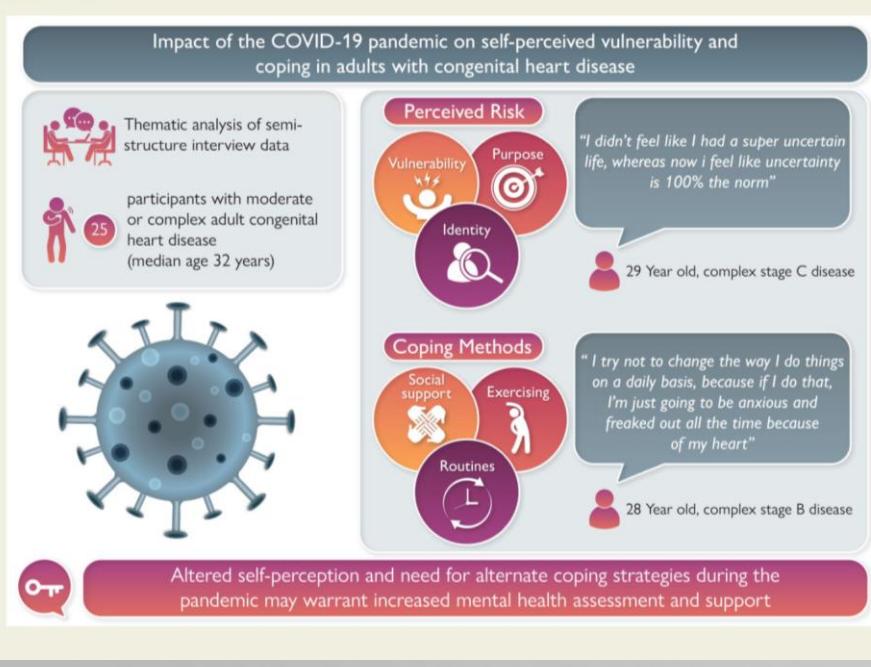


Table 2 Key participant quotations

COVID affected participants' sense of vulnerability

[Previously], when I thought of myself as a vulnerable population, I thought of it more as because I was pregnant not, 'Oh, and you have this heart condition.' Which is strange, ... a double whammy. When I had a heart appointment during my pregnancy, one of the cardiologists said, 'Yeah, it's good that you're being extra cautious because you are a vulnerable population, because of your heart condition.' I was like, 'Oh, yeah.'—32 years old, moderate Stage C disease

Before COVID, I was just like, 'Oh, I have this job, it's just a job to me, but I'm getting by and I'm reasonably happy.' Then COVID happened, and then we all kind of had to... confront the idea that we could get a terrible disease and die. I think, when I was kid, having to go through sort of a realization that I could die, it had some positive effect. It had some self-actualization in, it granted me some immediacy. I would say that that's what that did for me now, is, I feel like I do actually need to do something.—25 years old, moderate Stage B disease

My family was told to prepare for this, prepare for that. 'He may not make it to this age and that age'. So I've been preparing the whole time through my life because my mother shared this with me... And I don't know if that helped or hurt me, but I'm not going to sit here and pass my life in fear. I'm aware of the COVID... but I try not to live my life thinking, 'Oh, well I got to be super cautious in this and that'. So I try to live my life, and go through my daily routine, without thinking of it too much.—44 years old, moderate Stage D disease

I am one of the numbers of person that would totally die if I got it. I respect that deeply. And I've changed my life a little bit for that, but no more than anybody that was already expecting to die tomorrow... I laugh with my friends, like, 'Wouldn't it be weird if I lived all this extra time, and then this stupid thing got me?' It's a waste of a defeat of all these other, bigger diseases in my life I've conquered.—37 years old, complex Stage C disease

It's funny because I never saw my heart condition as ... It never caused that much unsettling uncertainty. There was always uncertainty, but it was enough able to be put in the back of my head. I didn't feel like I had a super uncertain life whereas now I feel like uncertainty is 100% the norm.—29 years old, complex Stage C disease

COVID impacted use of existing coping strategies

ACHD

PIU' UMANI DEGLI UMANI?

- LINE GUIDA PH 2022: INCLUDONO ASSOCIAZIONI DI PAZIENTI

New standards for PH centres have been presented and, for the first time, patient representatives were actively involved in developing these guidelines.



PAH : 4-6% di ACHD

L'uomo non è che un fuscello,
il più debole della natura,
ma è un fuscello che pensa.
Blaise Pascal

Aforismario



ACHD PIU' UMANI DEGLI UMANI?

- LE CC SONO M CRONICHE: **TUTTE**
- PERSONE A CUI E STATO DATO IL BENESSERE FISICO, LA POSSIBILITA DI ESSERE PARTE ATTIVA DELLA SOCIETA, SPESSO LA VITA
- CONTINUANO AD AVER BISOGNO DI REINTERVENTI E CURE
- DISAGIO PSICOLOGICO
- DIFFICOLTA' NEL MONDO DEL LAVORO



IL DIA E ANCORA UNA CHD SEMPLICE?

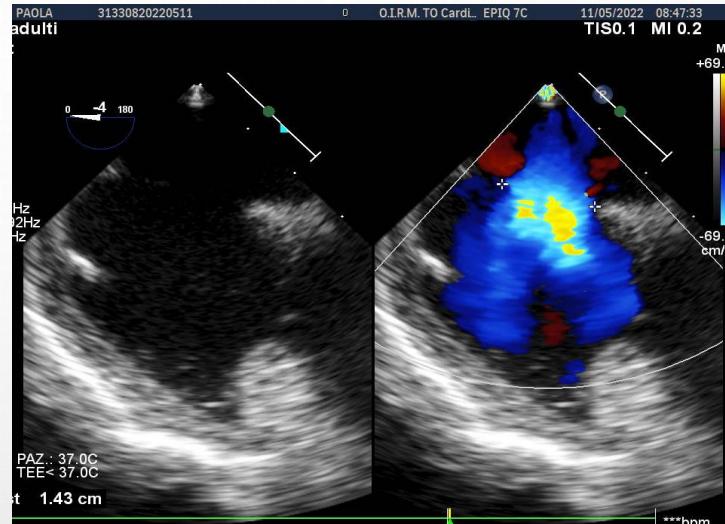
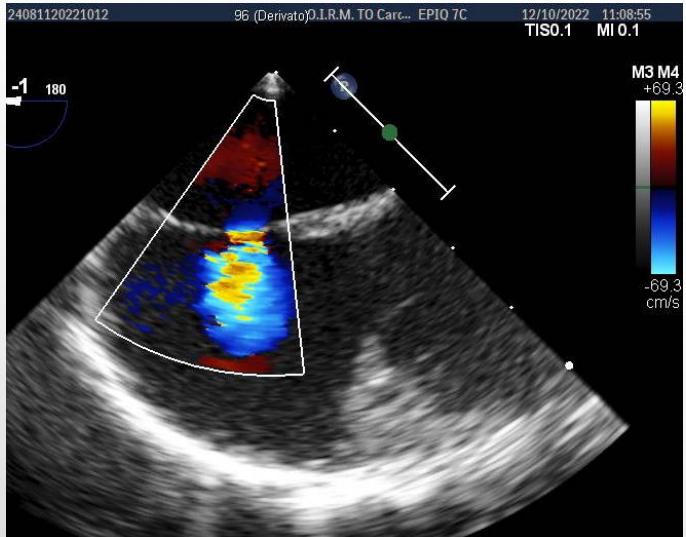
«QUESTO PAZIENTE HA UN DIA, LO POSSO GESTIRE DA SOLO»

Rischio aumentato di

- FA e stroke (Heart2015, Front Cardiovasc Med 2022)
- polmonite (Am J Cardiol 2014)
- tumore (Eur Heart J 2018)
- problemi psichiatrici (Congen Heart Dis 2019, Am J Cardiol 2020)

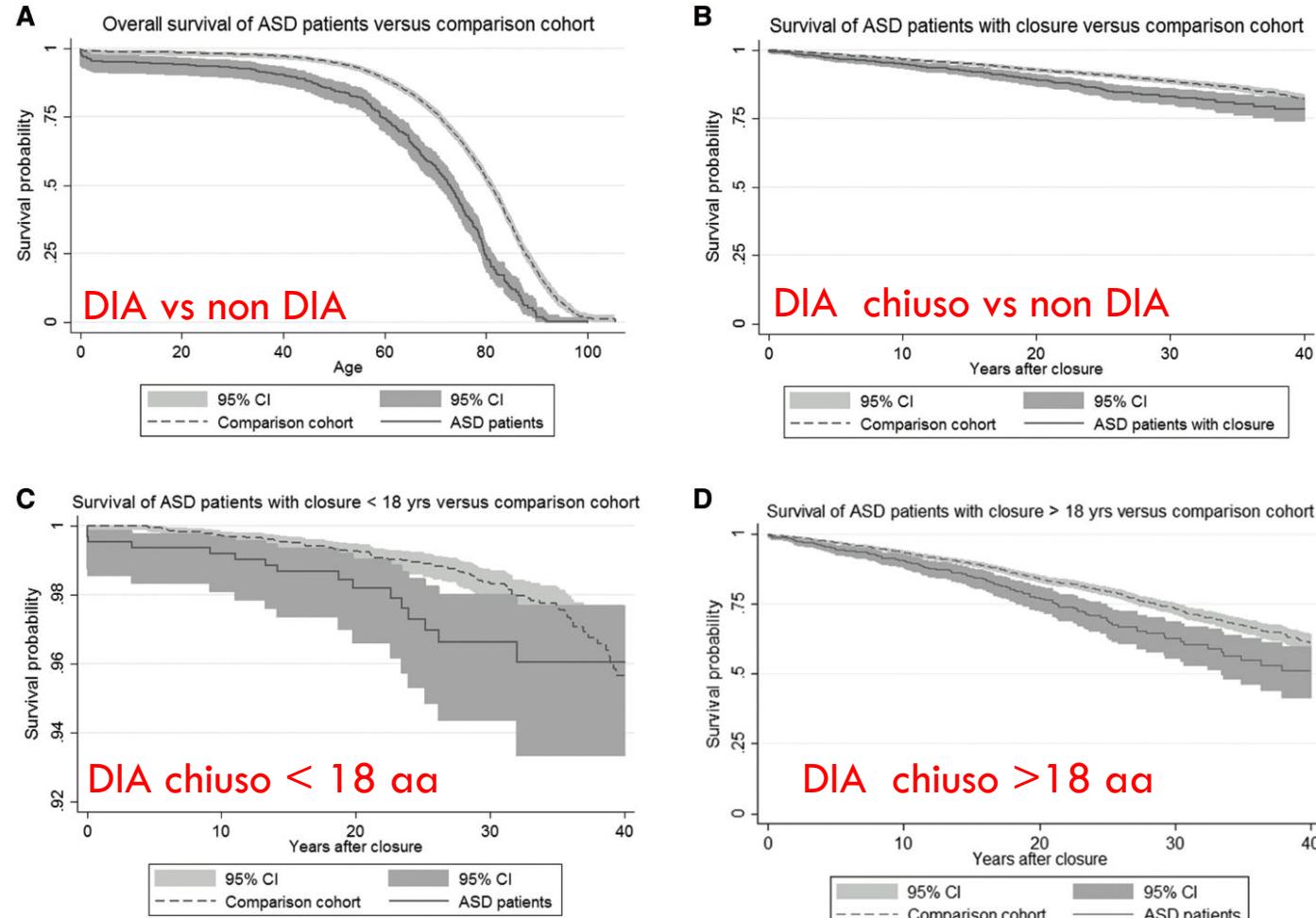


IL DIA E ANCORA UNA CHD SEMPLICE? DIA PICCOLO E GRANDE



I pz con DIA piccolo in storia naturale:
stesse problematiche dei pz con DIA ampio
Danish national registry
Int J cardiol 2019

MORTALITA' DEI PAZIENTI CON DIA



Mortalita' piu' alta, sia che il DIA sia stato chiuso o meno
Eur Heart J. 2018

Figure 1 (A) Survival in years in atrial septal defect (ASD) patients without closure compared with the comparison cohort with age as an underlying time scale. (B) Survival in ASD patients after closure compared with the comparison cohort with years after closure as an underlying time scale. (C) Survival in patients with closure before the age of 18 compared with the comparison cohorts with years after closure as an underlying timescale.

CHIUSURA VS STORIA NATURALE

Rubáčková Popelová et al.

Survival in Atrial Septal Defect

Mortalita' e incidenza di CHF piu' alta nei pz con

- DIA aperto
- Diagnosi tardiva
- PH

BLU: NO PH
ROSSO: PH

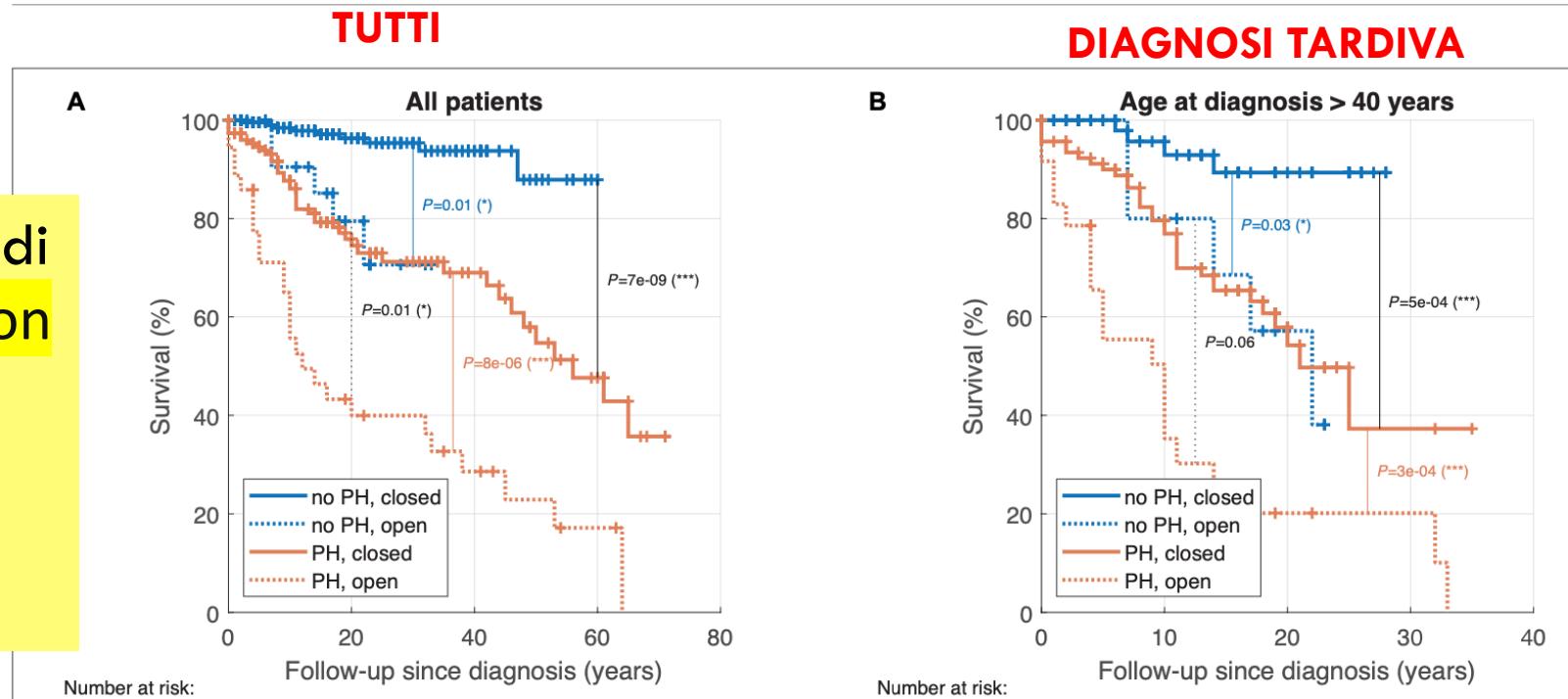
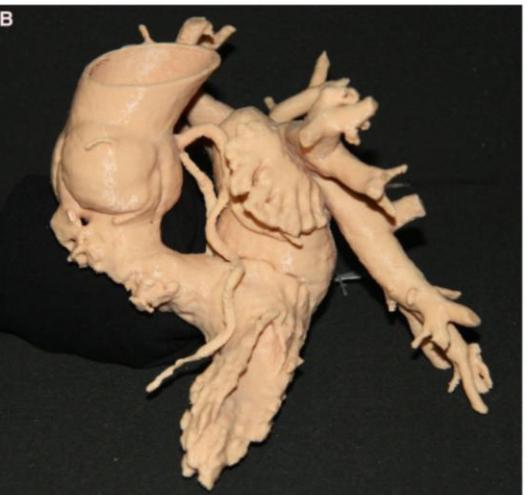
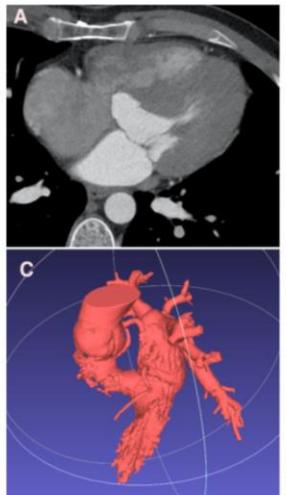
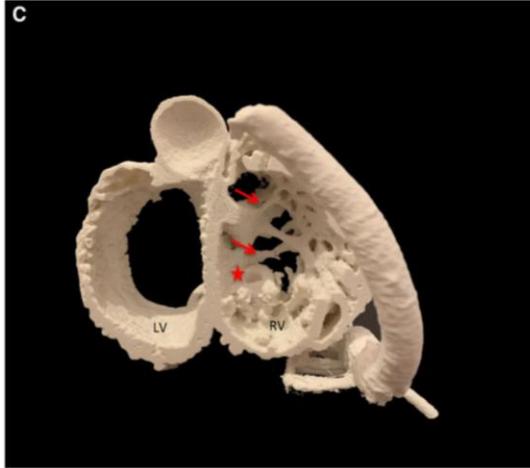
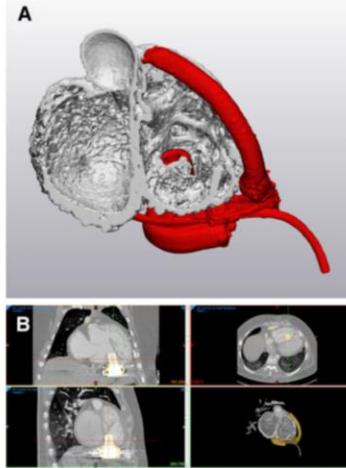


FIGURE 1 | Kaplan-Meier survival analysis of atrial septal defect (ASD) patients stratified by pulmonary hypertension (PH) and ASD closure; all patients (model A). (B) Patients diagnosed at the age above 40. ASD, atrial septal defect; MR, moderate or severe mitral regurgitation; NYHA, New York Heart Association class; PH, pulmonary hypertension.

ARRIVA IL METAVERSO



Virtual reality and augmented reality: imaging or imagining?

A VR-assisted training in the catheterization laboratory or operating theatre.



B AR-assisted interventional procedures.



C VR-assisted patient information and education.



Figure 7 (A) Virtual reality-assisted training the catheterization laboratory or operating theatre. (B) Augmented reality-assisted interventional procedures; (C) virtual reality-assisted patient information and education.



ESC

European Society
of Cardiology

European Heart Journal (2022) 43, 2672–2684

<https://doi.org/10.1093/euroheartj/ejac266>

STATE OF THE ART REVIEW

Congenital heart disease

Three-dimensional printing, holograms,
computational modelling, and artificial
intelligence for adult congenital heart disease
care: an exciting future