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Estudo ORBITA: Um Marco na Tomada de Decisão Terapêutica da Doença Coronariana Estável

ORBITA Trial: Redefining the Role of Intervention in the Treatment of Stable Coronary Disease?

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Embora muitas vezes esquecido, o objetivo principal do tratamento da doença arterial coronariana é diminuir o risco de infarto do miocárdio, conseqüentemente reduzindo a morte, e diminuir a ocorrência de angina. Não obstante no cenário da síndrome coronariana aguda, o papel da revascularização do miocárdio esteja bem estabelecido, os procedimentos de intervenção em pacientes com doença estável, especialmente a angioplastia coronária percutânea (ACP), permanecem controversos.

Neste contexto, o ORBITA Trial, recentemente publicado no Lancet[1] , trouxe respostas importantes a este debate, envolvendo conceitos inéditos até então. Como o primeiro ensaio randomizado e controlado por placebo, desenhado para testar a eficácia dos stents farmacológicos versus tratamento clínico otimizado (TCO), o estudo incluiu 230 pacientes com angina estável e estenose de artéria coronária ≥ 70%, para receberem uma simulação de intervenção coronária percutânea ou angioplastia de fato (ACP). Durante 6 semanas após o procedimento (simulado ou verdadeiro), ambos os grupos foram submetidos a OMT e os desfechos tempo de exercício, consumo máximo de O2 e controle da angina foram comparados. As lesões coronárias apresentaram estenose da área média de 85% e reserva de fluxo fracionado (FFR) de 0,69. Não houve diferença significativa no desfecho primário de aumento do tempo de exercício entre grupos (P=0,2) e também não foram relatadas mortes. Os eventos adversos graves incluíram quatro complicações relacionadas ao fio guia de punção no grupo placebo, e cinco eventos hemorrágicos maiores, incluindo dois no grupo ACP e três no grupo placebo. Contrariamente aos conceitos derivados de estudos anteriores não randomizados, os autores concluíram que, em pacientes com angina tratada medicamente e estenose coronária grave, a angioplastia coronária não aumenta o tempo de exercício e não promove mais alívio da angina, em relação ao procedimento placebo, ou seja, não é superior ao controle clínico e medicamentoso.

Estes resultados aparentemente surpreendentes são sustentados por um impressionante rigor metodológico, e uma condução criteriosa do protocolo de estudo. A medida do efeito placebo com a criação do grupo simulado (sham), foi uma inovação, e os pesquisadores foram impecáveis no controle de vieses. Outro ponto impressionante foi o controle clínico rigoroso: durante 6 semanas, os pacientes poderiam chamar um cardiologista clínico 24 horas e 7 dias por semana, que avaliaria controle da angina e efeitos colaterais. E os medicamentos foram ajustados no mínimo 2 vezes por semana, para que se pudesse obter terapia antianginosa maximamente tolerada.

Como uma das principais mensagens, o estudo ORBITA demonstrou que a melhora sintomática produzida em pacientes com angina estável, submetidos a angioplastia, pode conter um grande componente de efeito placebo.

Previamente ao ORBITA trial , os benefícios da revascularização de rotina em doença cardíaca isquêmica estável já haviam sido avaliados, em termos de mortalidade e taxa de infarto, em outros estudos randomizados: MASS II (Medicine, Angioplasty or Surgery Study), COURAGE (Clinical Outcomes Utilizing Revascularization and Aggressive Drug Evaluation), BARI 2D (Bypass Angioplasty Revascularization Investigation 2 Diabetes), e mais recentemente no ISCHEMIA trial (International Study of Comparative Health Effectiveness With Medical and Invasive Approaches), o ultimo ainda em andamento.

No estudo MASS II [2], 611 pacientes com doença coronária multiarterial estável e isquemia documentada, foram distribuídos randomizados para cirurgia de revascularização (CRM) , angioplastia (ACP) ou tratamento clínico otimizado (TCO). As taxas de mortalidade a 10 anos nos 3 grupos foram de 25%, 25% e 31%, respectivamente (P=0,09). As taxas de infarto foram 10%, 13% e 21%, respectivamente (P<0,01). A ausência de angina em 10 anos foi de 64% com CRM, 59% com ACP e 43% com TCO (P<0,001).

No ensaio COURAGE[3], em que foram alocados 2.287 pacientes para ACP associada a TCO , versus somente TCO, os autores não conseguiram demonstrar redução das taxas de morte ou infarto do miocárdio em longo prazo, com a intervenção percutânea (P=0,62). Além disso, as taxas de hospitalização e de ocorrência de síndrome coronária aguda em 5 anos foram similares (P=0,62 e P=0,56). Não obstante ter ocorrido redução significativa da angina no grupo percutâneo nos primeiros 2 anos de seguimento, esta redução foi mais evidente apenas nos pacientes com com maior nível de angina basal, e perdeu significância ao final de 5 anos (P=0,72) .

No estudo BARI 2D [4], 2.368 pacientes com diabetes tipo 2 e doença coronária multiarterial, foram randomizados para receber revascularização percutânea ou cirúrgica, associada a TCO, ou apenas TCO. Após 5 anos, as taxas de morte (desfecho primário) e MACE (morte, infarto ou AVC) não foram significativamente diferentes com qualquer das estratégias. No entanto, os pacientes no grupo CRM apresentavam doença mais avançada e complexa do que o grupo ACP, e os pacientes randomizados para CABG versus TCO, apresentaram taxas mais baixas de MACE de 5 anos (22,4% vs. 30,5%; P=0,01), provavelmente pela redução na ordem de 50% na taxa de infarto (7,4% vs. 14,6%). Em pacientes com DAC menos extensa, não houve diferença nas taxas de MACE entre ACP e TCO. A maioria das medidas de qualidade de vida e controle de angina também foi melhorada com CRM de rotina, em comparação com TCO. Além disso, a revascularização foi necessária em 42% dos pacientes do grupo de tratamento clínico, durante o seguimento.

Importante referir que os stents de metal (BMS) foram usados na maioria dos estudos de ACP versus TCO, incluindo os estudos MASS II, COURAGE e BARI 2D. É incontroverso o potencial dos stents farmacológicos (DES) em reduzir a resstenose e por conseguinte a isquemia recorrente, em comparação com o BMS, resultando em menos internações por revascularização repetida. No entanto, dados

de meta-análise têm sido controversos para demonstrar vantagem do DES na redução da mortalidade tardia ou da taxa de MI, em comparação com o BMS. Kirtane et al.[5] avaliaram a segurança e a eficácia dos stents farmacológicos em pacientes do "mundo real", e naqueles incluídos em ensaios clínicos randomizados; foram compilados dados de 9.470 pacientes em 22 trials e de 182.901 pacientes em 34 estudos observacionais. Nos estudos randomizados , não foram observadas diferenças significativas nas taxas de morte a longo prazo ou de infarto do miocárdio, após o uso de DES ou BMS. Somente em estudos observacionais do mundo real, o DES foi associado à redução do infarto e mortalidade.

A avaliação específica de pacientes com doença coronariana estável, submetidos ao implante de BMS ou DES, mostrou resultados ainda mais intrigantes. No NORSTENT trial [6], 9.013 pacientes foram randomizados para receber angioplastia com stents farmacológicos ou stents de metal. No grupo DES, 96% dos pacientes receberam stents de segunda geração - everolimus ou de zotarolimus. O desfecho primário foi morte por qualquer causa e/ou infarto do miocárdio não fatal, após 5 anos de seguimento. Os desfechos secundários incluíram revascularização repetida, trombose de stent e qualidade de vida. Não houve diferença significativa nos componentes do desfecho primário, e as medidas de qualidade de vida não diferiram significativamente entre os dois grupos. Apenas a taxa de revascularização repetida foi menor no grupo que recebeu DES.

Por outro lado, o valor da tomada de decisão terapêutica - entre agressiva ou conservadora , na doença coronária estável, após a realização da coronariografia, também tem sido questionada. No ISCHEMIA trial [7], ainda em curso (NCT01471522), a principal diferença no design do estudo é o momento da randomização, entre as estratégias invasiva ou conservadora, ser realizado antes do cateterismo. Este é um ensaio multicêntrico controlado, com uma alocação alvo de 5.000 pacientes estáveis, que apresentem isquemia ao menos moderada em testes de estresse. O principal objetivo é determinar se uma estratégia invasiva inicial de cateterismo cardíaco e revascularização ótima (com ACP ou CRM), além do TCO, reduzirá o desfecho composto de morte cardiovascular e/ou infarto do miocárdio não fatal, em comparação a uma estratégia desde o início conservadora. A randomização iniciou no final de 2012 , com previsão que conclusão em 2017. O seguimento médio será de aproximadamente 3 anos. Atualmente, existem cerca de 300 sites participantes, em mais de 30 países. O ISCHEMIA trial visa, portanto, abordar as seguintes limitações dos ensaios anteriores: 1) inclusão de pacientes antes do cateterismo, de modo que os pacientes anatômicos de alto risco não sejam excluídos; 2) inclusão de um grupo de maior risco com isquemia moderada; 3) minimização os cruzamentos; 4) uso DES contemporâneo em todos o grupo percutâneo e tomada de decisão guiada pela FFR, para obter revascularização completa fisiológica e não anatômica; e 5) poder estatístico para demonstrar se a revascularização de rotina reduz morte cardiovascular e/ou infarto, em pacientes com doença estável e isquemia ao menos moderada.

Há grande expectativa de que os resultados do estudo ISCHEMIA tenham importantes implicações, em relação a diretrizes globais para indicação e critérios para reembolso de procedimentos de revascularização, nos pacientes com doença coronariana estável.

No entanto, enquanto aguardamos os resultados do estudo ISCHEMIA e de outros estudos em andamento, o ORBITA é o ensaio mais bem concebido, comparando as estratégias conservadora e intervencionista, em pacientes com angina estável. O rigor com o qual o ensaio foi realizado e a conclusão de que a intervenção percutânea coronariana pode ter um poderoso efeito placebo, deverá ter impacto nas recomendações das próximas Diretrizes de doença coronariana estável.

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Registro Demonstra Superioridade da Revascularização Miocárdica Sobre a Angioplastia Coronária, em Pacientes Diabéticos Multiarteriais, com Síndrome Coronariana Aguda

Surgical versus Percutaneous Coronary Revascularization in Patients with Diabetes and Acute Coronary Syndromes

BACKGROUND

Randomized trial data support the superiority of coronary artery bypass grafting (CABG) surgery overpercutaneous coronary intervention (PCI) in diabetic patients with multivessel coronary artery disease (MV-CAD). However, whether this benefit is seen in a real-world population among subjects with stable ischemic heart disease(SIHD) and acute coronary syndromes (ACS) is unknown.

OBJECTIVES

The main objective of this study was to assess the generalizability of the FREEDOM (Future REvascularization Evaluation in Patients with Diabetes Mellitus: OptimalManagement of Multi-vessel Disease) trial in real-world practice among patients with diabetes mellitus and MV-CAD in residents of British Columbia, Canada. Additionally, the study evaluated the impact of mode of revascularization (CABG vs. PCI with drug-eluting stents) in diabetic patients with ACS and MV-CAD.

METHODS

In a large population-based database from British Columbia, this study evaluated major cardiovascular outcomes in all diabetic patients who underwent coronary revascularization between 2007 and 2014 (n=4.661, 2.947 patients with ACS). The primary endpoint (major adverse cardiac or cerebrovascular events [MACCE]) was a composite of all-cause death, nonfatal myocardial infarction, and nonfatal stroke. The risk of MACCE with CABG or PCI was compared using multivariable adjustment and a propensity score model.

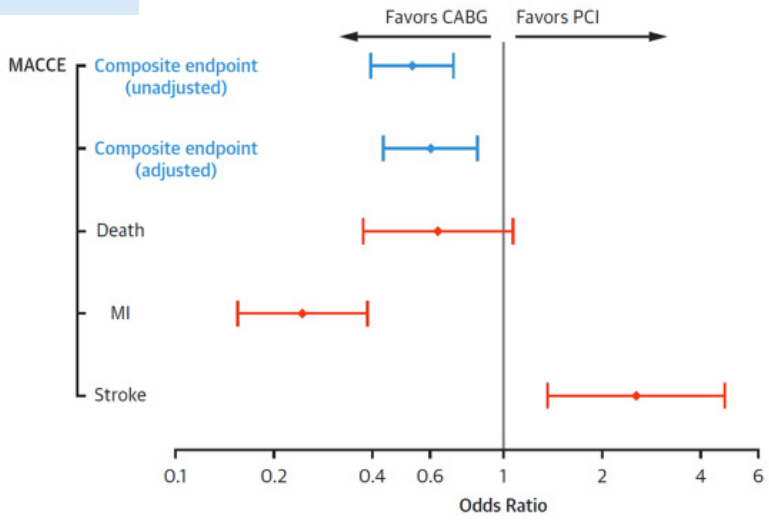
RESULTS

At 30-days post-revascularization, for ACS patients the odds ratio for MACCE favored CABG 0.49 (95% confidence interval [CI]: 0.34 to 0.71), whereas among SIHD patients MACCE was not affected by revascularization strategy (odds ratio: 1.46; 95% CI: 0.71 to 3.01; pinteraction <0.01). With a median follow-up of 3.3 years, the late (31-day to 5-year) benefit of CABG over PCI no longer varied by acuity of presentation, with a hazard ratio for MACCE in ACS patients of 0.67 (95% CI: 0.55 to 0.81) and the hazard ratio for SIHD patients of 0.55 (95% CI: 0.40 to 0.74; pinteraction = 0.28).

CONCLUSIONS

In diabetic patients with MV-CAD, CABG was associated with a lower rate of long-term MACCE relative to PCI for both ACS and SIHD. A well-powered randomized trial of CABG versus PCI in the ACS population is warranted because these patients have been largely excluded from prior trials. (J Am Coll Cardiol 2017;70:2995–3006).

FIGURE 2 Plot of ORs (95% Confidence Intervals) for 30-Day (Early) Outcomes (CABG vs. PCI)



Estudo Multicêntrico Demonstra Falha dos Filtros de Proteção Embólica em Prevenir o AVC, Em Pacientes Submetidos a Troca Valvar Aórtica

Effect of Cerebral Embolic Protection Devices on CNS Infarction in Surgical Aortic Valve Replacement. A Randomized Clinical Trial

IMPORTANCE
Stroke is a major complication of surgical aortic valve replacement (SAVR).

OBJECTIVE
To determine the efficacy and adverse effects of cerebral embolic protection devices in reducing ischemic central nervous system (CNS) injury during SAVR.

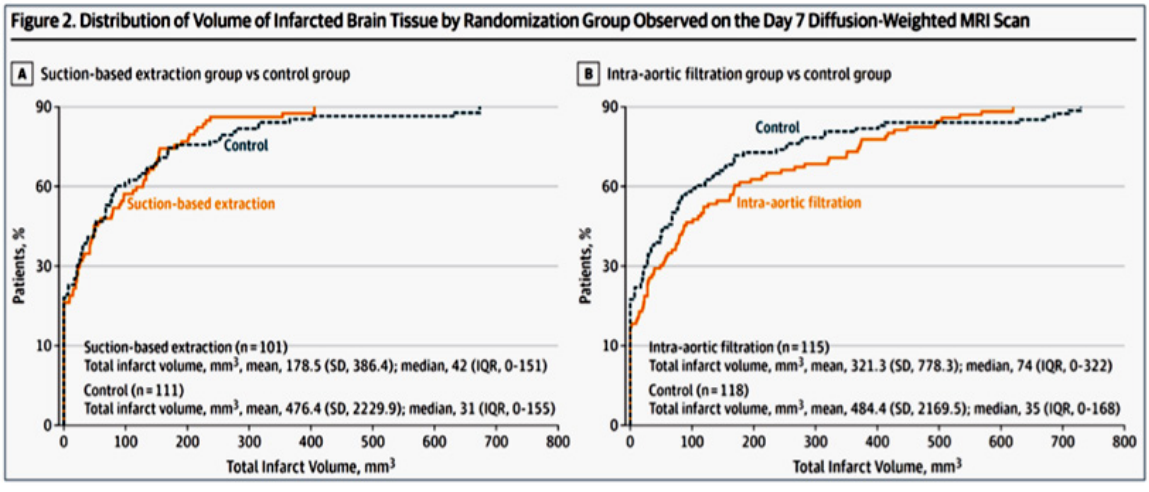
DESIGN, SETTING, AND PARTICIPANTS
A randomized clinical trial of patients with calcific aortic stenosis undergoing SAVR at 18 North American centers between March 2015 and July 2016. The end of follow-up was December 2016.

INTERVENTIONS
Use of 1 of 2 cerebral embolic protection devices (n = 118 for suction-based extraction and n = 133 for intra-aortic filtration device) vs a standard aortic cannula (control; n = 132) at the time of SAVR.

MAIN OUTCOMES AND MEASURES
The primary end pointwas freedom from clinical or radiographic CNS infarction at 7 days (± 3 days) after the procedure. Secondary end points included a composite of mortality, clinical ischemic stroke, and acute kidney injury within 30 days after surgery; delirium; mortality; serious adverse events; and neurocognition.

RESULTS
Among 383 randomized patients (mean age, 73.9 years; 38.4%women; 368 [96.1%] completed the trial), the rate of freedom from CNS infarction at 7 days was 32.0% with suction-based extraction vs 33.3%with control (between-group difference, –1.3%; 95% CI, –13.8% to 11.2%) and 25.6%with intra-aortic filtration vs 32.4% with control (between-group difference, –6.9%; 95% CI, –17.9% to 4.2%). The 30-day composite end point was not significantly different between suction-based extraction and control (21.4% vs 24.2%, respectively; between-group difference, –2.8% [95% CI, –13.5% to 7.9%]) nor between intra-aortic filtration and control (33.3% vs 23.7%; between-group difference, 9.7% [95% CI, –1.2% to 20.5%]). There were no significant differences in mortality (3.4% for suction-based extraction vs 1.7% for control; and 2.3% for intra-aortic filtration vs 1.5%f or control) or clinical stroke (5.1% for suction-based extraction vs 5.8% for control; and 8.3% for intra-aortic filtration vs 6.1% for control). Delirium at postoperative day 7 was 6.3% for suction-based extraction vs 15.3% for control (between-group difference, –9.1%; 95%CI, –17.1% to –1.0%) and 8.1% for intra-aortic filtration vs 15.6%for control (between-group difference, –7.4%; 95%CI, –15.5% to 0.6%). Mortality and overall serious adverse events at 90 days were not significantly different across groups. Patients in the intra-aortic filtration group vs patients in the control group experienced significantly more acute kidney injury events (14 vs 4, respectively; P = .02) and cardiac arrhythmias (57 vs 30; P = .004).

CONCLUSIONS AND RELEVANCE
Among patients undergoing SAVR, cerebral embolic protection devices compared with a standard aortic cannula did not significantly reduce the risk of CNS infarction at 7 days. Potential benefits for reduction in delirium, cognition, and symptomatic stroke merit larger trials with longer follow-up.



Meta-análise reforça Associação Direta Entre Tamanho das Vegetações e Risco de Embolização e Morte, na Endocardite Bacteriana

Association of Vegetation Size with Embolic Risk in Patients With Infective Endocarditis. A Systematic Review and Meta-analysis

IMPORTANCE
Infective endocarditis is a life-threating condition with annual mortality of as much as 40% and is associated with embolic events in as many as 80% of cases. These embolic events have notable prognostic implications and have been linked to increased length of stay in intensive care units and mortality. A vegetation size greater than 10mm has often been suggested as an optimal cutoff to estimate the risk of embolism, but the evidence is based largely on small observational studies.

OBJECTIVE
To study the association of vegetation size greater than 10 mmwith embolic events using meta-analytic techniques.

DATA SOURCES
A computerized literature search of all publications in the PubMed and EMBASE databases from inception to May 1, 2017, was performed with search terms including varying combinations of infective endocarditis, emboli, vegetation size, pulmonary infarct, stroke, splenic emboli, renal emboli, retinal emboli, and mesenteric emboli. This search was last assessed as being up to date on May 1, 2017.

STUDY SELECTION
Observational studies or randomized clinical trials that evaluated the association of vegetation size greater than 10mmwith embolic events in adult patients with infective endocarditis were included. Conference abstracts and non–English language literature were excluded. The search was conducted by 2 independent reviewers blinded to the other's work.

DATA EXTRACTION AND SYNTHESIS
Following PRISMA guidelines, the 2 reviewers independently extracted data; disputes were resolved with consensus or by a third investigator. Categorical dichotomous data were summarized across treatment arms using Mantel-Haenszel odds ratios (ORs) with 95%CIs. Heterogeneity of effects was evaluated using the Higgins I2 statistic.

RESULTS
The search yielded 21 unique studies published from 1983 to 2016 with a total of 6646 unique patients with infective endocarditis and 5116 vegetations with available dimensions. Patients with a vegetation size greater than 10mmhad increased odds of embolic events (OR, 2.28; 95% CI, 1.71-3.05; P < .001) and mortality (OR, 1.63; 95% CI, 1.13-2.35; P = .009) compared with those with a vegetation size less than 10 mm.

CONCLUSIONS AND RELEVANCE
In this meta-analysis of 21 studies, patients with vegetation size greater than 10mmhad significantly increased odds of embolism and mortality. Understanding the risk of embolization will allow clinicians to adequately risk stratify patients and will also help facilitate discussions regarding surgery in patients with a vegetation size greater than 10 mm.

Key Points

Question What is the association of vegetation size greater than 10 mm with embolic events in patients with infective endocarditis?

Findings In this systematic review and meta-analysis of 21 unique studies that included 6646 unique patients with infective endocarditis and 5116 measured vegetations, patients with a vegetation size greater than 10 mm had significantly increased odds of embolic events and mortality.

Meaning Large vegetations (>10 mm) may be associated with an increased risk of embolization.

Estudo TRICS avalia Implicações da Estratégias Transfusionais Restritiva ou Liberal, em Cirurgias Cardíacas

Restrictive or Liberal Red-Cell Transfusion for Cardiac Surgery

BACKGROUND

The effect of a restrictive versus liberal red-cell transfusion strategy on clinical outcomes in patients undergoing cardiac surgery remains unclear.

METHODS

In this multicenter, open-label, noninferiority trial, we randomly assigned 5243 adults undergoing cardiac surgery who had a European System for Cardiac Operative Risk Evaluation (EuroSCORE) I of 6 or more (on a scale from 0 to 47, with higher scores indicating a higher risk of death after cardiac surgery) to a restrictive red-cell transfusion threshold (transfuse if hemoglobin level was <7.5 g per deciliter, starting from induction of anesthesia) or a liberal red-cell transfusion threshold (transfuse if hemoglobin level was <9.5 g per deciliter in the operating room or intensive care unit [ICU] or was <8.5 g per deciliter in the non-ICU ward). The primary composite outcome was death from any cause, myocardial infarction, stroke, or new-onset renal failure with dialysis by hospital discharge or by day 28, whichever came first. Secondary outcomes included red-cell transfusion and other clinical outcomes.

RESULTS

The primary outcome occurred in 11.4% of the patients in the restrictive-threshold group, as compared with 12.5% of those in the liberal-threshold group (absolute risk difference, -1.11 percentage points; 95% confidence interval [CI], -2.93 to 0.72; odds ratio, 0.90; 95% CI, 0.76 to 1.07; P<0.001 for noninferiority). Mortality was 3.0% in the restrictive-threshold group and 3.6% in the liberal-threshold group (odds ratio, 0.85; 95% CI, 0.62 to 1.16). Red-cell transfusion occurred in 52.3% of the patients in the restrictive-threshold group, as compared with 72.6% of those in the liberal-threshold group (odds ratio, 0.41; 95% CI, 0.37 to 0.47). There were no significant between-group differences with regard to the other secondary outcomes.

CONCLUSIONS

In patients undergoing cardiac surgery who were at moderate-to-high risk for death, a restrictive strategy regarding red-celltransfusion was noninferior to a liberal strategy with respect to the composite outcome of death from any cause, myocardial infarction, stroke, or new-onset renal failure with dialysis, with less blood transfused. (Funded by the Canadian Institutes of Health Research and others; TRICS III ClinicalTrials.gov number, NCT02042898).

Table 3. Primary and Secondary Outcomes in the Per-Protocol Population.

Characteristic	Restrictive Threshold (N=2430)	Liberal Threshold (N=2430)
Primary outcome		
Composite-outcome event — no./total no. (%)	276/2428 (11.4)	303/2429 (12.5)
Death — no./total no. (%)	74/2427 (3.0)	87/2429 (3.6)
Stroke — no./total no. (%)	45/2428 (1.9)	49/2429 (2.0)
Myocardial infarction — no./total no. (%)	144/2428 (5.9)	144/2429 (5.9)
New-onset renal failure with dialysis — no./total no. (%)	61/2428 (2.5)	72/2429 (3.0)

Guidelines da Society for Thoracic Surgeons/American Society for Extracorporeal Tecnology sobre anticoagulação durante CEC

The Society of Thoracic Surgeons, The Society of Cardiovascular Anesthesiologists, and The American Society of Extracorporeal Technology: Clinical Practice Guidelines—Anticoagulation During Cardiopulmonary Bypass

Despite more than a half century of "safe" cardiopulmonary bypass (CPB), the evidence base surrounding the conduct of anticoagulation therapy for CPB has not been organized into a succinct guideline. For this and other reasons, there is enormous practice variability relating to the use and dosing of heparin, monitoring heparin anticoagulation, reversal of anticoagulation, and the use of alternative anticoagulants. To address this and other gaps, The Society of Thoracic Surgeons, the Society of Cardiovascular Anesthesiologists, and the American Society of Extracorporeal Technology developed an Evidence Based Workgroup. This was a group of interdisciplinary professionals gathered to summarize the evidence and create practice recommendations for various aspects of CPB. To date, anticoagulation practices in CPB have not been standardized in accordance with the evidence base. This clinical practice guideline was written with the intent to fill the evidence gap and to establish best practices in anticoagulation therapy for CPB using the available evidence.

The ideal anticoagulation strategy for cardiac surgery with CPB in patients who cannot take heparin does not exist. Heparin and protamine remain the gold standard for anticoagulation therapy. A small subset of patients requires heparin alternatives for the conduct of CPB. Bivalirudin seems to offer the safest heparin alternative in this setting. This drug has a short half-life of approximately 25 minutes. Nonetheless, coagulopathy occurs in bivalirudin-treated patients. There is no well-defined reversal agent for bivalirudin, and patients with coagulopathy and excessive bleeding require unusual interventions for hemorrhage control. Only anecdotal experience is available to address coagulopathy in cases of bivalirudin-related hemorrhage. Consensus suggests that a multifaceted approach offers the Best chance of successful hemorrhage control for these patients.

Recombinant activated factor VII may be na important part of hemorrhage control but other interventions including modified ultrafiltration, hemodialysis, and clotting factor replacement are also advocated.

Estatística da Doença Cardiovascular na Europa em 2017: prevalência das Patologias, Fatores de Risco, indicadores de Desempenho e Qualidade Assistencial em 56 países membros da ESC

European Society of Cardiology: Cardiovascular Disease Statistics 2017

OBJECTIVE

The European Society of Cardiology (ESC) Atlas has been compiled by the European Heart Agency to document cardiovascular disease (CVD) statistics of the 56 ESC member countries. A major aim of this 2017 data presentation has been to compare high-income and middle-income ESC member countries to identify inequalities in disease burden, outcomes, and service provision.

METHODS AND RESULTS

The Atlas utilizes a variety of data sources, including the World Health Organization, the Institute for Health Metrics and Evaluation, and the World Bank to document risk factors, prevalence, and mortality of cardiovascular disease and national economic indicators. It also includes novel ESC-sponsored survey data of health infrastructure and cardiovascular service provision provided by the national societies of the ESC member countries. Data presentation is descriptive with no attempt to attach statistical significance to differences observed in stratified analyses. Important differences were identified between the high-income and middle-income member countries of the ESC with regard to CVD risk factors, disease incidence, and mortality. For both women and men, the age-standardized prevalence of hypertension was lower in high-income countries (18% and 27%) compared with middle-income countries (24% and 30%). Smoking prevalence in men (not women) was also lower (26% vs. 41%) and together these inequalities are likely to have contributed to the higher CVD mortality in middle-income countries. Declines in CVD mortality have seen cancer becoming a more common cause of death in a number of high-income member countries, but in middle-income countries declines in CVD mortality have been less consistent where CVD remains the leading cause of death. Inequalities in CVD mortality are emphasized by the smaller contribution they make to potential years of life lost in high-income countries compared with middle-income countries both for women (13% vs. 23%) and men (20% vs. 27%). The downward mortality trends for CVD may, however, be threatened by the emerging obesity epidemic that is seeing rates of diabetes increasing across all the ESC member countries. Survey data from the National Cardiac Societies showed that rates of cardiac catheterization and coronary artery bypass surgery, as well as the number of specialist centres required to deliver them, were greatest in the high-income member countries of the ESC. The Atlas confirmed that these ESC member countries, where the facilities for the contemporary treatment of coronary disease were best developed, were often those in which declines in coronary mortality have been most pronounced. Economic resources were not the only driver for delivery of equitable cardiovascular health care, as some middle-income ESC member countries reported rates for interventional procedures and device implantations that matched or exceeded the rates in wealthier member countries.

CONCLUSION

In documenting national CVD statistics, the Atlas provides valuable insights into the inequalities in risk factors, health care delivery, and outcomes of CVD across the ESC member countries. The availability of these data Will underpin the ESC's ambitious mission 'to reduce the burden of cardiovascular disease' not only in its member countries but also in nation states around the world.