Bioestadística

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Urgencias Médicas

INCIDENCIA Y PREVALENCIA

	Cálculo	Significado
Prevalencia	$\frac{\text{Casos Existentes}}{\text{Población Total}}$	Proporción de individuos enfermos en una población en un momento determinado
Incidencia	$\frac{\text{Casos Nuevos}}{\text{Población susceptible en un periodo}}$	Riesgo individual de enfermar (Casos Nuevos de una enfermedad en un periodo de tiempo)

Ejemplo:
La **prevalencia** de DM2 en Colombia es del **5,2%**
La **incidencia** de DM2 en Colombia es de **7 /1000** en el año 2009

ESTADISTICA DE LAS PRUEBAS DIAGNOSTICAS

SENSIBILIDAD

- La sensibilidad define la probabilidad de que un individuo enfermo tenga un test positivo

  ¿si el paciente tiene realmente la enfermedad, cuál es la probabilidad de que la prueba empleada sea positiva?

- La sensibilidad del Test ELISA para VIH es de **99.5%**

  (**99.5** de 100 pacientes con VIH tienen ELISA positivo)

ESPECIFICIDAD

- La especificidad es la probabilidad de que un individuo sano tenga un test negativo

  ¿si el paciente no tiene la enfermedad, cuál es la probabilidad de que la prueba sea negativa?

- La especificidad del test ELISA para VIH es de **30%**

  (**30** de 100 pacientes que **no** tienen VIH (sanos) tienen ELISA **negativo**)

  Significado: 70% de los pacientes sanos tiene ELISA positivo

- La especificidad del test WESTERN BLOT para VIH es de **99%**

VALOR PREDICTIVO POSITIVO (VVP)

- El VPP es la probabilidad que un individuo con un test positivo este enfermo.

  Si el resultado de una prueba es positivo ¿qué probabilidad tiene el paciente de presentar la enfermedad en estudio?

- El VPP del test ELISA para VIH es de **52%**

  (**52** de 100 pacientes con el test ELISA positivo tienen VIH)

- El VPP del test WESTERN BLOT para VIH es de **99%**

VALOR PREDICTIVO NEGATIVO (VPN)

- El VPN es la probabilidad que un individuo con un test negativo **no** este enfermo

Si el resultado de una prueba es negativo, ¿cuál es la probabilidad que tiene el paciente de no presentar la enfermedad en estudio?

El VPN del test ELISA para VIH es de **99%**

(99 de 100 pacientes con test ELISA negativo **no** tienen VIH)

DIFERENCIAS

- **SENSIBILIDAD:**
  - **Tienen la enfermedad** → Signo o paraclínico positivo
  - La sensibilidad del Test ELISA para VIH es de **99.5%**

- **VALOR PREDICTIVO POSITIVO:**
  - **Paraclínico positivo** → Enfermedad
  - El VPP del test ELISA para VIH es de **52%**
  - El VPP del test WESTERN BLOT para VIH es de **99%**

DIFERENCIAS

- **ESPECIFICIDAD:**
  - **NO tienen la enfermedad** → Signo o paraclínico negativo
  - La especificidad del test ELISA para VIH es de **30%**
  - La especificidad del test WESTERN BLOT para VIH es de **99%**

- **VALOR PREDICTIVO NEGATIVO:**
  - **Paraclínico negativo** → **No** tienen Enfermedad
  - El VPN del test ELISA para VIH es de **99%**

SIGNIFICANCIA E INTERVALOS DE CONFIANZA

SIGNIFICANCIA Y VALOR DE P

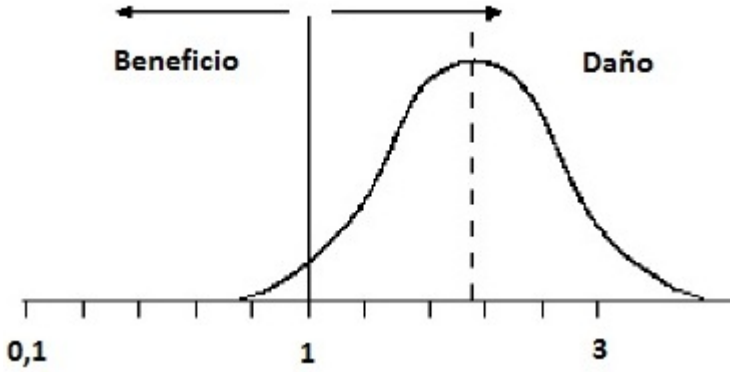
- En un estudio cualquier resultado observado puede deberse al azar.

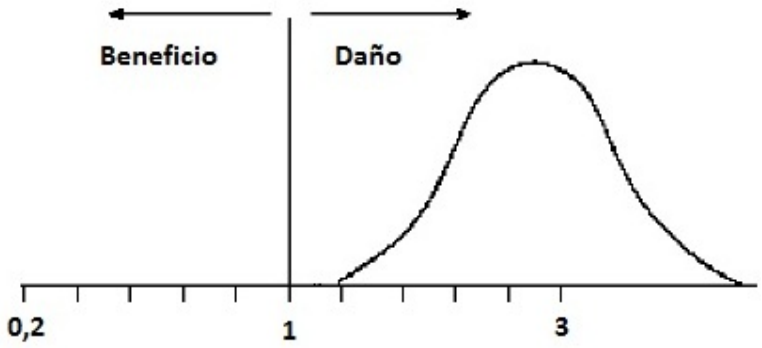
- El valor de ***p*** o nivel de significancia nos muestra la probabilidad de que el azar nos explique determinado resultado.

- Por lo tanto si la ***p*** es < 0,05 hay muy poca probabilidad de azar y se afirma que hay diferencias estadísticamente significativas entre las variables.

INTERVALO DE CONFIANZA

- Variabilidad entre la medida obtenida en un estudio.
- Corresponde a un rango de valores, cuya distribución es **normal** y en el cual se encuentra, con **alta probabilidad**, el **valor real (significativo)** de una determinada variable.
- Alta probabilidad → **95%**





The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

10-Year Follow-up of Intensive Glucose Control in Type 2 Diabetes

Rury R. Holman, F.R.C.P., Sanjoy K. Paul, Ph.D., M. Angelyn Bethel, M.D.,
David R. Matthews, F.R.C.P., and H. Andrew W. Neil, F.R.C.P.

METHODS

Of 5102 patients with newly diagnosed type 2 diabetes, 4209 were randomly assigned to receive either conventional therapy (dietary restriction) or intensive therapy (either sulfonylurea or insulin or, in overweight patients, metformin) for glucose control.

Table 2. Aggregate Outcomes for Patients during Follow-up.*

Aggregate Outcome	Patients with Clinical Outcome		Absolute Risk†		P Value‡	Risk Ratio for Intensive-Therapy Regimen (95% CI)
	Intensive Therapy	Conventional Therapy	Intensive Therapy	Conventional Therapy		
	no. of patients					
Sulfonyurea–insulin group	2729	1138				
Any diabetes-related end point	1571	686	48.1	52.2	0.04	0.91 (0.83–0.99)
Diabetes-related death	618	297	14.5	17.0	0.01	0.83 (0.73–0.96)
Death from any cause	1162	537	26.8	30.3	0.007	0.87 (0.79–0.96)
Myocardial infarction	678	319	16.8	19.6	0.01	0.85 (0.74–0.97)
Stroke	260	116	6.3	6.9	0.39	0.91 (0.73–1.13)
Peripheral vascular disease	83	40	2.0	2.4	0.29	0.82 (0.56–1.19)
Microvascular disease	429	222	11.0	14.2	0.001	0.76 (0.64–0.89)
Metformin group	342	411				
Any diabetes-related end point	209	262	45.7	53.9	0.01	0.79 (0.66–0.95)
Diabetes-related death	81	120	14.0	18.7	0.01	0.70 (0.53–0.92)
Death from any cause	152	217	25.9	33.1	0.002	0.73 (0.59–0.89)
Myocardial infarction	81	126	14.8	21.1	0.005	0.67 (0.51–0.89)
Stroke	34	42	6.0	6.8	0.35	0.80 (0.50–1.27)
Peripheral vascular disease	13	21	2.3	3.4	0.19	0.63 (0.32–1.27)
Microvascular disease	66	78	12.4	13.4	0.31	0.84 (0.60–1.17)

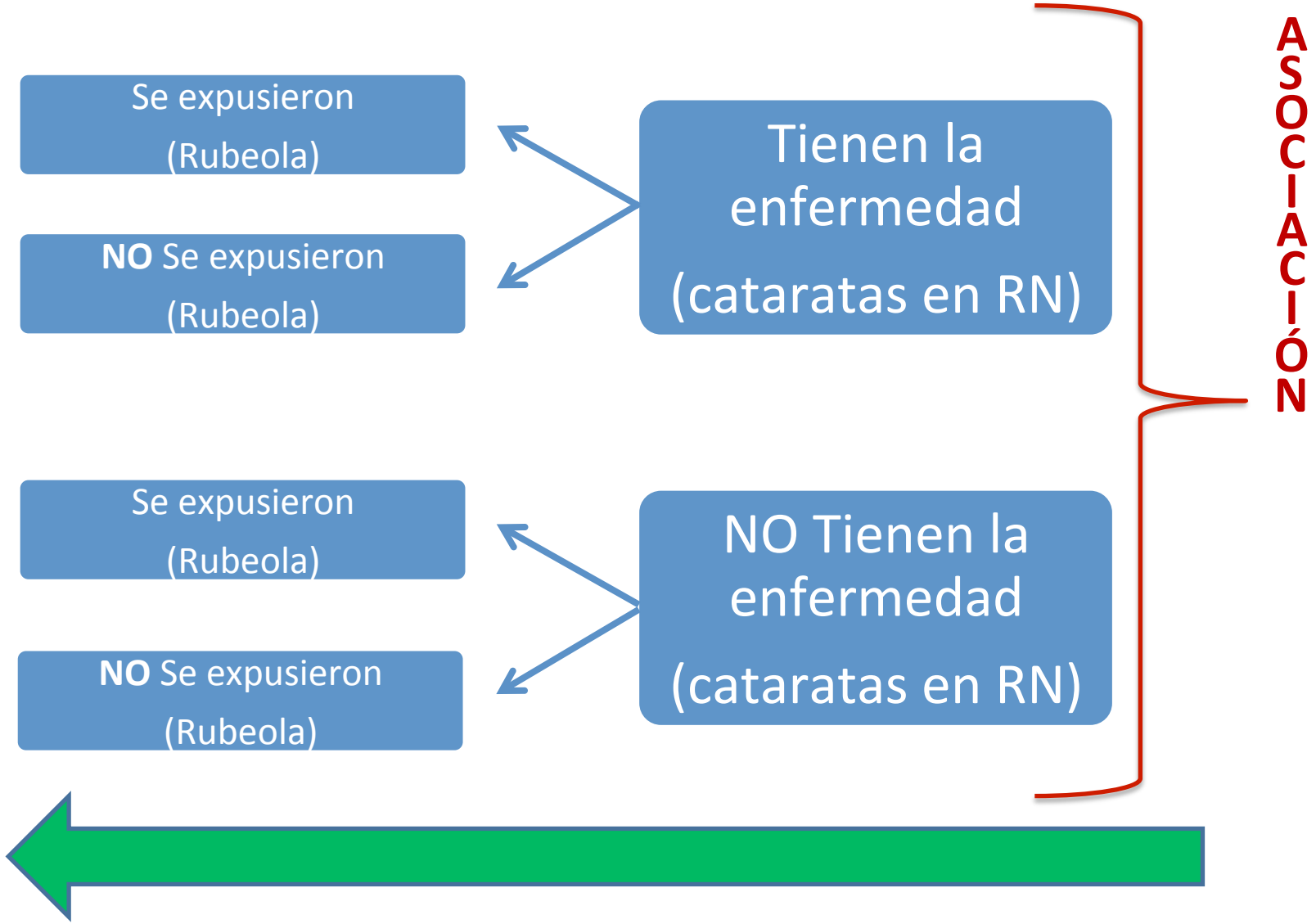
TIPOS DE ESTUDIOS INVESTIGATIVOS BIOMEDICOS

ESTUDIOS CUANTITATIVOS

- Observacionales
  - Casos y Controles
  - Cohorte
  - Transversales
- Ensayos Clínicos Aleatorizados
- Metaanálisis

CASOS Y CONTROLES

- **Hacia atras** 
- Se utiliza cuando el resultado de pacientes con y sin enfermedad son comparados retrospectivamente para encontrar que factor de riesgo se presento en el pasado.
- Útil en estudio de enfermedades raras o no comunes.


Se expusieron (Rubeola)
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Se expusieron (Rubeola)
NO Se expusieron (Rubeola)
NO Tienen la enfermedad (cataratas en RN)
ASOCIACIÓN

The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 MARCH 14, 2013 VOL. 368 NO. 11

Risk of Ischemic Heart Disease in Women after Radiotherapy for Breast Cancer

METHODS

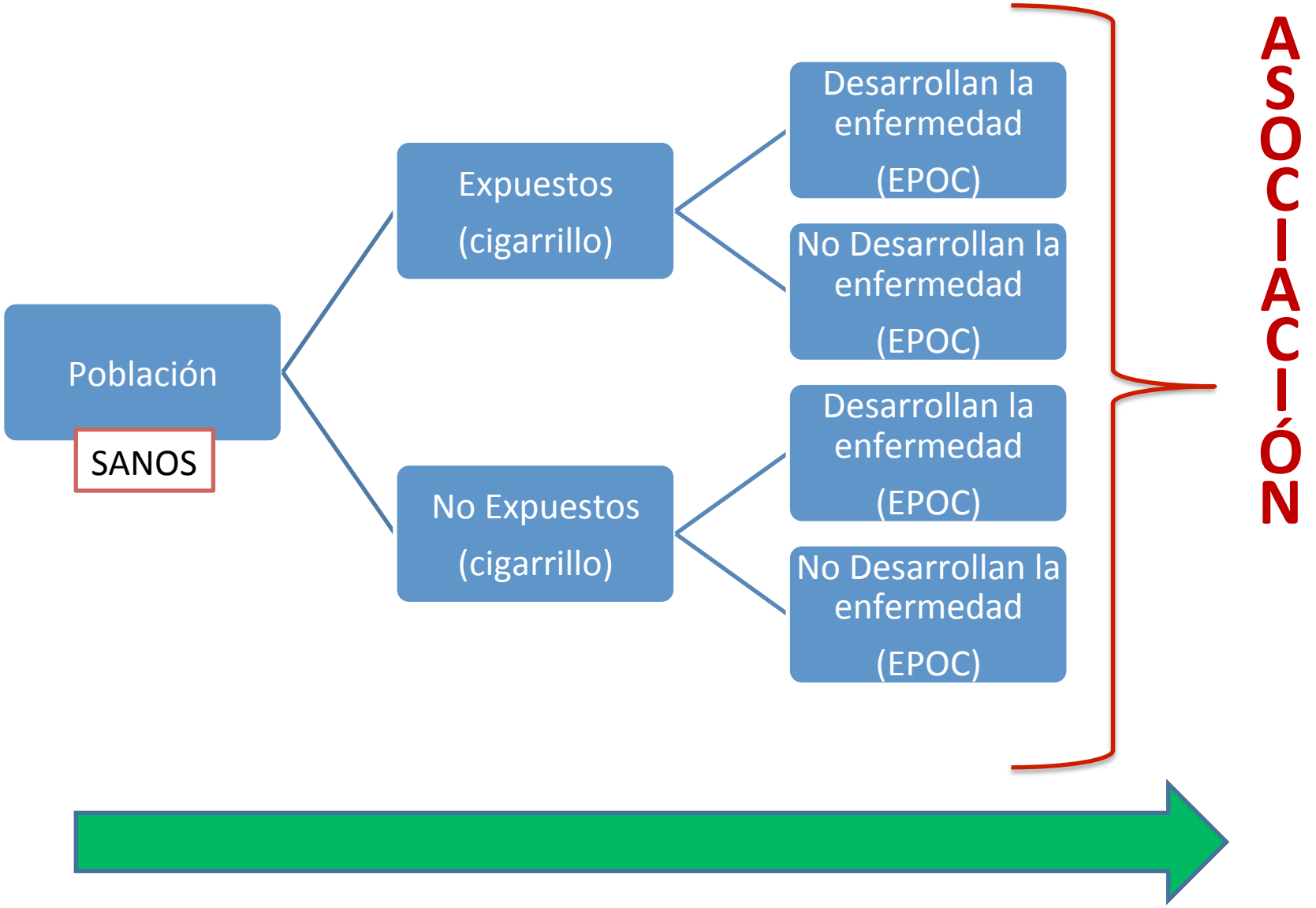
We conducted a population-based case–control study of major coronary events (i.e., myocardial infarction, coronary revascularization, or death from ischemic heart disease) in 2168 women who underwent radiotherapy for breast cancer between 1958 and 2001 in Sweden and Denmark; the study included 963 women with major coronary events and 1205 controls. Individual patient information was obtained from hospital records. For each woman, the mean radiation doses to the whole heart and to the left anterior descending coronary artery were estimated from her radiotherapy chart.

RESULTS

The overall average of the mean doses to the whole heart was 4.9 Gy (range, 0.03 to 27.72). Rates of major coronary events increased linearly with the mean dose to the heart by 7.4% per gray (95% confidence interval, 2.9 to 14.5; P<0.001), with no ap-

COHORTES

- **Hacia Adelante** 
- Es un tipo de estudio prospectivo con pacientes en distintos tratamientos o diferentes tipos de riesgo, son seguidos durante el tiempo para observar los desenlaces.
- Muy útiles en el estudio de enfermedades que toman mucho tiempo en desarrollar un desenlace o de lenta evolución.


Población
SANOS
Expuestos
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ASOCIACIÓN

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Azithromycin and the Risk of Cardiovascular Death

Wayne A. Ray, Ph.D., Katherine T. Murray, M.D., Kathi Hall, B.S., Patrick G. Arbogast, Ph.D., and C. Michael Stein, M.B., Ch.B.

METHODS

We studied a Tennessee Medicaid cohort designed to detect an increased risk of death related to short-term cardiac effects of medication, excluding patients with serious noncardiovascular illness and person-time during and shortly after hospitalization. The cohort included patients who took azithromycin (347,795 prescriptions), propensity-score–matched persons who took no antibiotics (1,391,180 control periods), and patients who took amoxicillin (1,348,672 prescriptions), ciprofloxacin (264,626 prescriptions), or levofloxacin (193,906 prescriptions).

RESULTS

During 5 days of therapy, patients taking azithromycin, as compared with those who took no antibiotics, had an increased risk of cardiovascular death (hazard ratio, 2.88; 95% confidence interval [CI], 1.79 to 4.63; P<0.001) and death from any cause (hazard ratio, 1.85; 95% CI, 1.25 to 2.75; P=0.002). Patients who took amoxicillin had no increase in the risk of death during this period. Relative to amoxicillin, azithromycin was associated with an increased risk of cardiovascular death (hazard ratio, 2.49; 95% CI, 1.38 to 4.50; P=0.002) and death from any cause (hazard ratio, 2.02; 95% CI, 1.24 to 3.30; P=0.005), with an estimated 47 additional cardiovascular deaths per 1 million courses; patients in the highest decile of risk for cardiovascular disease had an estimated 245 additional cardiovascular deaths per 1 million courses. The risk of cardiovascular death was significantly greater with azithromycin than with ciprofloxacin but did not differ significantly from that with levofloxacin.

TRANSVERSAL

- Los datos tomados en el estudio son tomados en un momento determinado de tiempo.
- Útiles para determinar frecuencias o rangos de un factor de riesgo medible.

BMJ open
accessible medical research

The relationship between osteoarthritis and cardiovascular disease in a population health survey: a cross-sectional study

Objectives: Our objective was to determine the relationship between osteoarthritis (OA) and heart diseases (myocardial infarction (MI), angina, congestive heart failure (CHF)) and stroke using population-based survey data.

Design: Cross-sectional study.

Main outcome measures: Self-reported heart disease was the primary outcome and MI, angina, CHF and stroke were considered as secondary outcomes. Multivariable logistic regression models were used to estimate the ORs after adjusting for sociodemographic status, obesity, physical activity, smoking status, fruit and vegetable consumption, medication use, diabetes, hypertension and chronic obstructive pulmonary disease.

Results: The mean age of OA cases was 66 years and 71.6% were women. OA exhibited increased odds of prevalent heart disease, and adjusted overall OR (95% CI) was 1.45 (1.36 to 1.54), 1.35 (1.21 to 1.50) among men and 1.51 (1.39 to 1.64) among women with OA. OA showed increased ORs for angina and CHF in both men and women, and for MI in women. ORs (95% CI) for men and women, respectively, were 1.08 (0.91 to 1.28) and 1.49 (1.28 to 1.75) for MI, 1.76 (1.43 to 2.17) and 1.84 (1.59 to 2.14) for angina, 1.50 (1.13 to 1.97) and 1.81 (1.49 to 2.21) for CHF, and 1.08 (0.83 to 1.40) and 1.13 (0.93 to 1.37) for stroke.

Conclusions: Prevalent OA was associated with self-reported heart disease, particularly angina, and CHF in both men and women, after controlling for established risk factors for these conditions. This study provides a rationale for further investigation of the association between OA and heart disease in longitudinal studies for investigating possible biological and behavioural mechanisms.

ENSAYO CLÍNICO ALEATORIZADO

- Los ensayos clínicos son un tipo de estudio donde el paciente es puesto aleatoriamente en un grupo donde recibirá una o dos o mas intervenciones, para ser comparadas posteriormente en el tiempo.
- Preferiblemente doble ciego.
- Otros tipos de Ensayo clinico:
  - **No inferioridad**: Son estudios diseñados para evaluar una nueva terapia o intervención y compararlo con el control o terapia estándar del momento, dando como resultados estadísticos que el nuevo fármaco es inferior en su efectividad o no inferior.

frontiers in
PHARMACOLOGY

ORIGINAL RESEARCH ARTICLE
published: 14 May 2013
doi: 10.3389/fphar.2013.00039

Dabigatran – a case history demonstrating the need for comprehensive approaches to optimize the use of new drugs

Dabi **Conclusion:** Models for introducing new drugs are essential to optimize their prescribing especially where there are concerns. Without such models, new drugs may be withdrawn prematurely and/or struggle for funding.

METHODS

In this noninferiority trial, we randomly a… trial fi-
brillation and a risk of stroke to receive, in a bl…
igatran — 110 mg or 150 mg twice daily — or, in an unbl…
warfarin. The median duration of the follow-up period was 2.…
outcome was stroke or systemic embolism.

…eichman, Ph.D., and Ellis F. Unger, M.D.

…eports of Bleeding

POSTMARKETING REPORTS OF BLEEDING

The NEW ENGLAND JOURNAL of MEDICINE

Bleeding Risk with Dabigatran in the Frail Elderly

VALORACIÓN DEL RIESGO

EVALUACIÓN DEL RIESGO

- Riesgo absoluto
- Reducción del riesgo absoluto
- Riesgo relativo

- **Riesgo Absoluto (RA):**

  Es la probabilidad de que un individuo experimente el desenlace de riesgo (FR) en un determinado periodo de tiempo.

  5-8% de pacientes con FA desarrollarán un ACV cada año.

EVALUACIÓN DEL RIESGO

- **Reducción del riesgo absoluto (RRA):**

En el contexto de un ensayo clínico aleatorizado, es el valor que un determinado tratamiento disminuye el riesgo de un evento.

La terapia anticoagulante tiene RRA de 1,6 – 2% /año

- **Riesgo Relativo (RR):**

Se entiende como el chance de un posible desenlace utilizando un especifico tratamiento comparado con el chance de otro tratamiento alternativo.

EVALUACIÓN DEL RIESGO

Midiendo la fuerza de asociación en los estudios prospectivos, variando entre 0 e infinito.

interpretándose de la siguiente manera:

RR > 1: Factor de riesgo

RR = 1: la incidencia es igual en expuestos y en no expuestos

RR < 1: Factor protector

Table 2. Aggregate Outcomes for Patients during Follow-up.*

Aggregate Outcome	Patients with Clinical Outcome		Absolute Risk†		P Value‡	Risk Ratio for Intensive-Therapy Regimen (95% CI)
	Intensive Therapy	Conventional Therapy	Intensive Therapy	Conventional Therapy		
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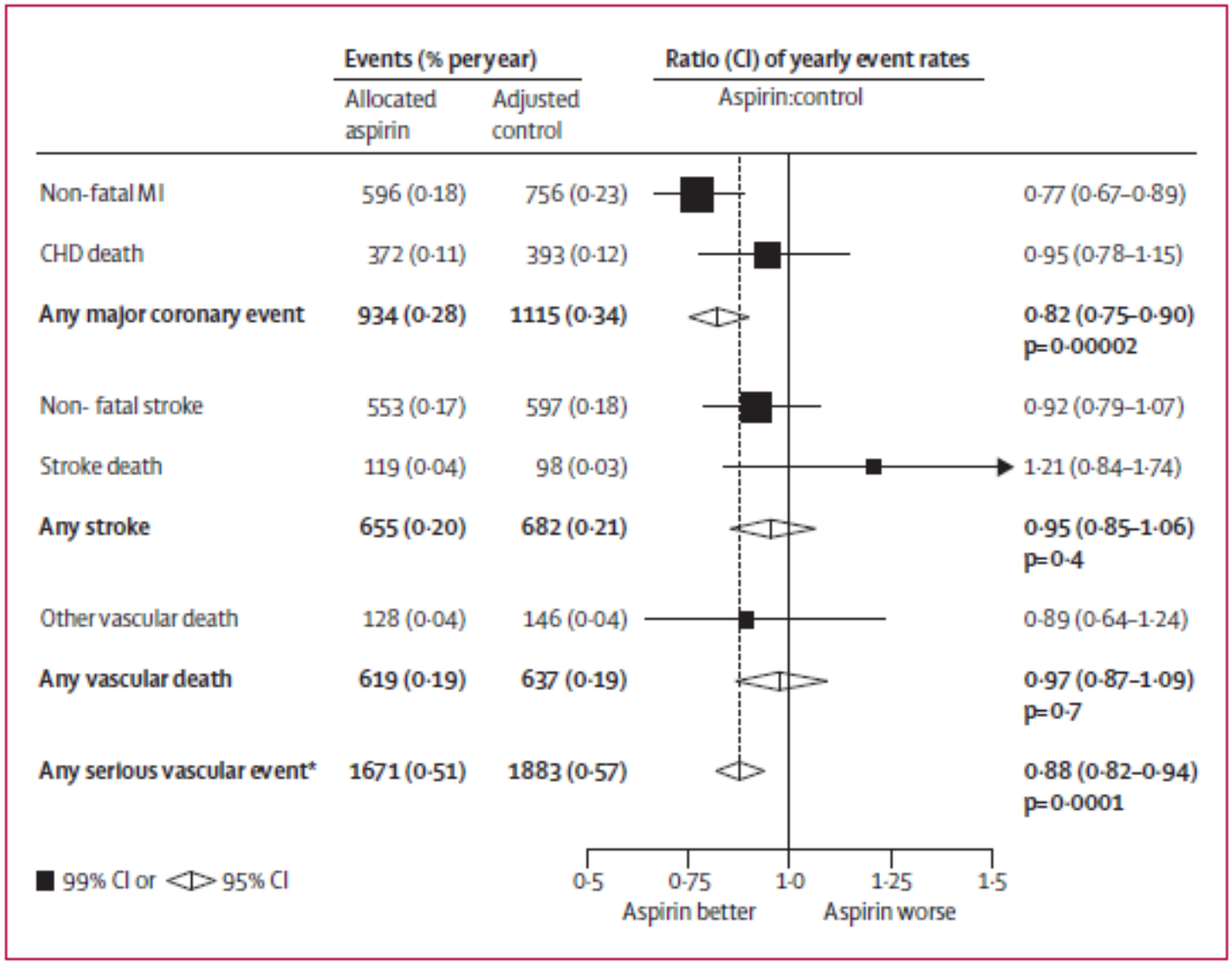
Aspirin in the primary and secondary prevention of vascular disease: collaborative meta-analysis of individual participant data from randomised trials

Antithrombotic Trialists' (ATT) Collaboration*



ELSEVIER
International Journal of Cardiology 141 (2010) 157–166
International Journal of Cardiology
www.elsevier.com/locate/ijcard

Fibrates in the prevention of cardiovascular disease in patients with type 2 diabetes mellitus – A pooled meta-analysis of randomized placebo-controlled clinical trials ☆

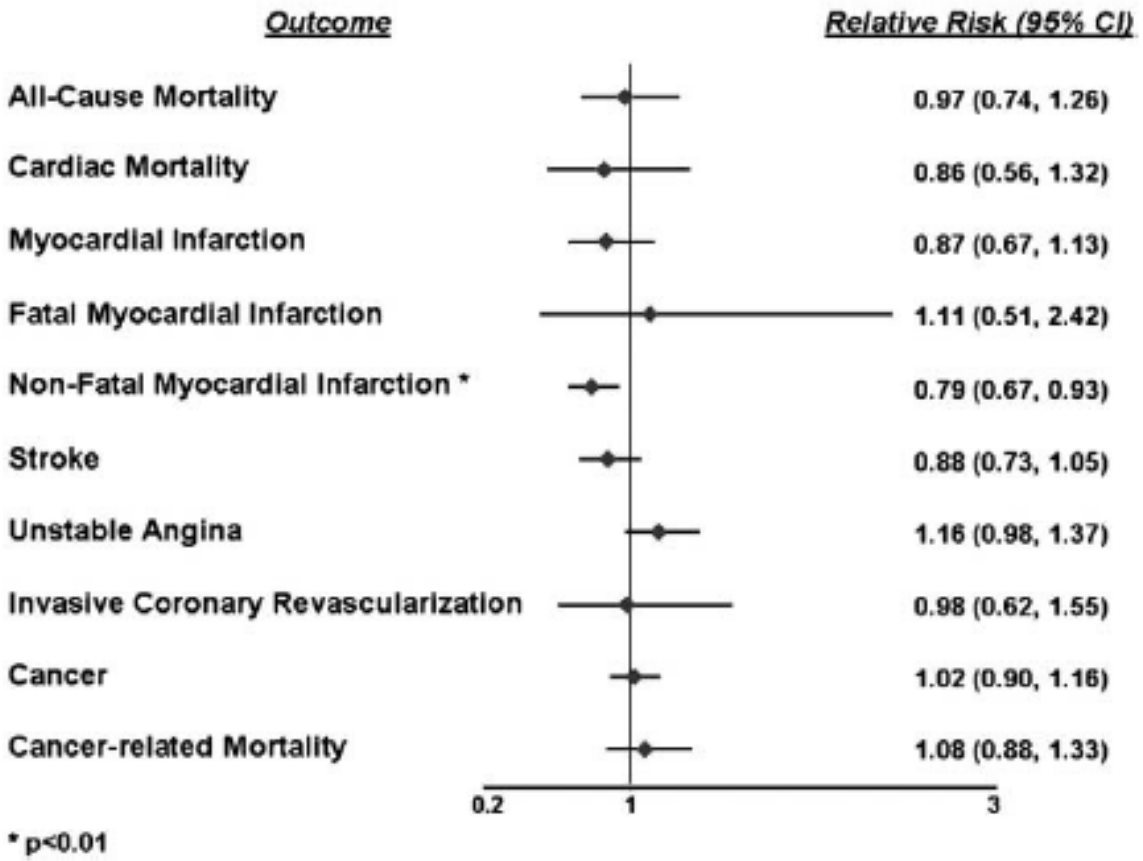


Fig. 12. Cumulative results of the pooled meta-analysis.

EVALUACIÓN DEL RIESGO

- **Odds Ratios (OR)**

  Su interpretación es similar al RR

  Útil particularmente en desenlaces poco frecuentes como en los estudios de casos y controles, también se utiliza frecuentemente en búsqueda de asociaciones con otras variables (edad, sexo. Etc.) que puedan influir en el desenlace.

  Cuando los % de riesgos son menores a 20% valor corresponde con el RR.

  Es un cociente de posibilidades, (que tan posibles es que un evento suceda *vs* que no suceda)

Table 4. Odds Ratios for Associations between Key Risk Factors and the Incidence of Diabetic Neuropathy with the Use of Two Logistic-Regression Models.*

Variable	Odds Ratio (95% CI)	P Value
Model 1†		
Duration of diabetes (yr)	1.40 (1.21–1.63)	<0.001
Glycosylated hemoglobin (% of hemoglobin)	1.48 (1.23–1.79)	<0.001
Change in glycosylated hemoglobin (% of hemoglobin)	1.36 (1.14–1.62)	0.001
Triglycerides (mmol/liter)	1.21 (1.02–1.44)	0.03
Total cholesterol (mmol/liter)	1.15 (0.98–1.35)	0.08
Body-mass index	1.27 (1.09–1.47)	<0.001
History of smoking	1.38 (1.03–1.85)	0.03
Hypertension	1.57 (1.03–2.39)	0.03
Albumin excretion rate (μg/min)	1.01 (0.88–1.14)	0.93
Model 2‡		
Duration of diabetes (yr)	1.25 (1.03–1.51)	0.02
Glycosylated hemoglobin (% of hemoglobin)	1.64 (1.33–2.03)	<0.001
Change in glycosylated hemoglobin (% of hemoglobin)	1.44 (1.17–1.77)	0.001
Triglycerides (mmol/liter)	1.17 (0.97–1.41)	0.10
Total cholesterol (mmol/liter)	1.11 (0.93–1.34)	0.25
Body-mass index	1.20 (1.01–1.43)	0.04
History of smoking	1.68 (1.20–2.36)	0.003
Hypertension	1.54 (0.96–2.47)	0.07
Cardiovascular disease	2.12 (1.16–3.86)	0.01
Any retinopathy	1.45 (0.98–2.13)	0.06
Albumin excretion rate (μg/min)	1.02 (0.89–1.18)	0.76

Cardiovascular disease among osteoarthritis patients

Table 3 Adjusted and unadjusted OR and 95% CI of specific cardiovascular outcomes for osteoarthritis (OA) in the age-matched and sex-matched sample

Outcome	Model	Overall OR (95% CI)	Men OR (95% CI)	Women OR (95% CI)
Myocardial infarction (n=3197)	OA adjusted	1.28 (1.15 to 1.44)	1.08 (0.91 to 1.28)	1.49 (1.28 to 1.75)
	OA unadjusted	1.38 (1.23 to 1.54)	1.19 (1.01 to 1.40)	1.56 (1.34 to 1.82)
Angina (n=3143)	OA adjusted	1.83 (1.62 to 2.06)	1.76 (1.43 to 2.17)	1.85 (1.59 to 2.14)
	OA unadjusted	1.94 (1.73 to 2.18)	1.94 (1.58 to 2.38)	1.94 (1.68 to 2.24)
Congestive heart failure (n=1586)	OA adjusted	1.72 (1.46 to 2.01)	1.50 (1.13 to 1.97)	1.81 (1.49 to 2.21)
	OA unadjusted	1.84 (1.57 to 2.15)	1.71 (1.31 to 2.23)	1.91 (1.57 to 2.31)
Stroke (n=1112)	OA adjusted	1.11 (0.95 to 1.29)	1.08 (0.83 to 1.40)	1.13 (0.93 to 1.37)
	OA unadjusted	1.20 (1.03 to 1.39)	1.14 (0.89 to 1.48)	1.23 (1.01 to 1.48)

Adjusted ORs were obtained after controlling for age, sex, income, education, body mass index, physical activity, smoking, fruit and vegetable consumptions, pain medication use, chronic obstructive pulmonary disease, hypertension and diabetes.

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