Dolore toracico e Heart score: Validazione di un processo diagnostico-terapeutico nella popolazione toscana.

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Pisa
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Chest pain in the ER: a multicenter validation of the HEART Score (2010)
The HEART score for patients with CP in the ED: a multinational validation study (2013)

The HEART score for Chest Pain Patients in the ED		
History	Highly Suspicious Moderately Suspicious Slightly or Non-Suspicious	2 ponits 1 point 0 points
ECG	Significant ST-Depression Nonspecific repolarization Normal	2 ponits 1 point 0 points
Age	≥ 65 years > 45 - <65 years ≤ 45 years	2 ponits 1 point 0 points
Risk Factors	≥ 3 or istory of CAD 1 or 2 RF No RF	2 ponits 1 point 0 points
Troponin	≥ 3 x Normal Limit > 1 - < 3 x Normal Limit ≤ Normal Limit	2 ponits 1 point 0 points
Risk factors: DM, current or recent (< 1 month) smoker, HTN, HLP, family history of CAD, & obesity		
Score 0-3: 2.5% MACE over next 6 weeks —> Discharge Home Score 4-6: 20.3% MACE over next 6 weeks —> Admit for Clinical Observation Score 7-10: 72.7% MACE over next 6 weeks —> Early invasive Strategies		

Backus BE. *Crit Pathw Cardiol. 2010;9:164–169.* Six AJ. *Crit Pathw Cardiol. 2013;12:121–126.*

Circulation
Cardiovascular Quality and Outcomes

American Heart Association®

The HEART Pathway Randomized Trial: Identifying Emergency Department Patients With Acute Chest Pain for Early Discharge

Simon A. Mahler, Robert F. Riley, Brian C. Hiestand, Gregory B. Russell, James W. Hoekstra, Cedric W. Lefebvre, Bret A. Nicks, David M. Cline, Kim L. Askew, Stephanie B. Elliott, David M. Herrington, Gregory L. Burke and Chadwick D. Miller

Background

The HEART Pathway is a decision aid designed to identify emergency department patients with acute chest pain for early discharge. No randomized trials have compared the HEART Pathway with usual care.

Methods and Results

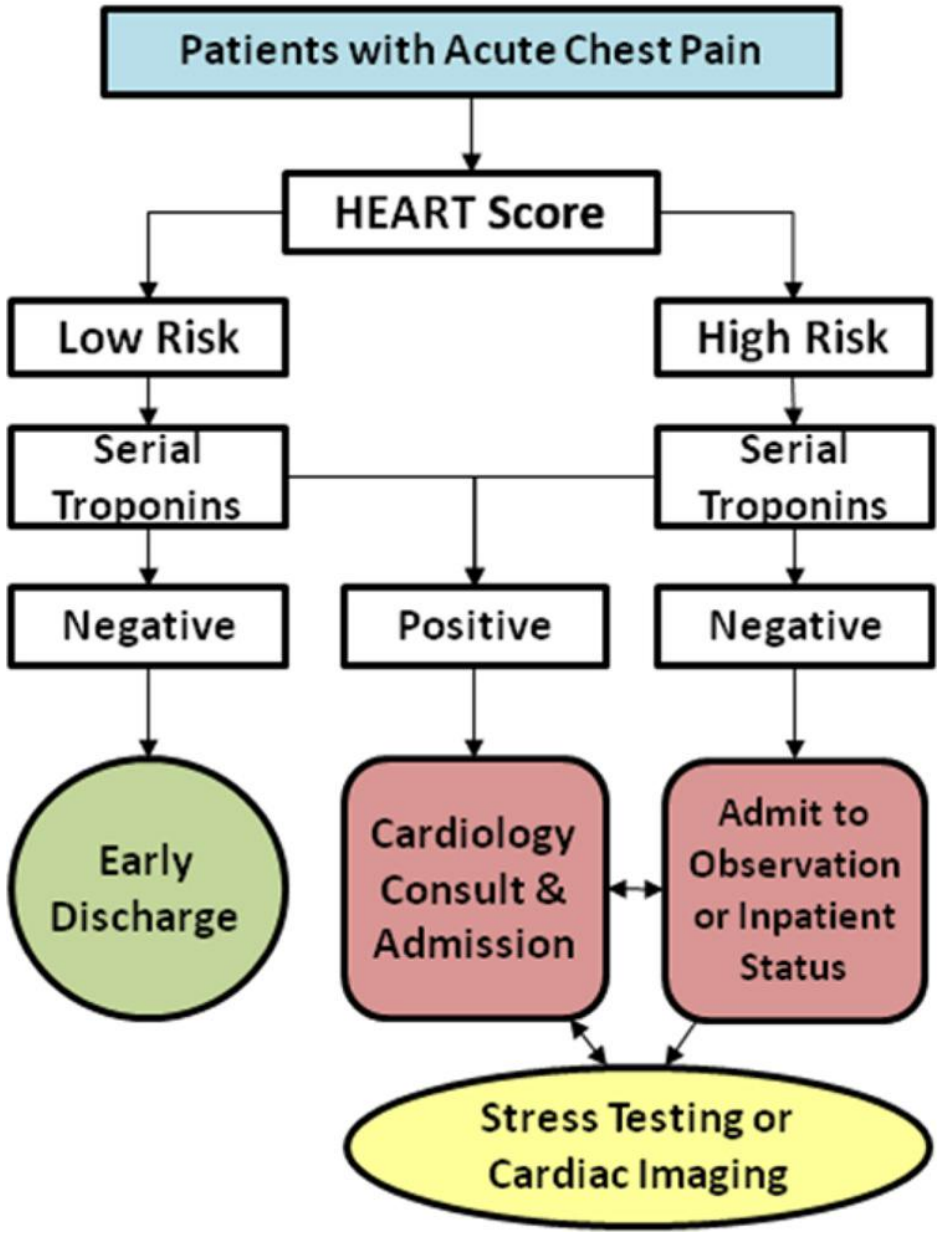
Adult emergency department patients with symptoms related to acute coronary syndrome without ST-elevation on ECG (n=282) were randomized to the HEART Pathway or usual care. In the HEART Pathway arm, emergency department providers used the HEART score, a validated decision aid, and troponin measures at 0 and 3 hours to identify patients for early discharge. Usual care was based on American College of Cardiology/American Heart Association guidelines. The primary outcome, objective cardiac testing (stress testing or angiography), and secondary outcomes, index length of stay, early discharge, and major adverse cardiac events (death, myocardial infarction, or coronary revascularization), were assessed at 30 days by phone interview and record review. Participants had a mean age of 53 years, 16% had previous myocardial infarction, and 6% (95% confidence interval, 3.6%–9.5%) had major adverse cardiac events within 30 days of randomization. Compared with usual care, use of the HEART Pathway decreased objective cardiac testing at 30 days by 12.1% (68.8% versus 56.7%; *P*=0.048) and length of stay by 12 hours (9.9 versus 21.9 hours; *P*=0.013) and increased early discharges by 21.3% (39.7% versus 18.4%;*P*<0.001). No patients identified for early discharge had major adverse cardiac events within 30 days.

Conclusions

The HEART Pathway reduces objective cardiac testing during 30 days, shortens length of stay, and increases early discharges. These important efficiency gains occurred without any patients identified for early discharge suffering MACE at 30 days.

Mahler SA. The HEART Pathway RCT. Circ Cardiovasc Qual Outcomes 2015.

HEART Pathway



Mahler SA. The HEART Pathway RCT. Circ Cardiovasc Qual Outcomes 2015.

Discriminative performance of alternative risk scores for the prediction of the primary endpoint

Score	ROC area
TIMI	0.74
Sanchis	0.79
Heart	0.78
Florence Prediction Rule	0.80
Bouzas-Mosquera	0.84

Effectiveness of a multidisciplinary chest pain unit for the assessment of coronary syndromes and risk stratification in the Florence area

Alberto Conti, MD,[a] Barbara Paladini, MD,[a] Simone Toccafondi, MD,[a] Simone Magazzini, MD,[a] Iacopo Olivotto, MD,[a] Ferdinando Galassi, MD,[b] Cesco Pieroni, MD,[c] Gennaro Santoro, MD,[d] David Antoniucci, MD,[c] and Giancarlo Berni, MD[a] *Florence, Italy*

Location	
Substernal, precordial	+3
Left chest, neck, lower jaw, epigastrium	+1
Apex	−1
Radiation	
Either arm, shoulder, back, neck, lower jaw	+1
Character	
Crushing, pressing, heaviness	+3
Sticking, pleuritic, pinprick	−1
Associated symptoms	
Dyspnea, nausea, diaphoresis	+2
History of angina	+3

A score <4 is considered as "very low" probability of CAD; a score ≥4 as "low-intermediate and high" probability of CAD.

The Chest Pain Score

SEDE DEL DOLORE	Retrosternale, precordiale Emitorace sinistro, collo, mandibola, epigastrio	+3 +1
IRRADIAZIONE	Braccia, spalla, dorso, collo, mandibola	+1
CARATTERISTICHE	Oppressivo, “a morsa” Puntorio, trafittivo, pleuritico	+3 +1
SINTOMI ASSOCIATI	Dispnea, nausea, sudorazione	+2
STORIA DI DOLORE	Angina	+3

< 4 basso rischio, > 4 alto rischio, e > 8 rischio molto alto

Ma il dolore esofageo ha le stesse caratteristiche!

Geleijnse ML, *Eur Heart J* 2000
Conti A, Am Heart J 2002

American Journal of Emergency Medicine (2010) **28**, 135–142

ELSEVIER

The
American Journal of
Emergency Medicine

www.elsevier.com/locate/ajem

A new simple risk score in patients with acute chest pain without existing known coronary disease

The clinical prediction rule, composed of 5 independent prognostic variables (CP score higher than 6, male gender, age older than 50 years, MS, and DM), patients with a risk ranging from 1% 25% (group C, rule 5-6) (Figs. 3 and 4

Chest Pain Score >6
Male gender
Age > 50 years
MS or DM

0-1 risk of MACE… 1%
2-4 risk of MACE… 4-11%
5-6 risk of MACE… 25%

A Conti, Am J Emerg Med 2010; 28: 135-142

USL NordOvest Toscana protocollo Chest Pain screening
…se “rischio intermedio”

1
se dolore toracico tipico, ECG non diagnostico, cTnI normale non diagnostica,
paziente < 65 anni:
AngioTC-Coronarica

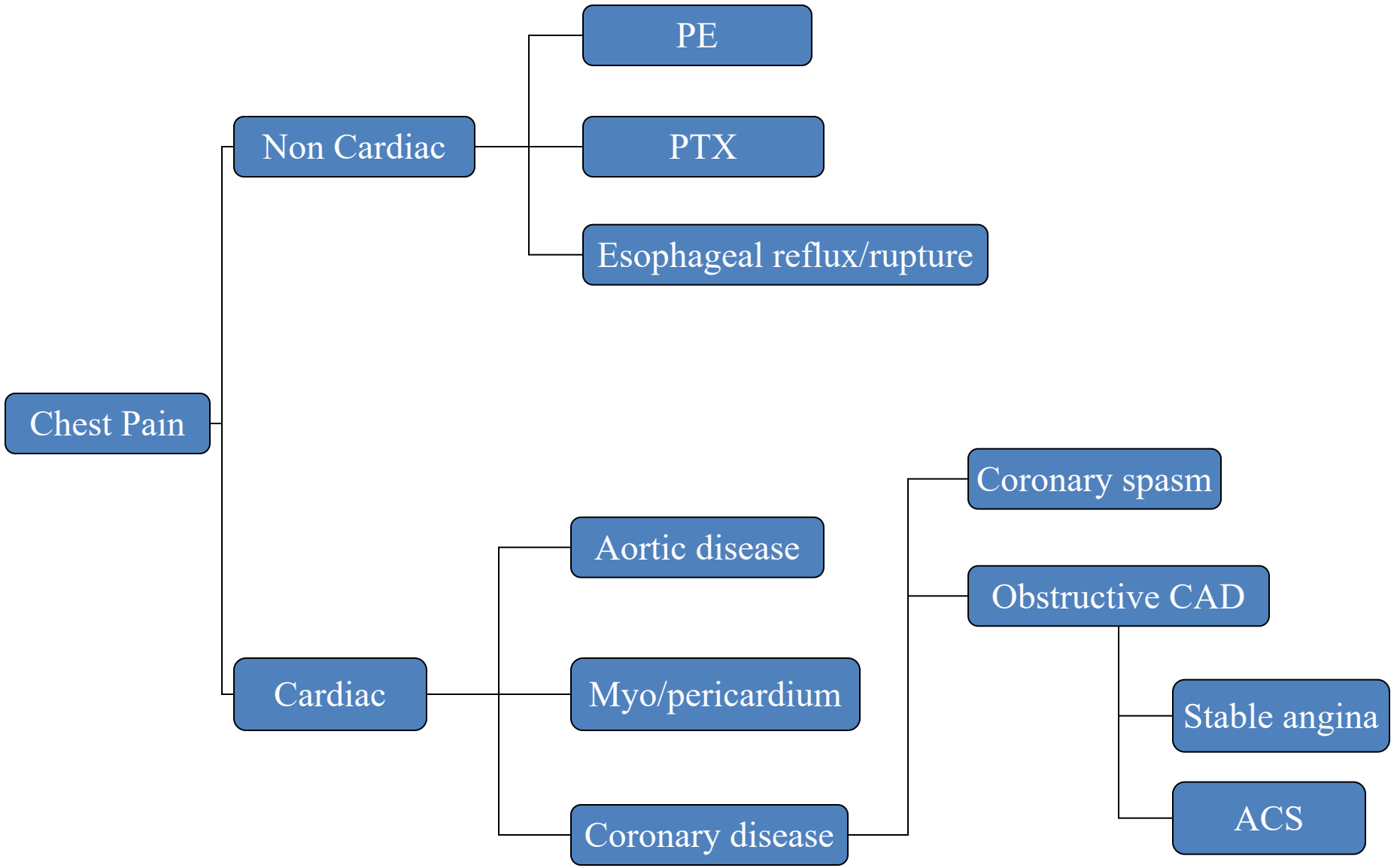
2
se dolore toracico tipico, ECG non diagnostico, cTnI normale non diagnostica,
paziente ≥ 65 anni:
SPECT Miocardica (Scintigrafia miocardica da stress)

Nel sesso femminile è consigliata comunque angio-TC-coronarica
Successiva eventuale ulteriore definizione diagnostica con SPECT Miocardica

In atto protocollo per appuntamento informatico con
radiodiagnostica e medicina nucleare:
il paziente del PS alla dimissione riceve data e ora dell’esame prospettato

Il dolore toracico

Dolore toracico: origine non cardiaca e cardiaca



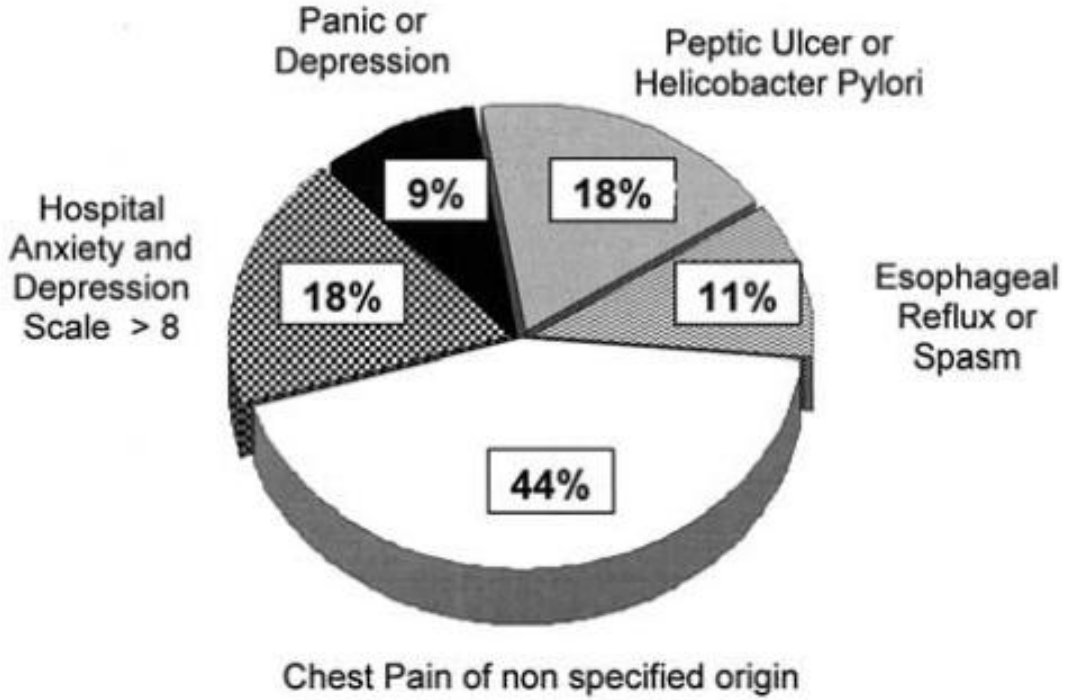
Il quintetto mortale

1. Infarto miocardico
2. Pneumotorace (iperteso)
3. Dissecazione aortica
4. Embolia polmonare
5. Rottura esofagea

…il quintetto temibile

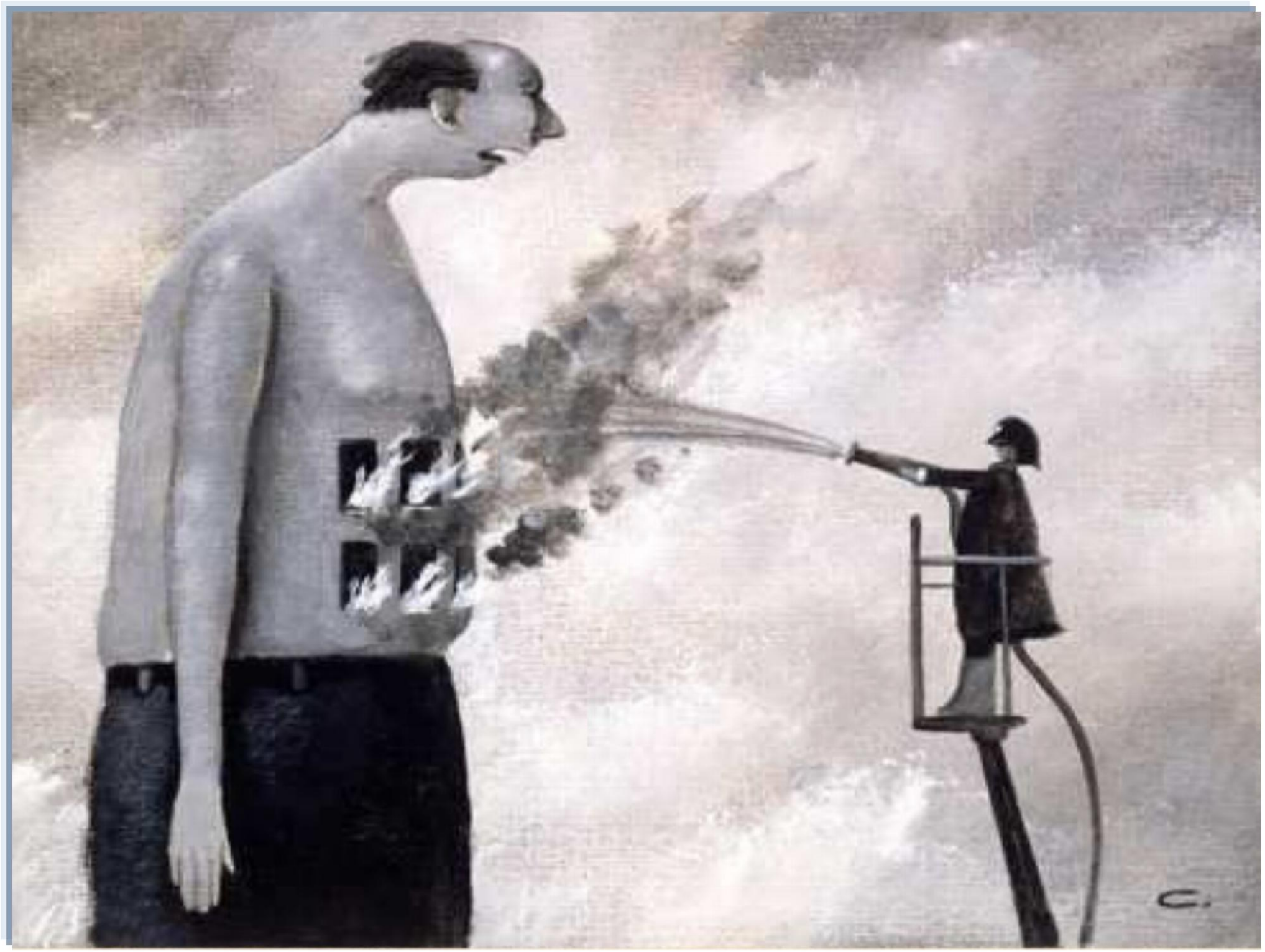
1. Pericardite
2. Reflusso gastro-esofageo
3. S. Tako-tsubo
4. Herpes Zoster
5. Pleuro-polmonite

Dolore toracico: origine non cardiaca



Alternative diagnoses in patients discharged after CPU management with no evidence of CAD (n = 870).

Conti A, Am Heart J, 2002



...sindrome extraesofagea

- Tosse
- Laringite
- Asma
- Erosioni dentali

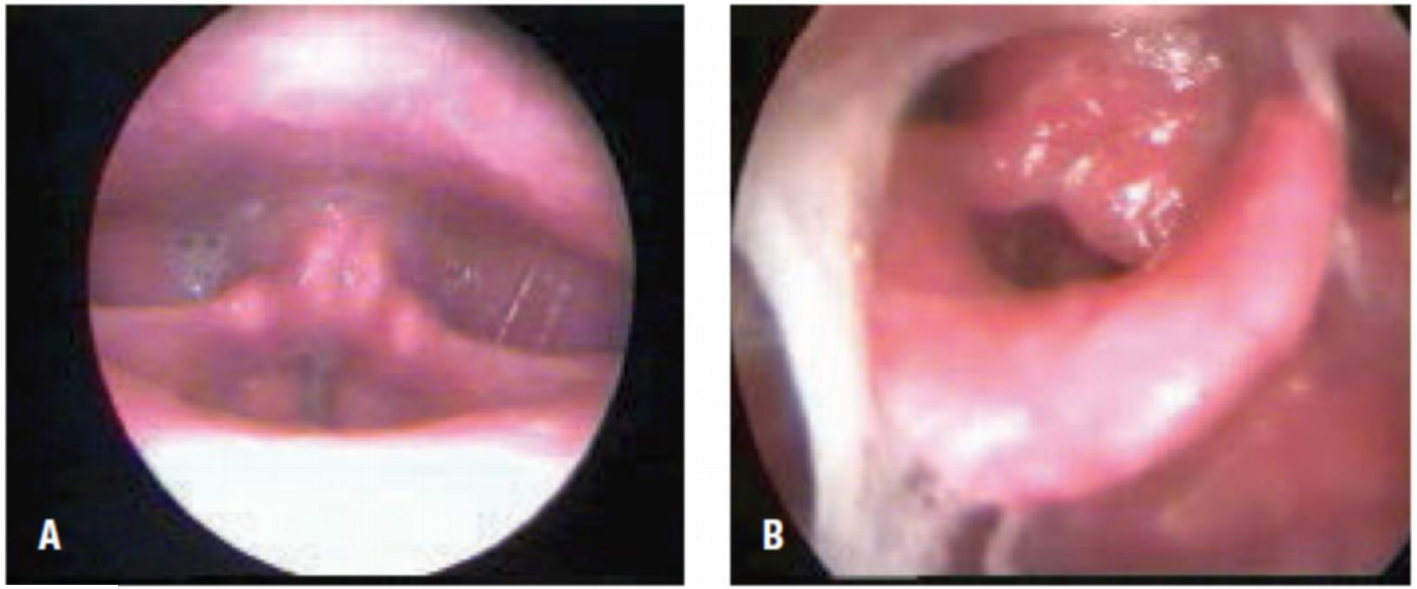
Spesso associata ai sintomi tipici ma anche isolata.

Sindrome Laringea?

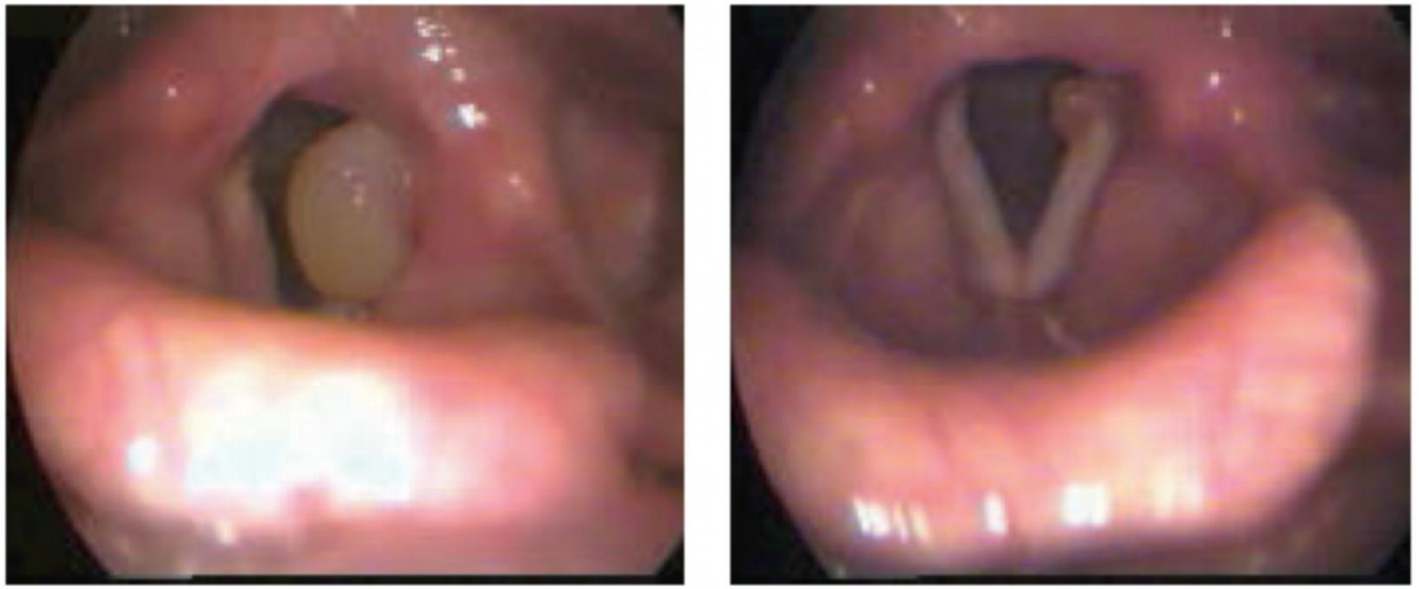
IL REFLUSSO LARINGOFARINGEO

Segni faringo-laringei potenzialmente associati al GER	
Edema ed iperemia mucosa laringea	Stenosi sottoglottica
Granuloma	Iperemia ed iperplasia linfoide della parete posteriore faringea
Polipi-noduli laringei	Ulcera da contatto
Edema di Reinke	Edeme interaritenoideo
Tumori	Stenosi della porzione posteriore glottide

Elif Sataris Yuksel 2012



Edema interaritenoideo. a) lieve. b) grave



Granuloma laringeo

Società Italiana di Medicina d'Emergenza-Urgenza

SIMEU

Il dolore toracico: etica e genetica

The patient as a person

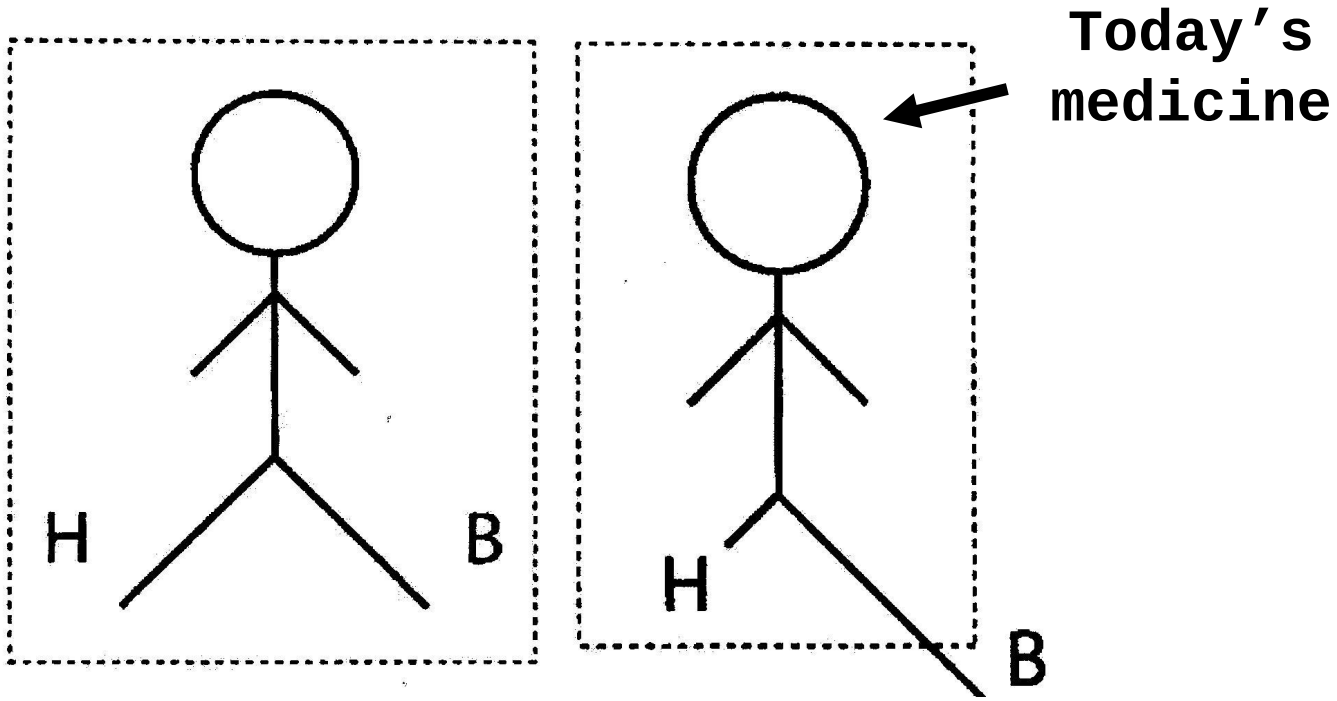
Today's medicine

"è più importante conoscere il tipo di persona che ha una malattia piuttosto che il tipo di malattia che ha una persona"

In questa breve frase sta il concetto
della medicina personalizzata e
della precision medicine.

William Osler

The patient as a person



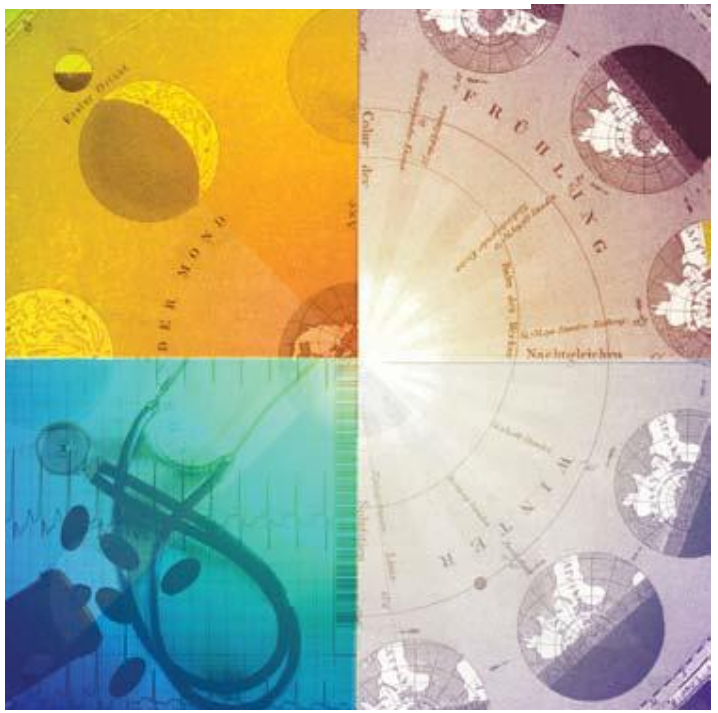
B: Biomedical model; H: Humanistic model

Hetlevik I. Evidence-based medicine in general practice: a hindrance to optimal medical care?

Defining "Patient-Centered Medicine"

Charles L. Bardes, M.D.

…..The growing demands for quality and safety in health care have refocused **attention on patient outcomes**, even if efforts to ensure more consistently positive outcomes sometimes reduce the physician's prized autonomy



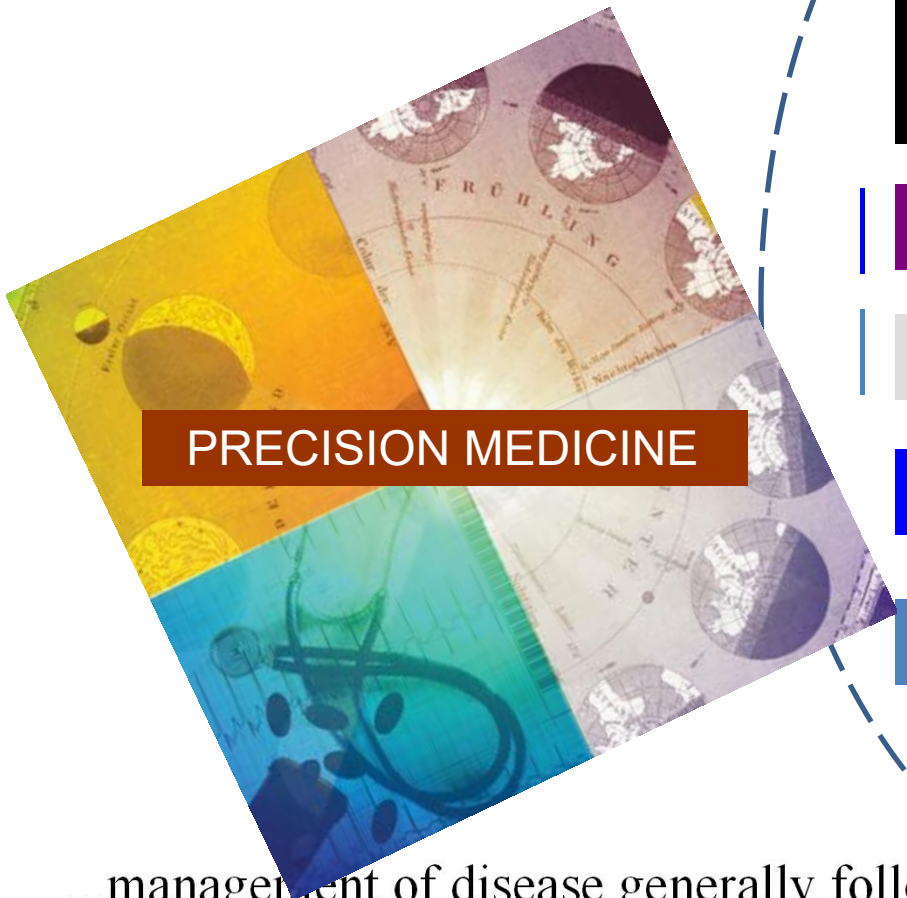
Shared Decision Making — The Pinnacle of Patient-Centered Care

Michael J. Barry, M.D., and Susan Edgman-Levitan, P.A.

Nothing about me without me.

— Valerie Billingham,
Through the Patient's Eyes,
Salzburg Seminar
Session 356, 1998

Evolving Medical Practice



Future Model

Genetic Predisposition ↔ **Stratified Population**

↓

Monitoring and Prevention

↓

Diagnose

↓

Treatment

↓

Outcome

Cost-effective healthcare

Safer Treatments

Better Patient Outcomes

...management of disease generally follows the old, established paradigm:
have risk factors, develop symptoms, get a diagnosis,...treat

Genomics: biological ageing and cardiovascular disease

Telomeres are the extreme ends of eukaryotic chromosomes and are involv cycle
control and maintenance of c lity.

In West of Scot ion Study (WOSCOPS)

for MACE was x 2 in placebo pts

in the lower two tertiles of telomere length

compared with the highest.

Clinical practice in the next future

Genomics: biological ageing and cardiovascular disease

Telomeres are the extreme ends of eukaryotic chromosomes and are involved in cell cycle control and maintenance of chromosomal stability.

In West of Scotland Primary Prevention Study (WOSCOPS)

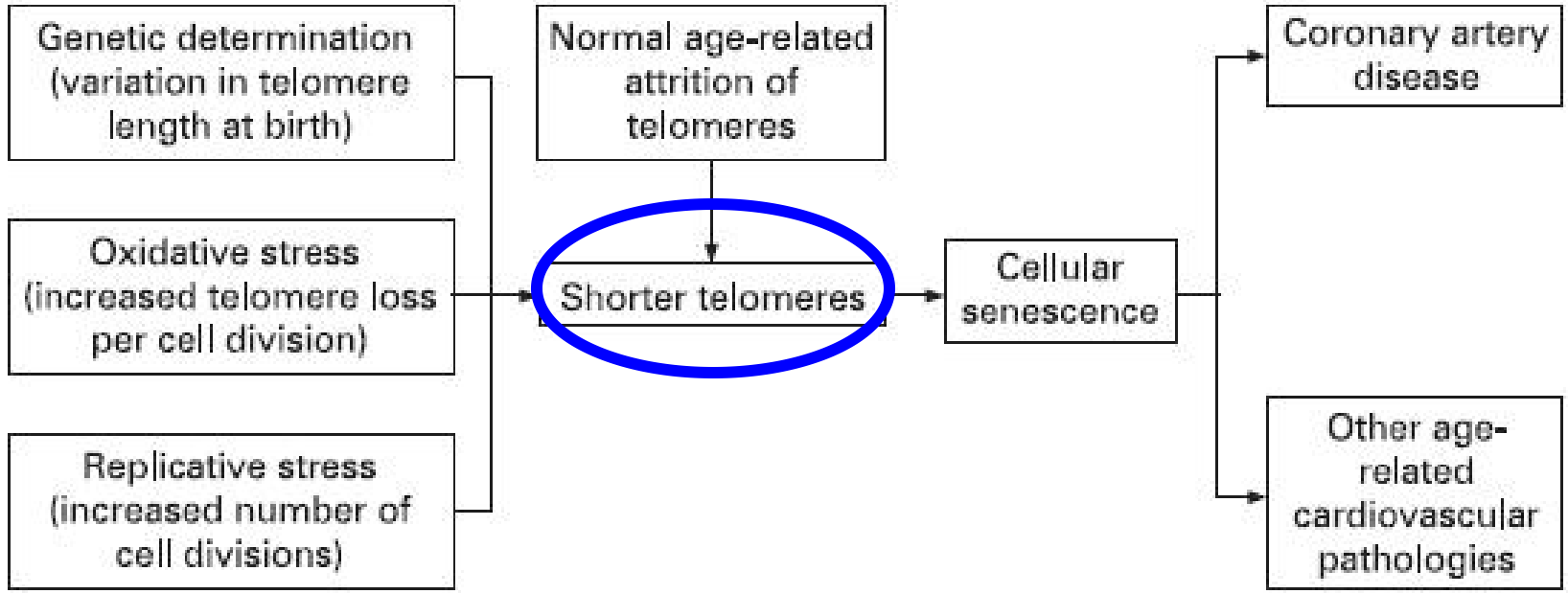
odds ratio for MACE was x 2 in placebo pts

in the lower two tertiles of telomere length

versus the highest.

Samani NJ, from heart.bmj.com 2008

Genomics: biological ageing and cardiovascular disease



Factors affecting telomere length and how these could explain interindividual variation in risk of age-related cardiovascular diseases. The telomere hypothesis postulates that shorter telomeres contribute to a risk of coronary artery disease and other cardiovascular diseases through its impact on cellular senescence. In turn, telomere length is affected by age and a number of other factors whose impact vary between individual subjects.

Samani NJ, Heart 2008

Genomics: …genetic variant predisposing to CAD on chromosome 1 associates with serum cholesterol

… the novel 7 CAD-associated loci in the vicinity of the PSRC1 and CELSR2 genes on chromosome 1 (1p13.3), showed a strong association with total cholesterol.

The CAD-associated risk allele A of rs599839 (allele frequency 0.78) was associated with a 0.17-mmol/l (95% CI 0.10 to 0.24 mmol/l) higher serum cholesterol level per allele copy ($P = 3.84 \times 10{-}6$).
An association of rs599839 with LDL cholesterol was also shown in 1,090 cases with myocardial infarction ($P = 0.0026$).

Nilesh J, J Mol Med 2008.

Genomics

The presence of 2 alleles is strogly associated with risk of MI or CAD

shows the same risk for CAD
as the presence of
multiple RF for atherosclerosis

Samani, UK, ref 3365 EHJ, ESC 2008

"Tonight, I'm launching a new **Precision Medicine Initiative** to bring us closer to curing diseases like cancer and diabetes — and to give all of us access to the **personalized information** we need to keep ourselves and our families healthier."

President Barack Obama, State of the Union Address, January 20, 2015

The NEW ENGLAND JOURNAL of MEDICINE

Perspective
FEBRUARY 26, 2015

A New Initiative on Precision Medicine

Francis S. Collins, M.D., Ph.D., and Harold Varmus, M.D.

- … Although the precision medicine initiative will probably yield its greatest benefits years down the road, there should be some notable near-term successes. In addition to the results of the cancer studies described above, studies of a large research cohort exposed to many kinds of therapies may provide early insights into pharmacogenomics — **enabling the provision of the right drug at the right dose to the right patient.**
- Opportunities to identify persons with rare loss of function mutations that protect against common diseases may point to attractive drug targets for broad patient populations. And observations of beneficial use of mobile health technologies may improve strategies for preventing and managing chronic

The Precision Medicine Initiative: Data-Driven Treatments as Unique as Your Own Body

Lindsay Holst

January 30, 2015

09:19 AM EST

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Right now, most medical treatments are designed for the average patient.

But one size doesn't fit all, and treatments that are very successful for some patients don't work for others. **Think about it:**

- If you need glasses, you aren't assigned a generic pair. You get a prescription customized for you.
- If you have an allergy, you get tested to determine exactly what you're allergic to.
- If you need a blood transfusion, it has to match your precise blood type.

…fin'ora:

BMJ

BMJ 2014;348:g22 doi: 10.1136/bmj.g22 (Published 3 January 2014)

VIEWS & REVIEWS

FROM THE FRONTLINE

Evidence based medicine is broken

Des Spence *general practitioner, Glasgow*

La medicina basata sulle evidenze ricerca **evidenze relative a malattie a definizione ontologica ben circoscritta**,

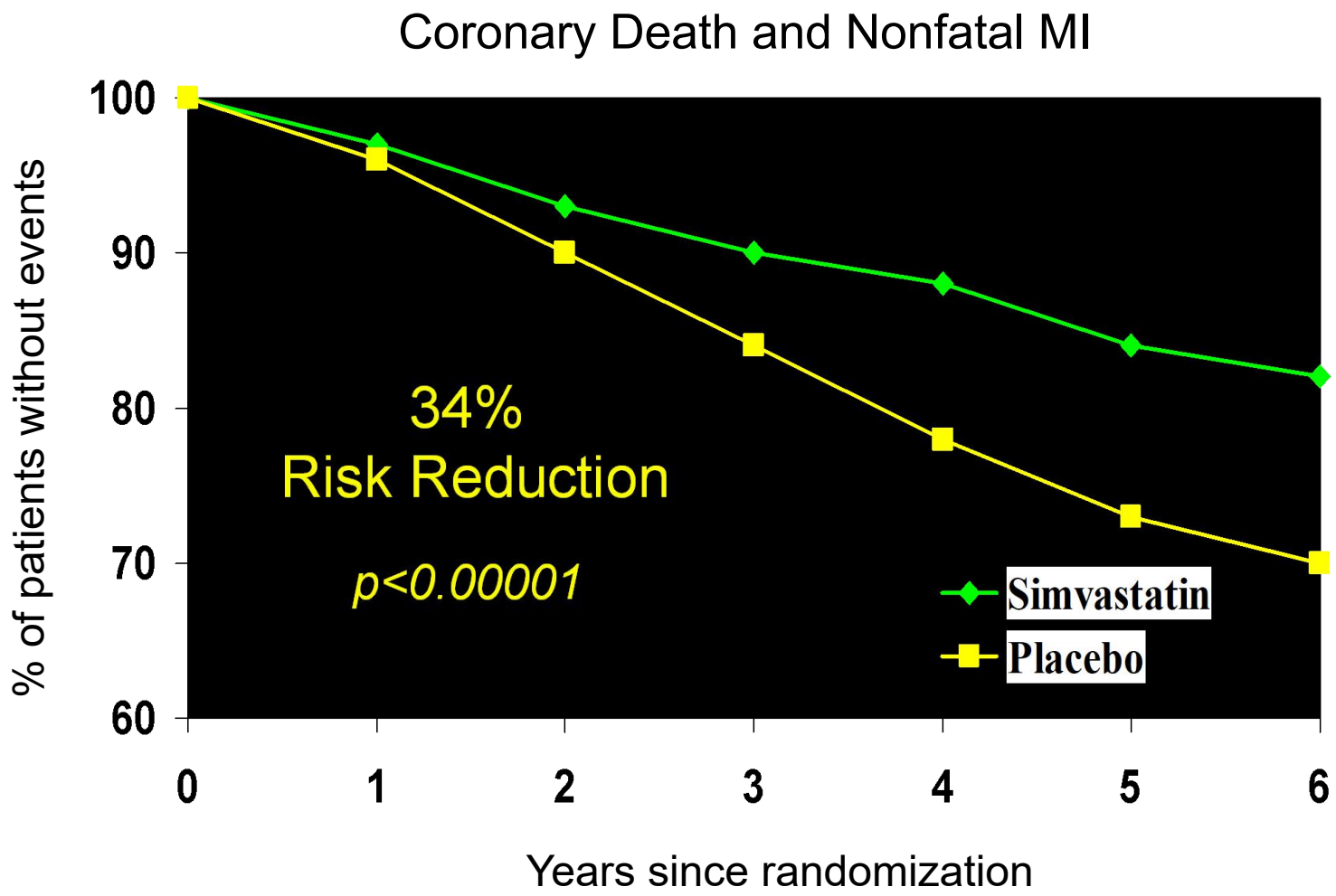
con studi clinici focalizzati su **pazienti il più possibile privi di altre condizioni cliniche rilevanti** che risulterebbero "confondenti" per le evidenze ricercate.

Evidence-Based Medicine

A New Approach to Teaching the Practice of Medicine

Evidence-Based Medicine Working Group

1994: an example of simple Evidence



Inclusion Criteria: **Prior MI** and/or angina pectoris

The Lancet, Vol 344, November 19, 1994

I “nuovi” pazienti

Sconosciuti ai Trials !

JAMA The Journal of the American Medical Association

Home Current Issue All Issues Online First Specialties & Topics CME Mu

March 21, 2007, Vol 297, No. 11 >

< Previous Article Next Article >

Review | March 21, 2007

Eligibility Criteria of Randomized Controlled Trials Published in High-Impact General Medical Journals

A Systematic Sampling Review FREE

Cause di mancato arruolamento nei trial

- Età…… (72%)
- Sesso femminile.. (47%)
- **Comorbilità.. …… (81%)**
- Polifarmacoterapia (54%)

Avoid: Macrolides plus Statin!
= Rabdomiolysis

UNIVERSITÀ CATTOLICA del Sacro Cuore

Van Spall HG, JAMA 2007

New York Times 18 sep 2007

Dr. Michael Stern reported in the June issue of Emergency Medicine.

By JANE E. BRODY

Published: September 18, 2007

A 78-year-old woman was found unconscious on the floor of her apartment by a neighbor who checked on her. The woman could not remember falling but told doctors that before going to bed she had abdominal pain and nausea and had produced a black stool, after which she had palpitations and felt lightheaded.

New York Times 18 sep 2007

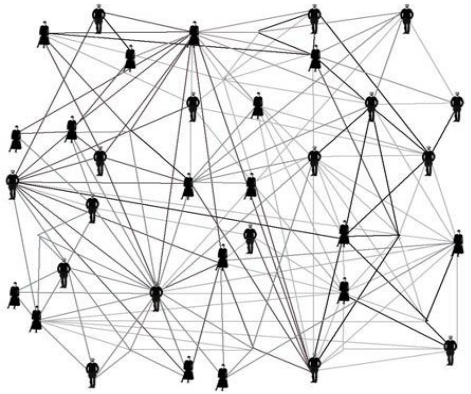
Her medical history included

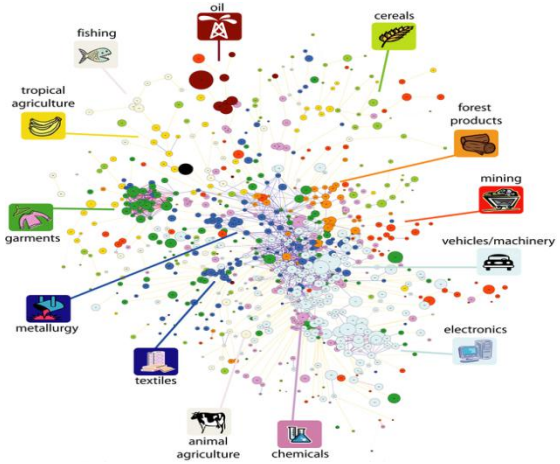
- **High blood pressure** (ACEinhib)
- **Coronary artery disease** (ASA and Beta-blocker)
- **Atrial fibrillation** (Warfarin)
- **Congestive heart failure** (Diuretic)
- **Hypercholesterolemia** (Statin)
- **Osteoarthritis** (NSAD).
- She also had
- a **cold** with a (Paracetamole)
- **productive cough….**

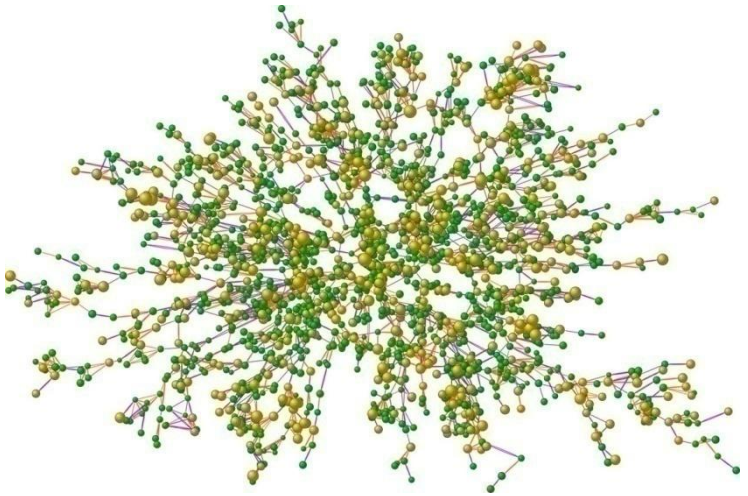
For each condition, she had been prescribed a different drug, and she was taking a few over-the-counter remedies on her own.

Complex Systems

- A complex system is a system composed of interconnected parts that **as a whole** exhibit **one or more properties** (behavior among the possible properties) **not obvious from the properties** of the **individual parts** .







Etimologia della complessità

- Complesso, complicato e semplice sono termini che vengono tutti dalla stessa radice indoeuropea: plek- (parte, piega, intreccio).Da **plek**- derivano, in latino:

- Il verbo **plicare** = piegare

  Il verbo **plectere** = intrecciare

  Il suffisso –**plex** = parte

- La parola **semplice** = sine ple

complessità

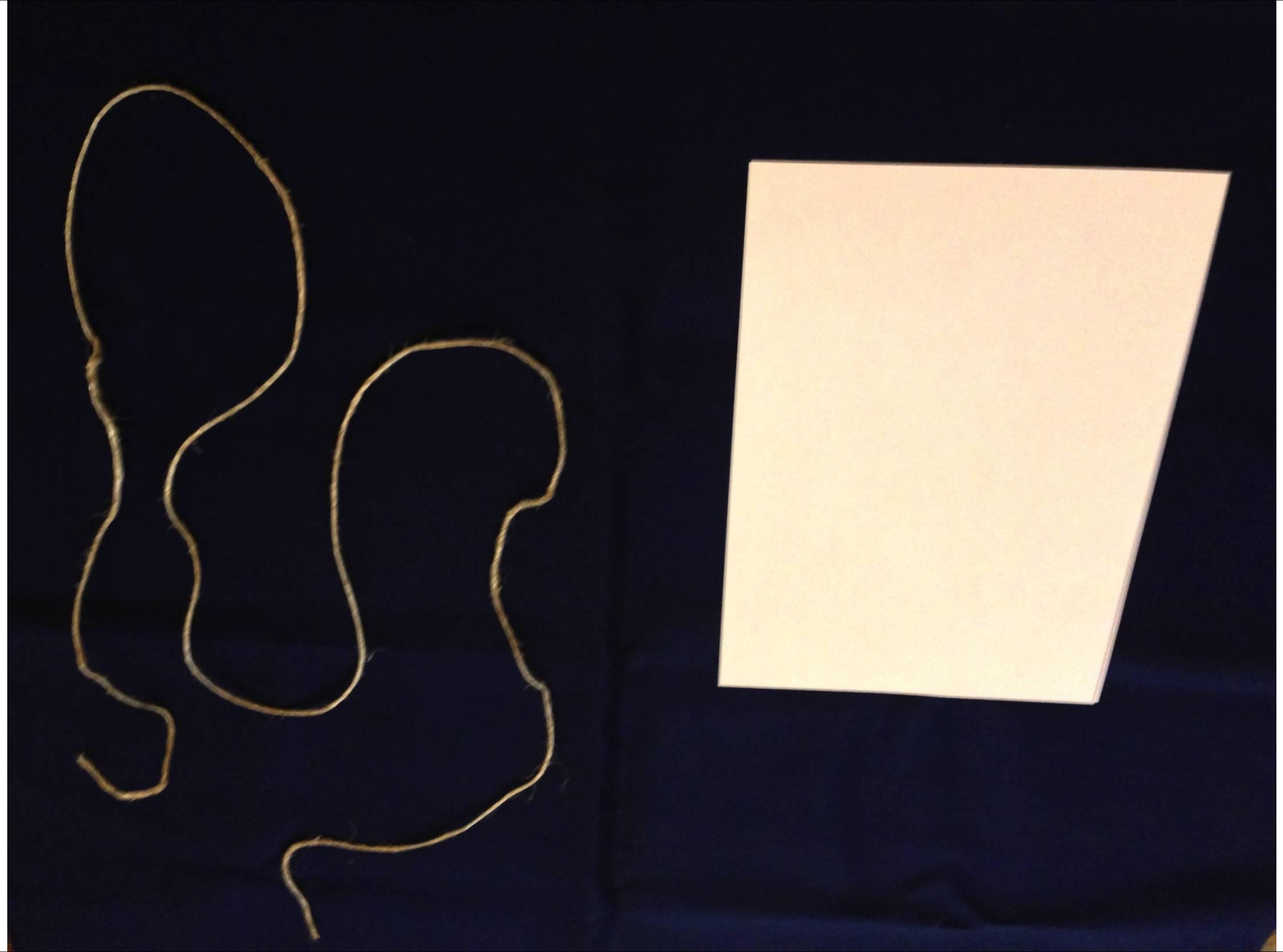
- Da cum- + plicare deriva: **Complicatus**

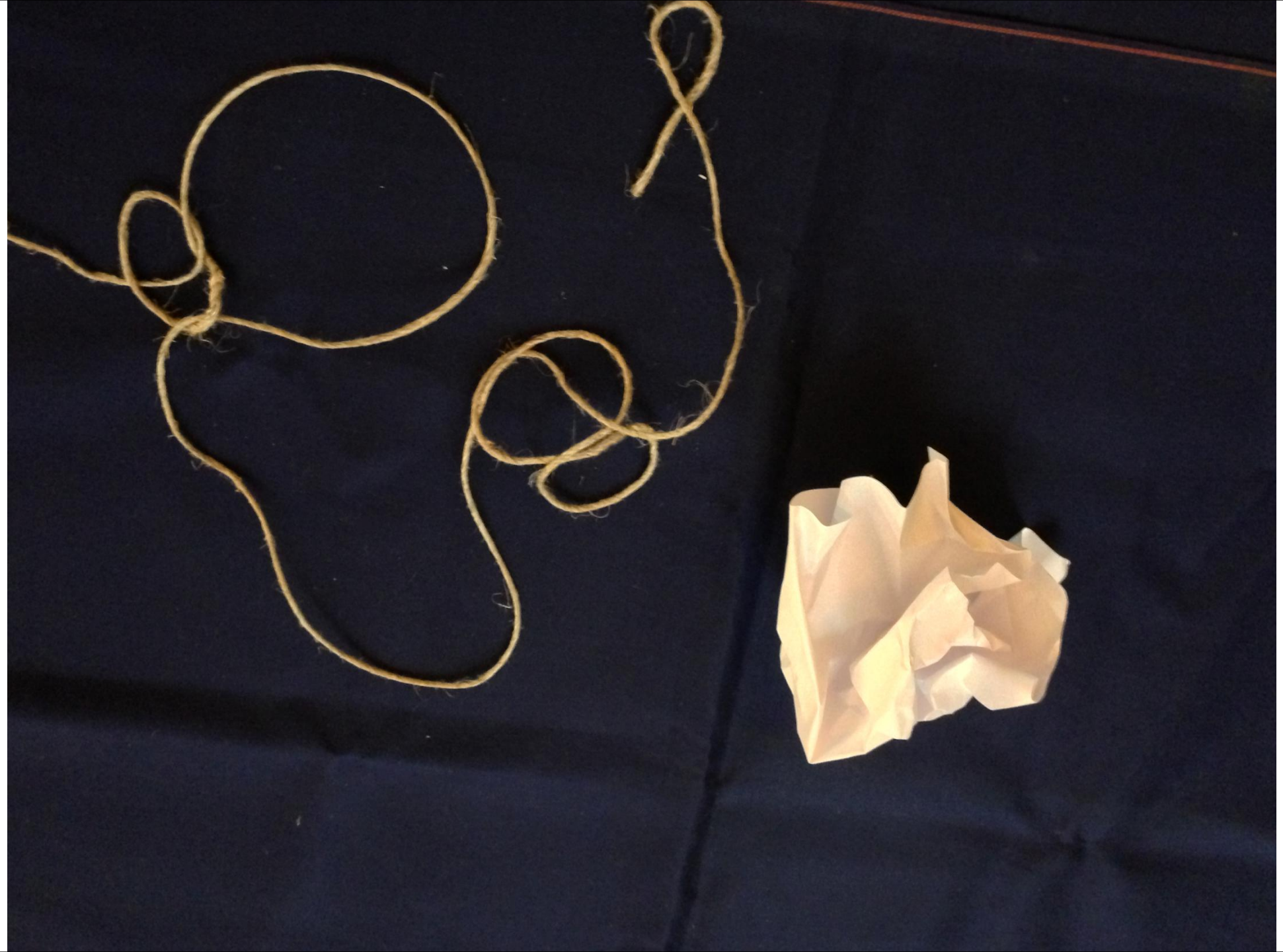
Ovvero: complicato (con pieghe)

Può essere “spiegato”

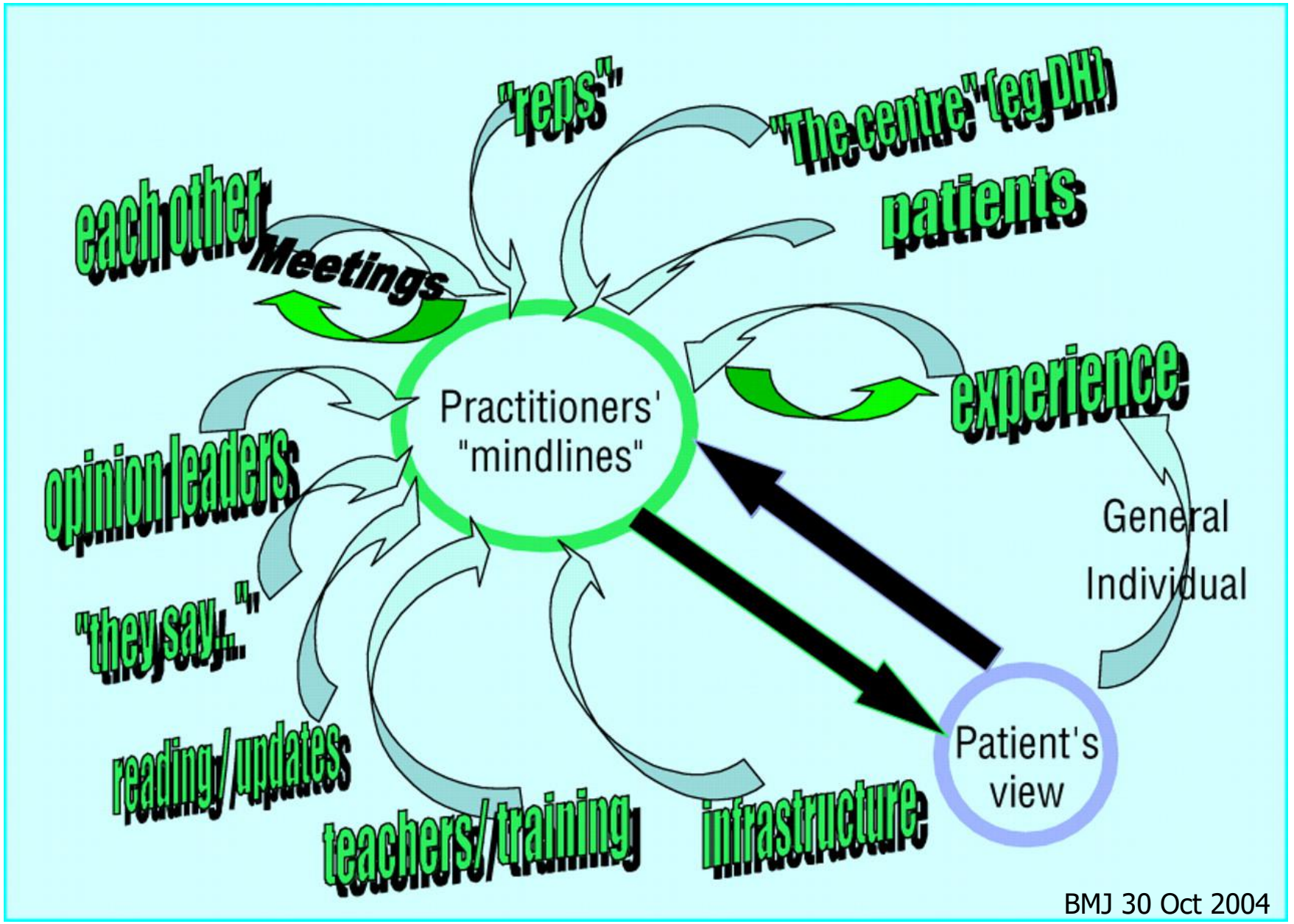
- Da cum- + plectere deriva: **Complexus** Ovvero: complesso (con intrecci)
- Non può essere “spiegato”

- Da **sine- + -plex** deriva: **Simplex**• Ovvero: semplice (senza pieghe)• Né complicato,





From Guidelines ...to Mindlines



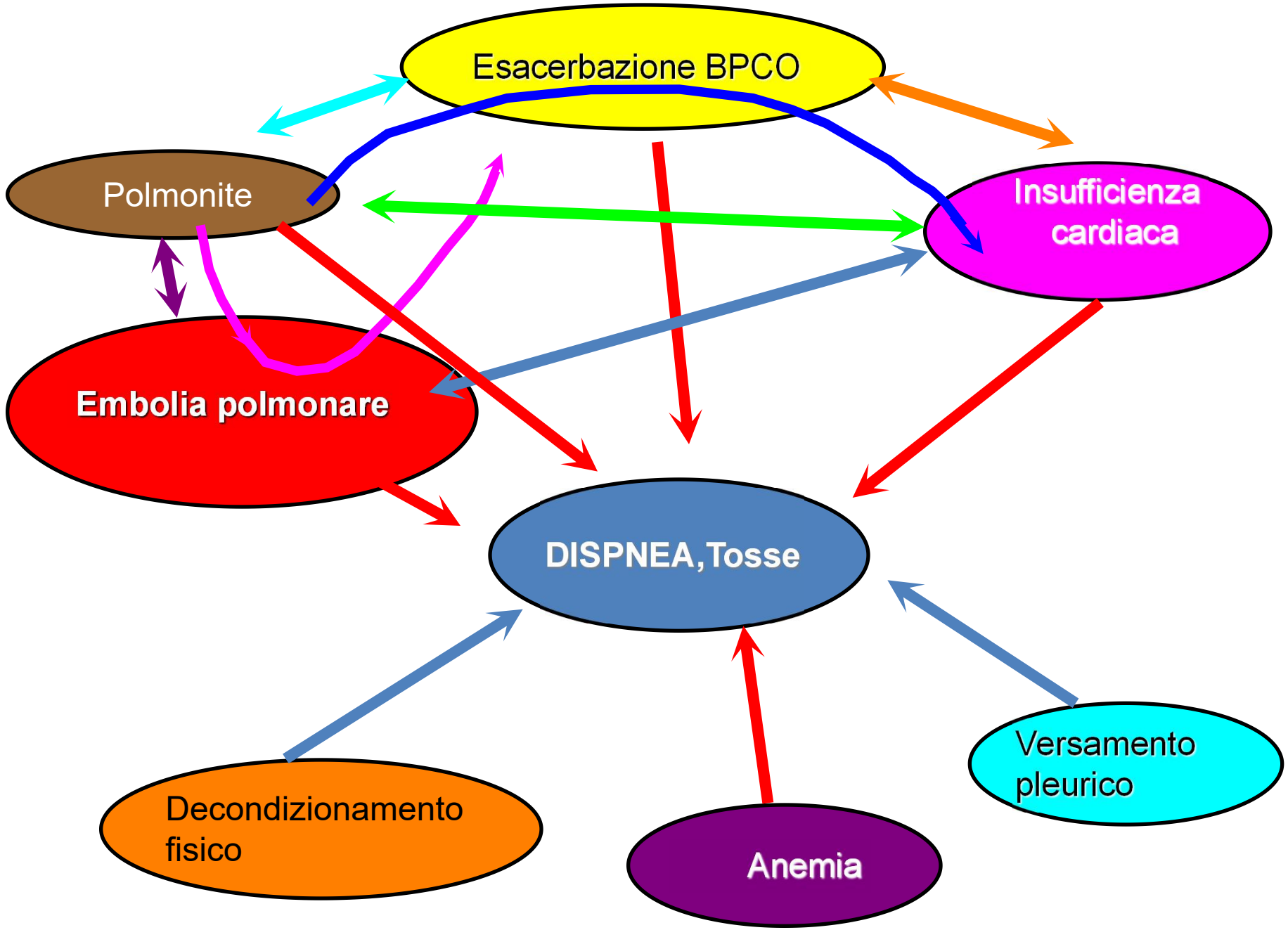
Linee guida

-uno stimolo per il medico skilled
(formato, acculturato, aggiornato)

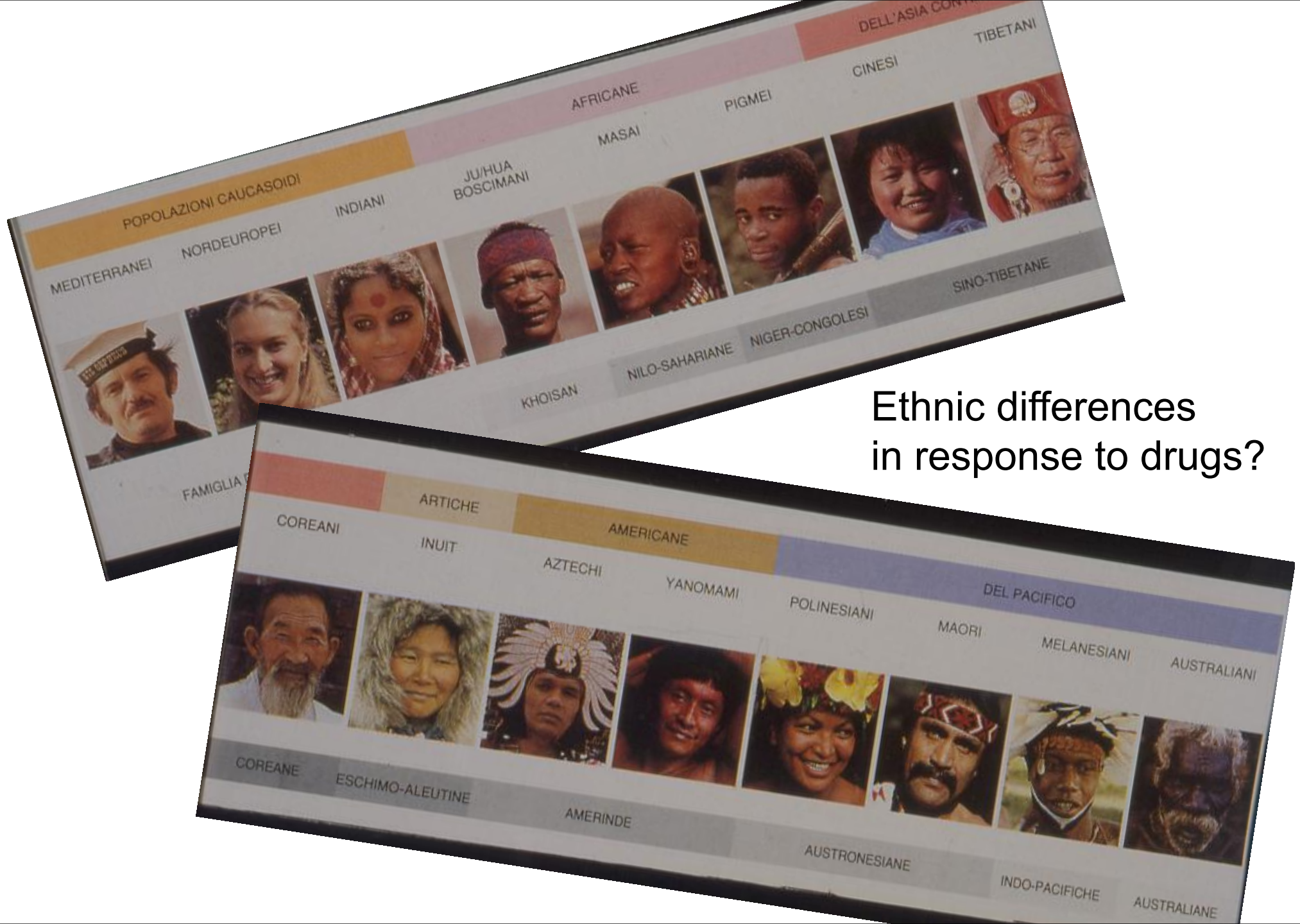
-una trappola (pastoia) per il medico impreparato

EVIDENZE ?

La complessità di un elemento clinico:




• Embolia polmonare
• Insufficienza cardiaca
• Polmonite
• Esacerbazione di BPCO
• Versamento pleurico
• Anemia
• Decondizionamento fisico
DISPNEA
TICAGRELOR



Ethnic differences
in response to drugs?

Ethnic Differences in Cardiovascular Drug Response

Potential Contribution of Pharmacogenetics

Julie A. Johnson, PharmD

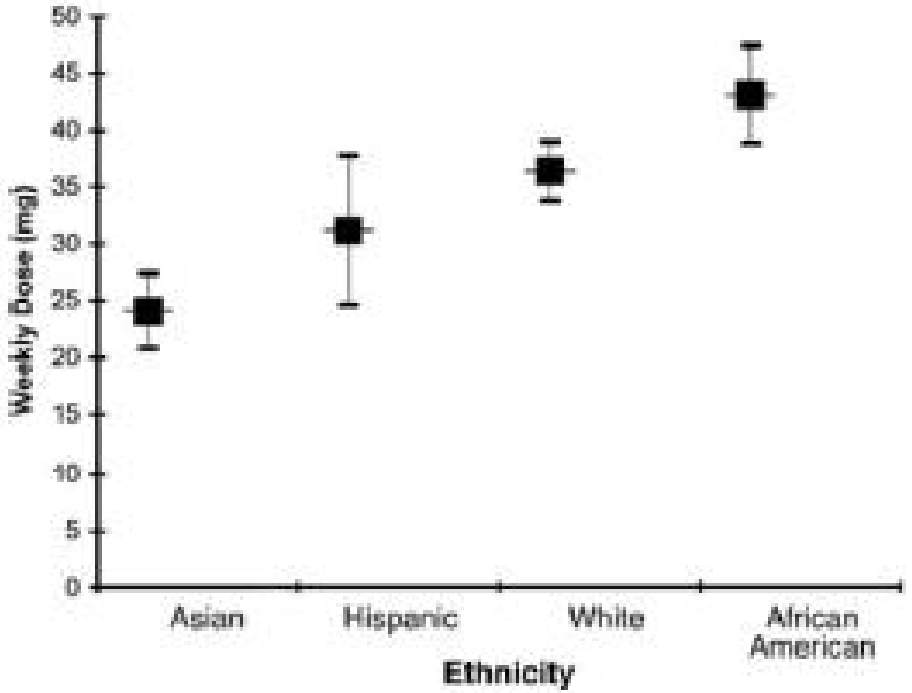
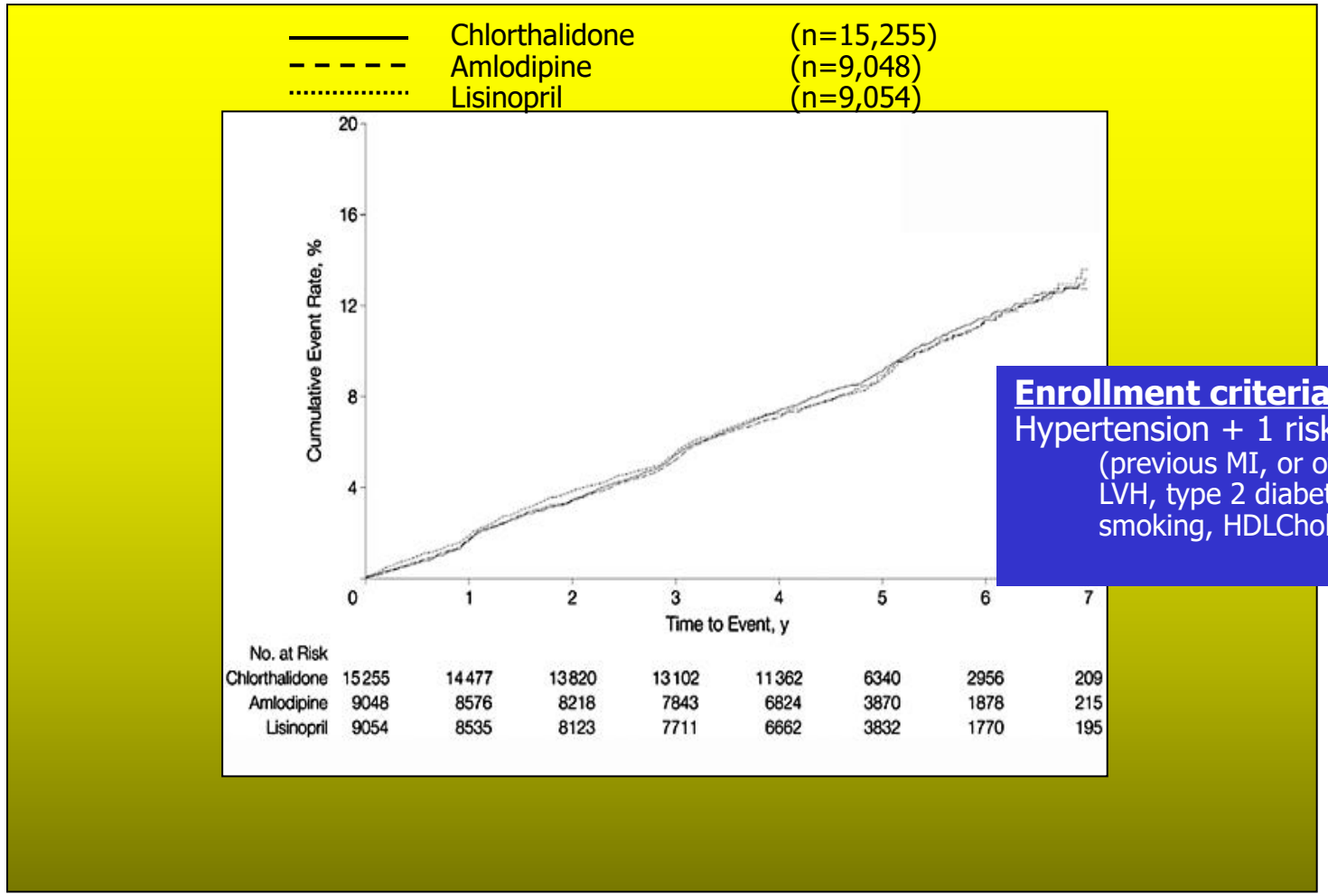


Figure 1. Average warfarin dose requirements, by ethnicity, to maintain a therapeutic INR.[2,3] Reproduced from Dang et al,[6] with permission from the *Annals of Pharmacotherapy*.

Circulation. 2008; 118: 1383-1393

ALLHAT
Cumulative Event Rates for the Primary Outcome (Fatal Coronary Heart Disease or Nonfatal Myocardial Infarction)



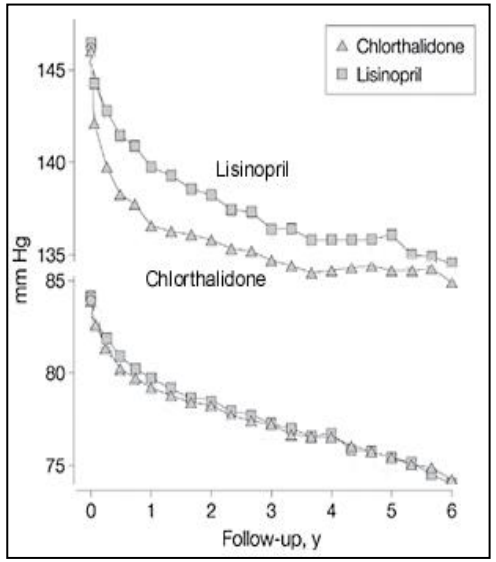
Enrollment criteria

Hypertension + 1 risk factor
(previous MI, or other CVD, LVH, type 2 diabetes, smoking, HDLChol <35 mg/dl)

ALLHAT Collaborative Research Group. JAMA. 2002; 288: 2981-97

ALLHAT

Effects of ACE inhibitor based and Diuretic based treatments on Blood Pressure and Outcomes



Chlortalidone vs Lisinopril

Outcomes	*RR (95% CI)*
All cause mortality	1.00 (0.94-1.06)
Myocardial infarction	0.99 (0.91-1.08)
Stroke	1.19 (1.02-1.30)*
Heart failure	1.20 (1.09-1.34)*

** = p<0.01*

35% of enrolled patients were blacks

ALLHAT Collaborative Research Group. JAMA. 2002; 288: 2981-97

ALLHAT—All Hit or All Miss? Key Questions Still Remain

Franz H. Messerli, MD, and Michael A. Weber, MD

... black patients did not do well when randomized to lisinopril; most glaringly, the incidence of stroke was 40% higher than while receiving chlorthalidone.

The American Journal of Cardiology Vol. 92 August 1, 2003

Chlortalidone vs Lisinopril

	stroke	**BP (mmHg)**
All patients	15%	- 2 mmHg
Blacks	**40%**	**- 4 mmHg**
effect of race	p<0.01	

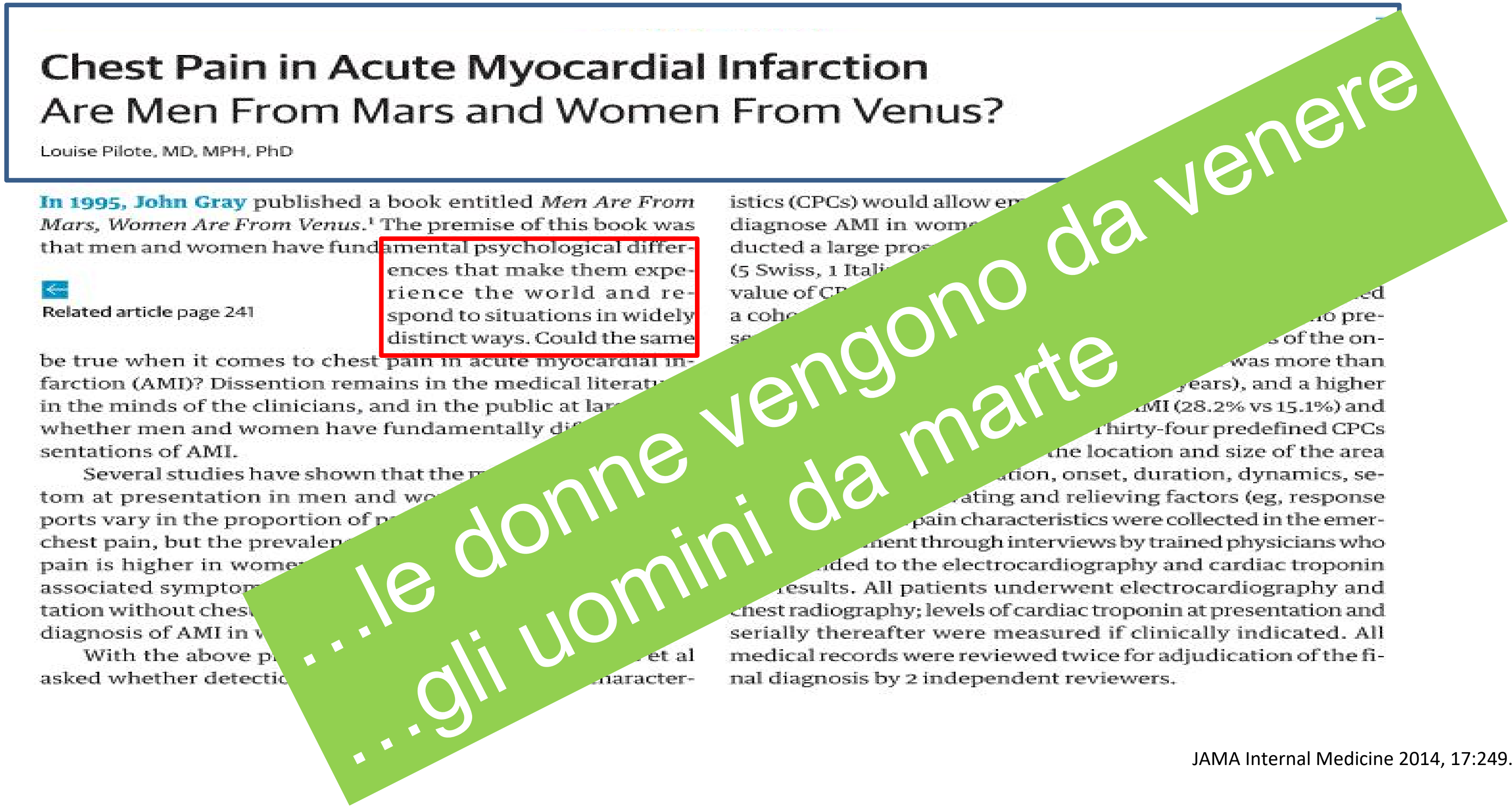
ALLHAT Collaborative Research Group. JAMA. 2002; 288: 2981-97

ALLHAT Collaborative Research Group. JAMA. 2002; 288: 2981-97

Gender differences
in response to drugs?

esiste una differenza nella presentazione della coronaropatia fra uomo e donna?

JAMA Internal Medicine 2014, 17:249



Chest Pain in Acute Myocardial Infarction
Are Men From Mars and Women From Venus?

Louise Pilote, MD, MPH, PhD

In 1995, John Gray published a book entitled *Men Are From Mars, Women Are From Venus*.[1] The premise of this book was that men and women have fundamental psychological differences that make them experience the world and respond to situations in widely distinct ways. Could the same be true when it comes to chest pain in acute myocardial infarction (AMI)? Dissention remains in the medical literatu… in the minds of the clinicians, and in the public at lar… whether men and women have fundamentally di… sentations of AMI.

Related article page 241

Several studies have shown that the m… tom at presentation in men and wo… ports vary in the proportion of p… chest pain, but the prevalen… pain is higher in wome… associated sympto… tation without ches… diagnosis of AMI in w…

With the above p… et al asked whether detectio… haracter-

istics (CPCs) would allow em… diagnose AMI in wome… ducted a large pros… (5 Swiss, 1 Itali… value of CP… a coho… …ed …o pre- se… …s of the on- …was more than …years), and a higher …MI (28.2% vs 15.1%) and …Thirty-four predefined CPCs …the location and size of the area …ation, onset, duration, dynamics, se… …ating and relieving factors (eg, response …pain characteristics were collected in the emer… …ment through interviews by trained physicians who …nded to the electrocardiography and cardiac troponin …results. All patients underwent electrocardiography and chest radiography; levels of cardiac troponin at presentation and serially thereafter were measured if clinically indicated. All medical records were reviewed twice for adjudication of the final diagnosis by 2 independent reviewers.

…le donne vengono da venere
…gli uomini da marte

JAMA Internal Medicine 2014, 17:249

Chest Pain in Acute Myocardial Infarction
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In 1995, John Gray published a book entitled *Men Are From Mars, Women Are From Venus*.[1] The premise of this book was that men and women have fundamental psychological differences that make them experience the world and respond to situations in widely distinct ways. Could the same be true when it comes to chest pain in acute myocardial infarction (AMI)? Dissention remains in the medical literature, in the minds of the clinicians, and in the public at large as to whether men and women have fundamentally different presentations of AMI.

Related article page 241

Several studies have shown that the most common symptom at presentation in men and women is chest pain.[2] Reports vary in the proportion of patients who present without chest pain, but the prevalence of presentation without chest pain is higher in women. More information on chest pain–associated symptoms and symptoms accompanying presentation without chest pain might prove useful in improving the diagnosis of AMI in women.

With the above premises in mind, Rubini Gimenez et al asked whether detection of sex-specific chest pain characteristics (CPCs) would allow emergency department physicians to diagnose AMI in women more accurately.[3] The authors conducted a large prospective cohort study in 7 European centers (5 Swiss, 1 Italian, and 1 Spanish) to investigate the predictive value of CPCs. From 2006 to 2012, the investigators assembled a cohort of 2475 patients, 796 women and 1679 men, who presented to an emergency department within 12 hours of the onset of acute chest pain. The median age of men was more than 10 years younger that of women (59 vs 70 years), and a higher proportion of men had had a previous AMI (28.2% vs 15.1%) and revascularization (32.9% vs 17.3%). Thirty-four predefined CPCs were collected with regard to the location and size of the area of pain, pain quality, radiation, onset, duration, dynamics, severity, and the aggravating and relieving factors (eg, response to nitrates). Chest pain characteristics were collected in the emergency department through interviews by trained physicians who were blinded to the electrocardiography and cardiac troponin test results. All patients underwent electrocardiography and chest radiography; levels of cardiac troponin at presentation and serially thereafter were measured if clinically indicated. All medical records were reviewed twice for adjudication of the final diagnosis by 2 independent reviewers.

JAMA Internal Medicine 2014, 17:249.

Società Italiana di Medicina d'Emergenza-Urgenza

SIMEU

Il dolore toracico: origine cardiaca e non cardiaca

- Il dolore toracico è sintomo di più patologie

-Cardiache

-Esofagee
-Polmonari
-Muscoloscheletriche
-Nevritiche

…oltre il cuore

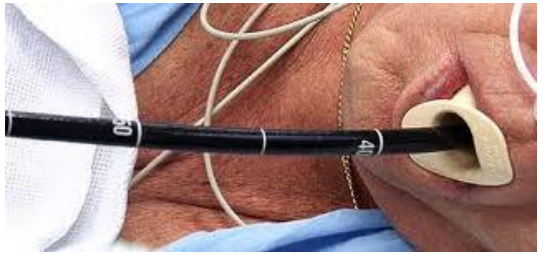
- Pirosi: dolore urente (bruciore) in genere a sede retrosternale (heartburn)

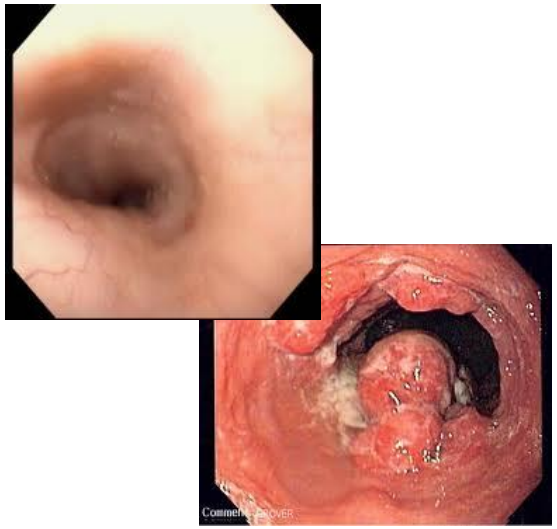
- Rigurgito: comparsa senza sforzo di un liquido acido/amaro in bocca

- Broncopolmonite-polmonite con interessamento pleurico:
  associate a corteo sindromico (tosse, escreato, febbre…)

- Contratture muscolari e artrosi e discopatie dorsali-cervicali
  eventuale blocco motorio, dolore alla torsione

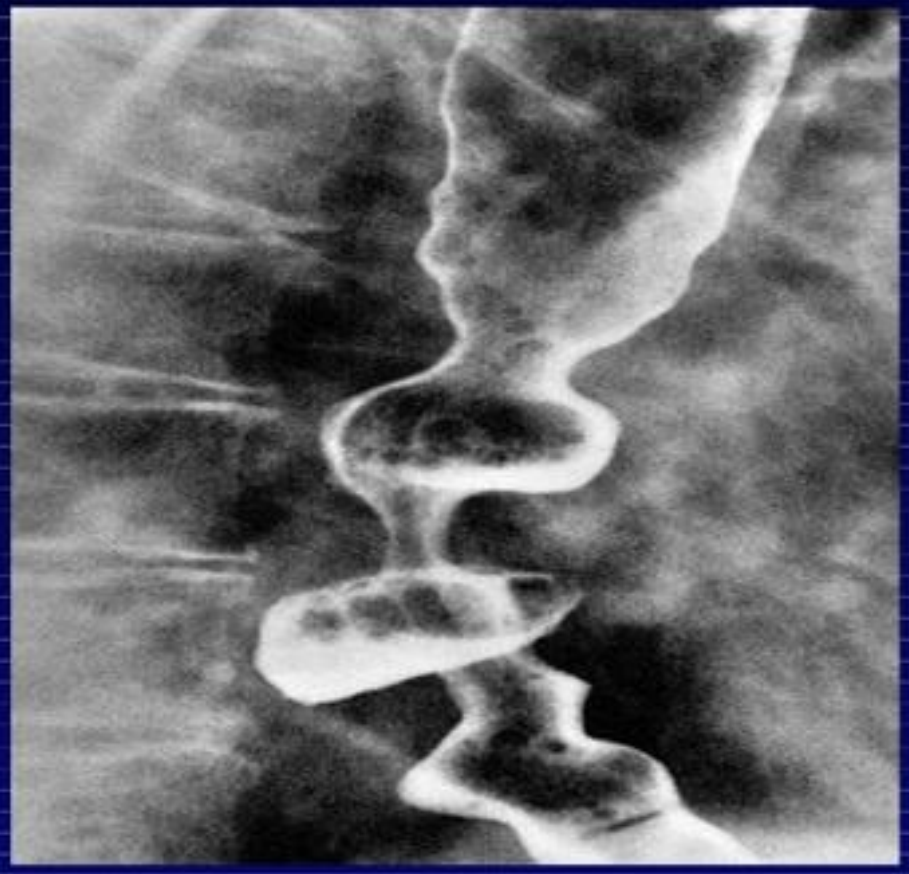
- Herpes Zooster toracico:
  associato a manifestazioni cutanee iperemiche, a chiazze, con aree di soluzione di continuo e secrezione seriosa, croste



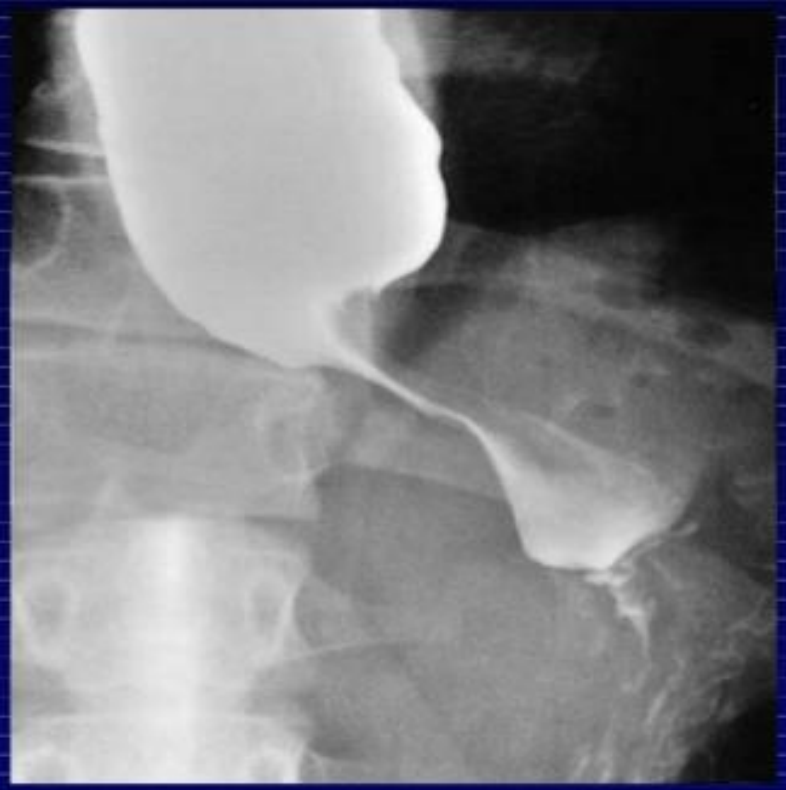


L’EGDS è positiva solo se c’è esofagite.
La diagnosi può essere clinica.

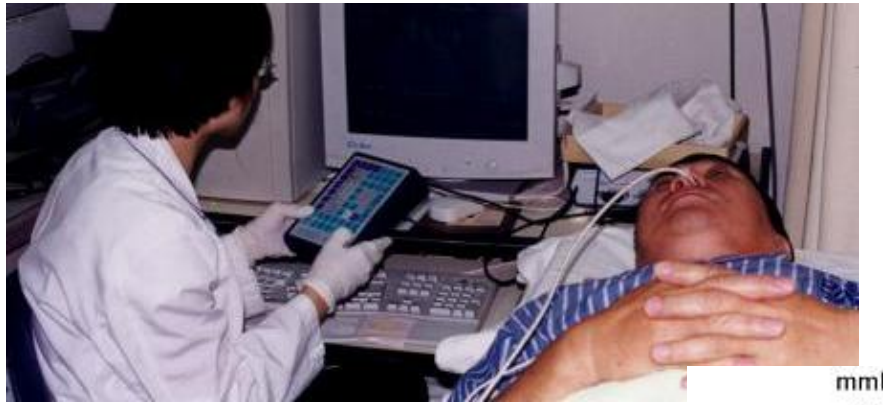
Diffuse Oesophageal Spasm

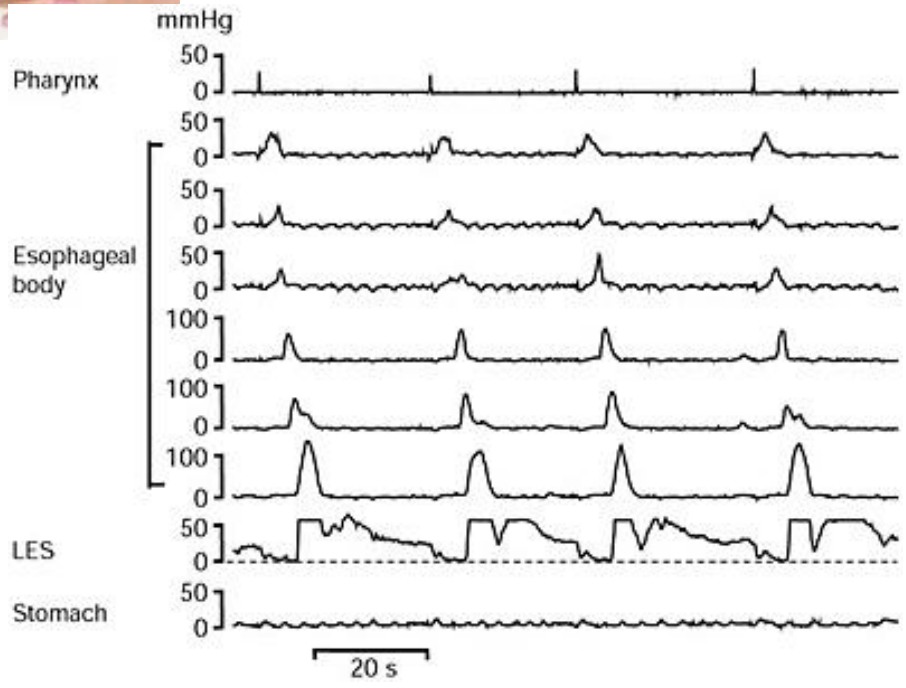


Achalasia Of The Oesophagus



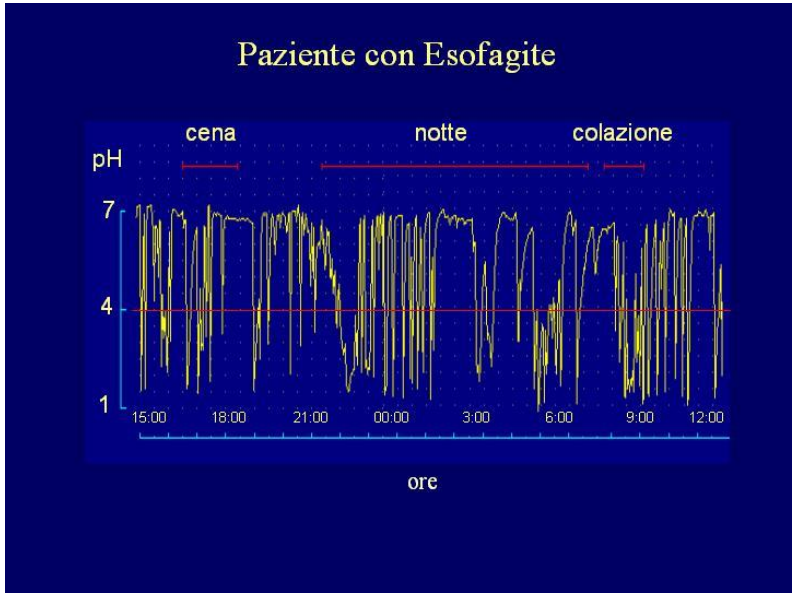
Manometria esofagea:





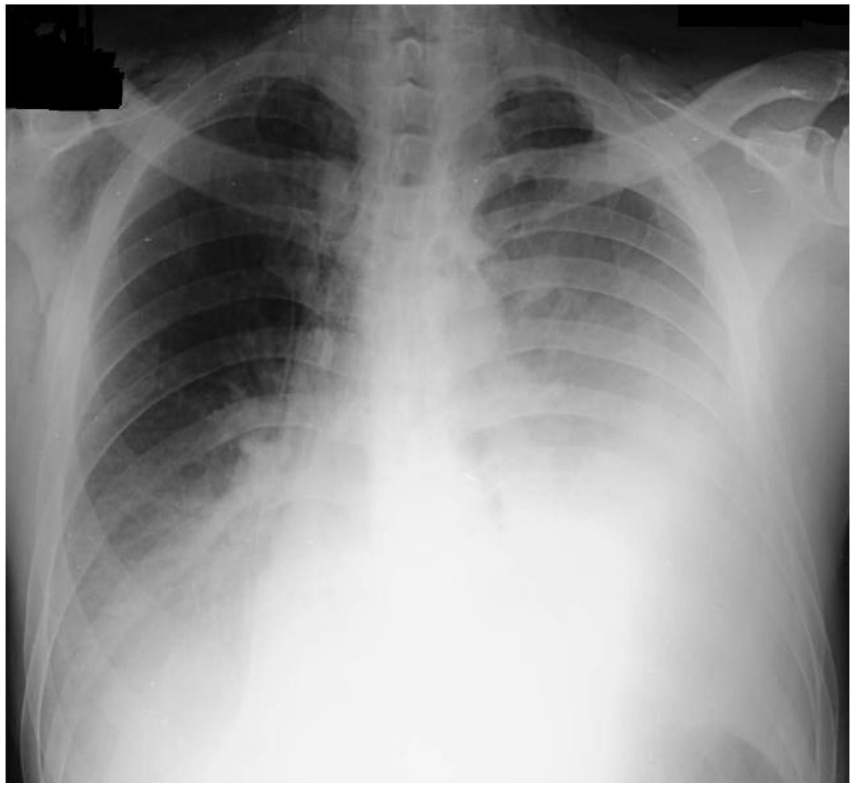
Pirosi e rigurgito? pH metria

- pH metria (delle 24 ore)

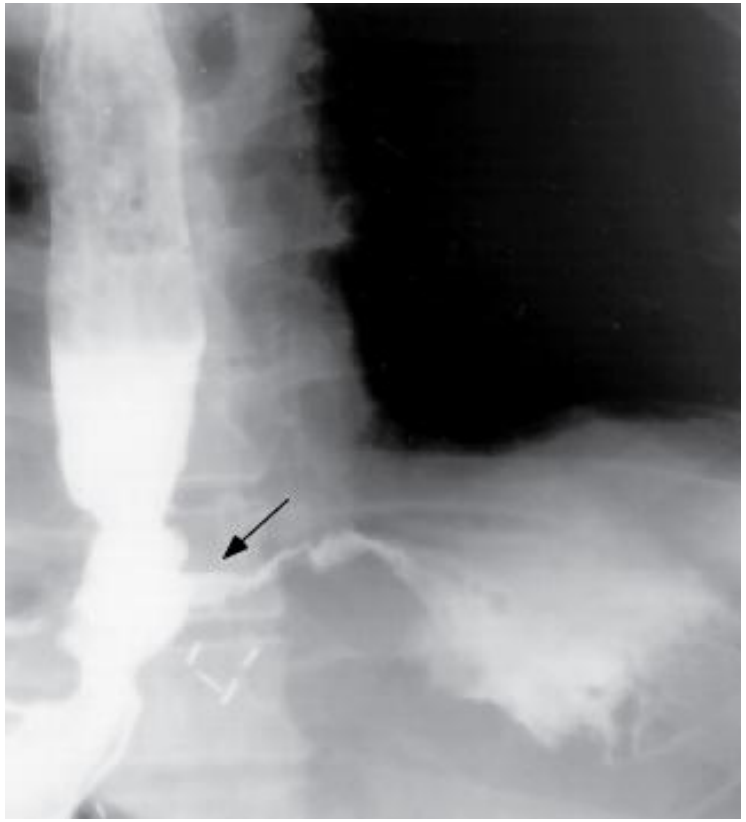


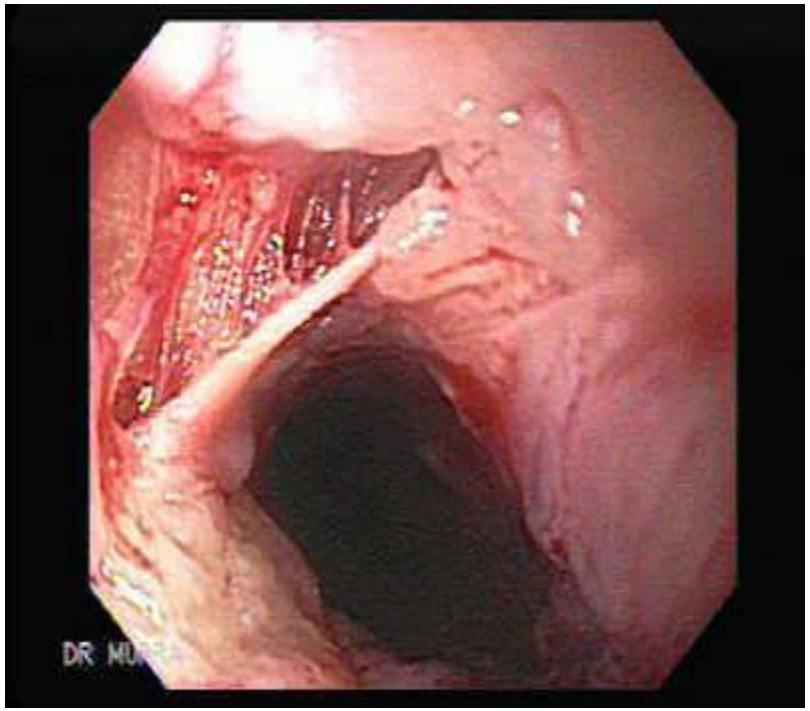
Esophageal rupture: Diagnosis

- CXR: early shows mediastinal or free peritoneal air
  - Hours to days later: widening of mediastinum, pleural effusion



Imaging





Chest Pain: Hellerstein team pager…10:59:45pm

- *From NACR, 30512…I have your last patient for the night…Jones, 01111111, 54 yo female coming in with chest pain…currently in the ED going to T5*

Reflux?

Atypical presentations of GERD

Pulmonary

- Asthma
- Bronchitis
- Aspiration pneumonia
- Apnea
- Atelectasis
- Pulmonary fibrosis

Chest Pain

ENT

- Hoarseness
- Cough
- Globus
- Halitosis
- Vocal cord granuloma
- Laryngeal stenosis
- Laryngeal cancer
- Loss of dental enamel
- Sinusitis, otitis

Sintomi Tipici di MRGE

PIROSI RETROSTERNALE
RIGURGITO ACIDO

Segni e Sintomi Atipici esofagei ed extraesofagei di MRGE

Dolore toracico non cardiaco
Raucedine cronica
Asma e Patologie polmonari
Laringite cronica
Globo faringeo
Tosse cronica

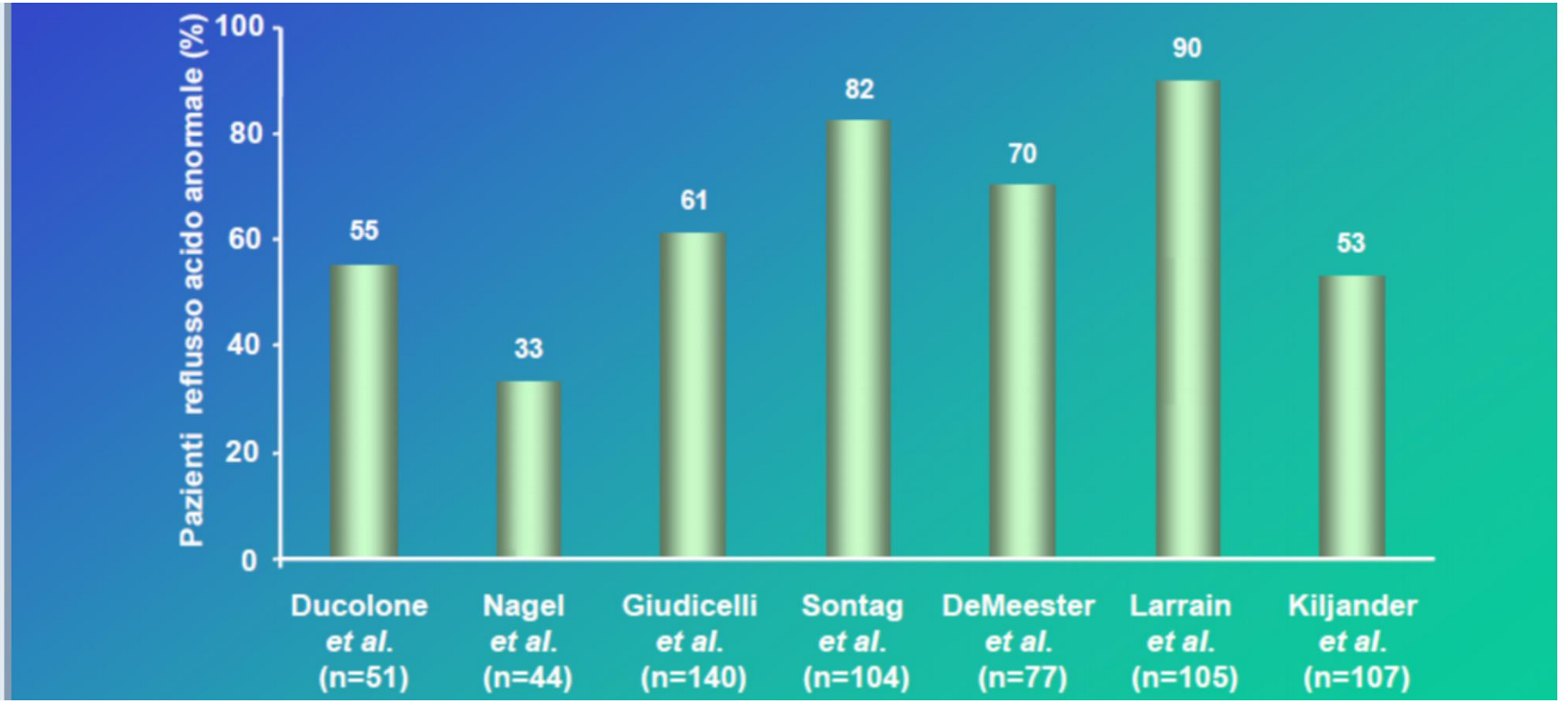
Prevalenza di Segni e Sintomi Atipici di MRGE

Variabile dal 5 al 20% a seconda delle casistiche

Dolore toracico non cardiaco	50%
Raucedine cronica	78%
Asma	82%
Laringite cronica	60%
Globo faringeo	25-30%
Tosse cronica	10-25%

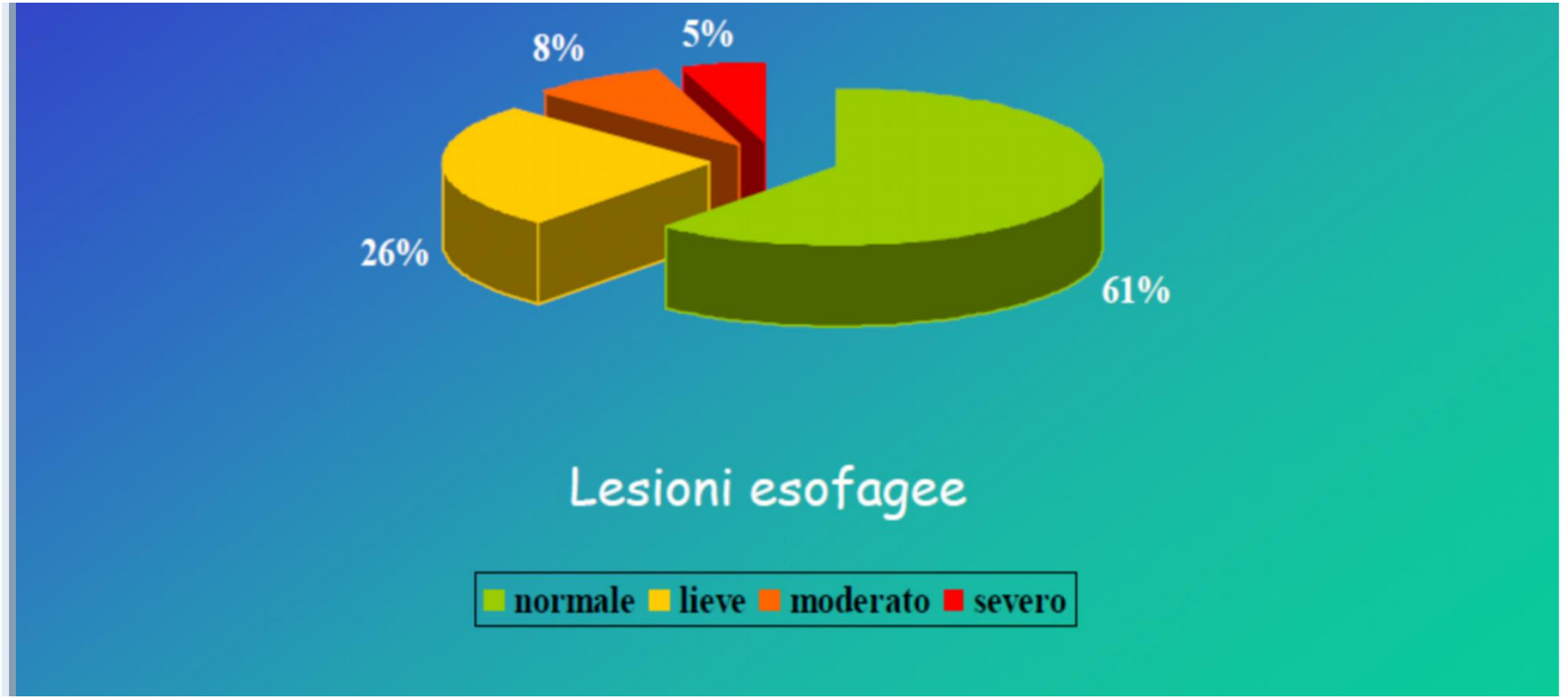
Jaspersen D et al Aliment Pharmacol Ther. 2003 Jun 15;17(12):1515-20.
Malagelada JR.; Aliment Pharmacol Ther. 2004 Feb;19 Suppl 1:43-8.
Richter JE; Aliment Pharmacol Ther. 2005 Aug;22 Suppl 1:70-80.

Anormale esposizione a reflusso acido correlata all'asma



Harding & Sontag, *Am J Gastroenterol* 2000; **95**(Suppl): S23–32.

Prevalenza di lesioni esofagee in pazienti asmatici



Sontag SJ 1999

...sindrome extraesofagea

- Tosse
- Laringite
- Asma
- Erosioni dentali

Spesso associata ai sintomi tipici ma anche isolata.

La laringite da reflusso è evidenziabile dall'ORL

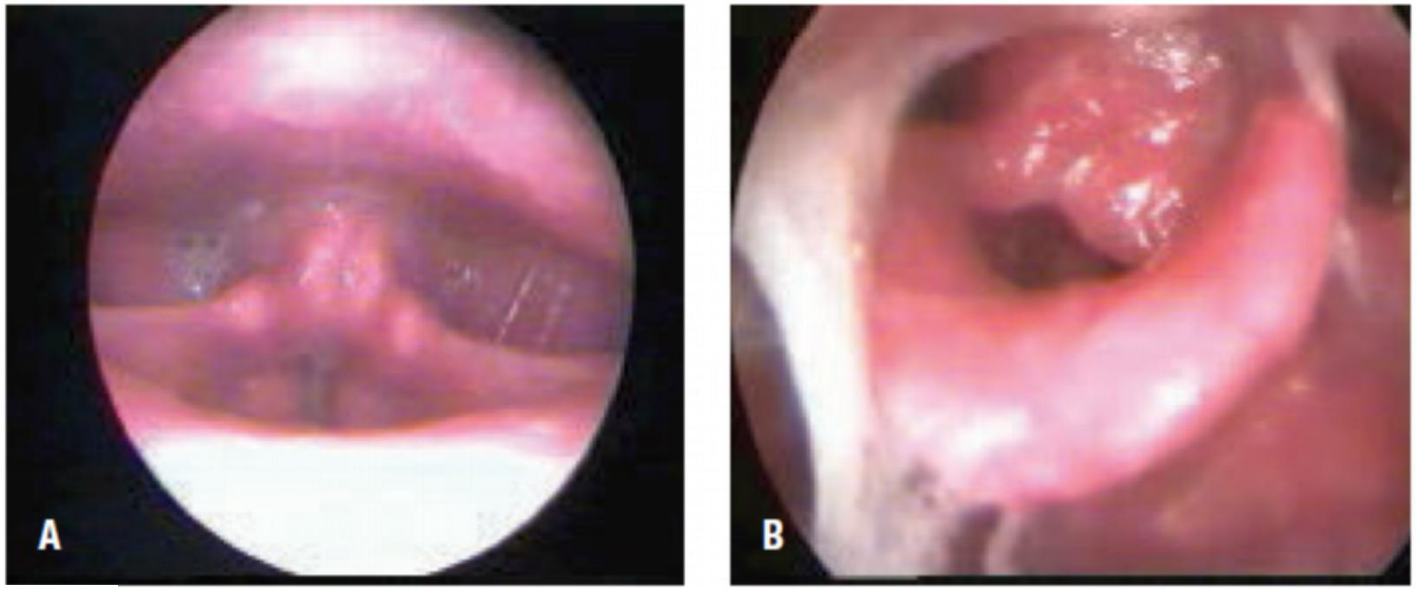
IL REFLUSSO LARINGOFARINGEO

Segni faringo-laringei potenzialmente associati al GER	
Edema ed iperemia mucosa laringea	Stenosi sottoglottica
Granuloma	Iperemia ed iperplasia linfoide della parete posteriore faringea
Polipi-noduli laringei	Ulcera da contatto
Edema di Reinke	Edeme interaritenoideo
Tumori	Stenosi della porzione posteriore glottide

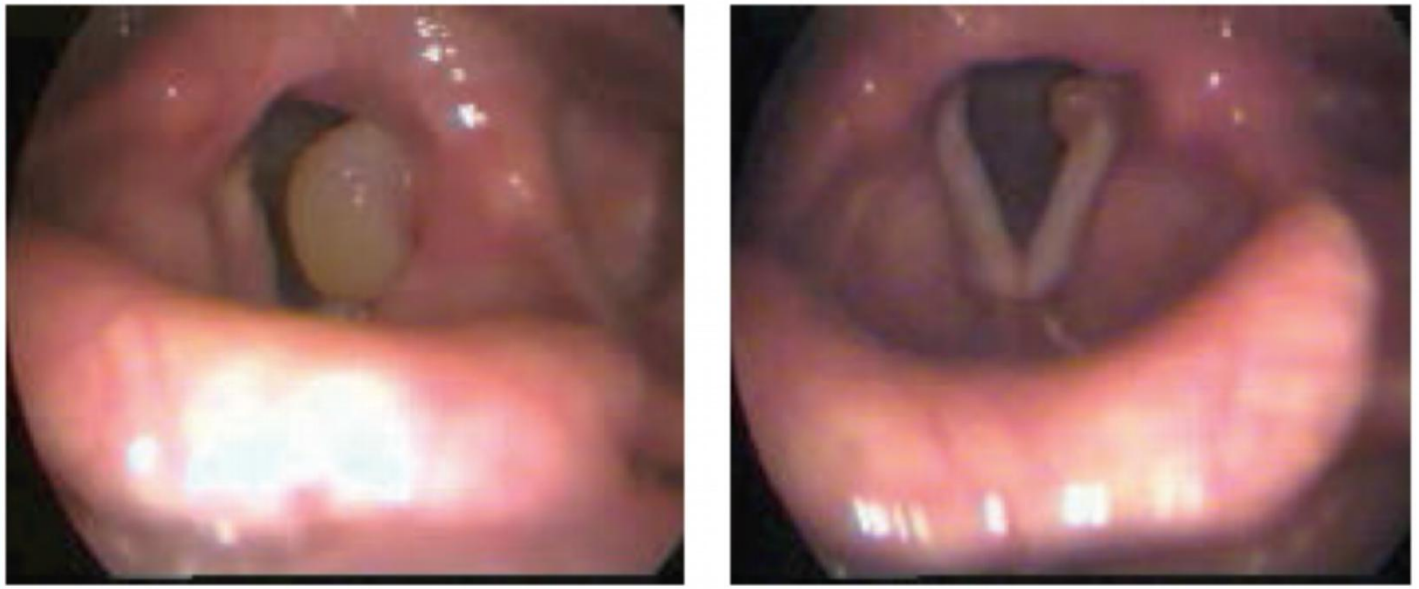
Elif Sataris Yuksel 2012

Sindrome Laringea?

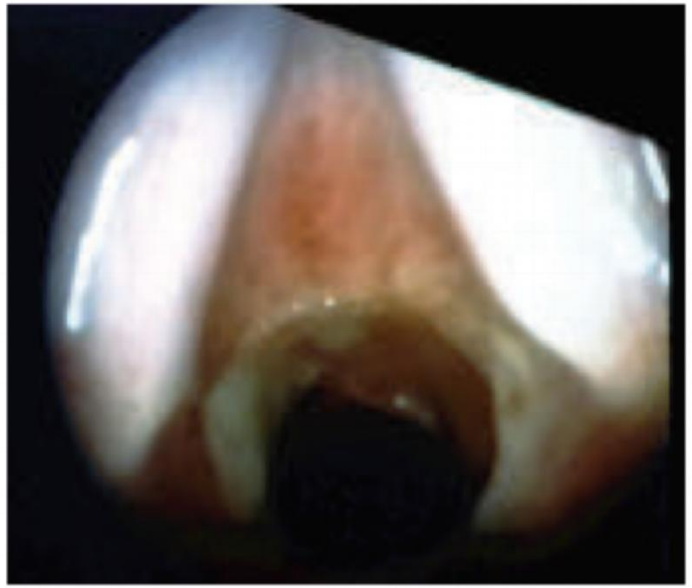
QUADRI CLINICI DIVERSI DI UNO STESSO PROCESSO PATOLOGICO	
Reflusso laringo-faringeo (LFR)	**Reflusso esofageo (GER)**
Sintomi	
atipici "extra digestivi"	tipici "digestivi"
Insorgenza	
Diurna	Notturna
Modalità	
Posizione eretta	Posizione clinostatica
Meccanismi di danno mucoso	
UES	LES
Meccanismi di compenso	
Nessuno	Peristalsi, flusso salivare
Concause	
Traumatismo glottico	Connettiviti, m.nerologiche



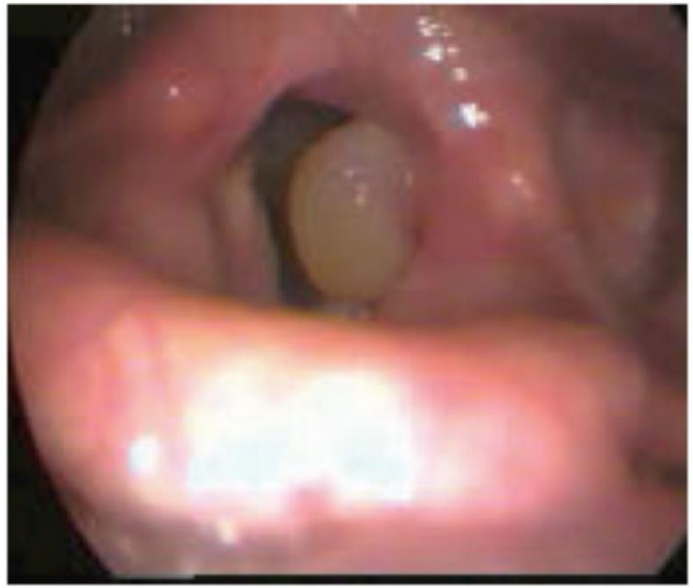
Edema interaritenoideo. a) lieve. b) grave



Granuloma laringeo

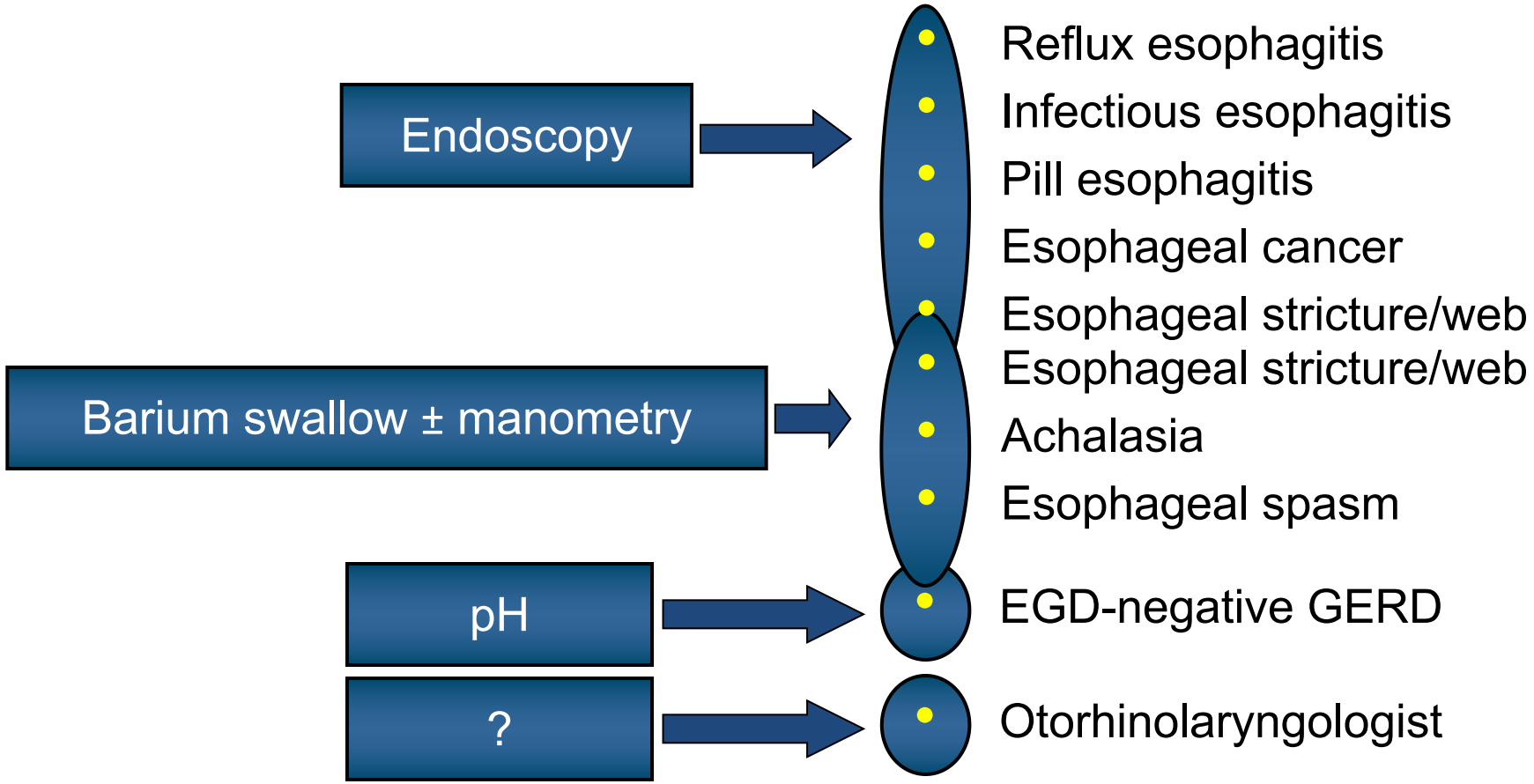


Pachidermia interaritenoidea



Stenosi sottoglottica

Detection of Esophageal Disorders Potentially Responsible for Symptoms



Esophageal Chest Pain Work-Up

- Traditionally
  - Ø Endoscopy
  - Ø pH probe
  - Ø Manometry
  - Ø Provocative testing
- Emerging role for up-front empiricism

PPIs Test

Medical Rx Outcomes high-dose (PPIs)

- Relief of symptoms 85-95%
- Healing esophagitis 85-95%
- Prevent complications 80%
- Remission 90%

- High-dose: up to 40 mg bid
- up to 30 mg bid

Alcuni schemi terapeutici consigliati…

Sintomo	Farmaco e dose	Durata
Dolore toracico	PPI b.i.d.	1-8 sett
Asma	PPI b.i.d.	≤3 mesi
Tosse	PPI b.i.d.	1-3 mesi
Vie aeree superiori	PPI b.i.d.	1-3 mesi

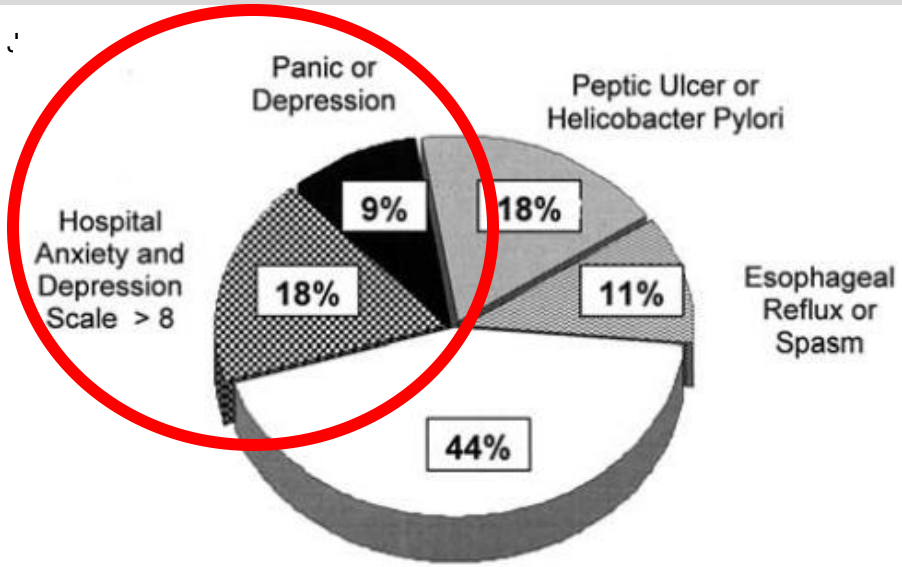
Katz *et al, Am J Med* 2000; 108(suppl 4a): 170S-177S.

Dolore toracico: sistema complesso

Cardiac	Pulmonary	Vascular	Gastro-intestinal	Orthopaedic	Other
Myopericarditis Cardiomyopathies[2]	Pulmonary embolism	Aortic dissection	Oesophagitis, reflus or spasm	Musculoskeletal disorders	Anxiety disorders
Tachyarrhythmias	(Tension)-Pneumothorax	Symptomatic aortic aneurysm	Peptic ulcer, gastritis	Chest trauma	Herpes zoster
Acute heart failure	Bronchitis, pneumonia	Stroke	Pancreatitis	Muscle injury/ inflammation	Anaemia
Hypertensive emergencies	Pleuritis		Cholecystitis	Costochondritis	
Aortic valve stenosis				Cervical spine pathologies	
Tako-Tsubo cardiomyopathy					
Coronary spasm					
Cardiac trauma					

Dolore toracico: origine non cardiaca e cardiaca

2015 ESC Guidelines for the Management of NSTEACS Eur Heart J.



Alternative diagnoses in patients discharged after CPU management with no evidence of CAD (n = 870).

Conti A, Am Heart J, 2002

Chest Pain - Imipramine

- 50 mg nightly for 3 wks
- 52% reduction in chest pain episodes
- Suggested visceral analgesic effect
  - *Cannon R, et al. N Engl J Med 1994; 330:1411-7*

- 15 healthy male volunteers
- Balloon inflation volume at pain threshold higher on imipramine
  - *Peghini PL, et al. Gut 1998; 42:807-13*

Differential cont
Gastrointestinal

- Non-esophageal
  - Biliary
  - Peptic ulcer disease
  - pancreatitis
- **Esophageal**
  - Reflux diseases
  - Esophageal spasm
  - Esophageal hypersensitivity
  - Pill esophagitis
  - HIV-AIDS diseases
  - Lye ingestion
  - Achalasia

Impression

- Non-cardiac chest pain most likely of esophageal origin.
- Pathophysiology
  - Pathological acid reflux
  - Non-acid reflux
  - Disturbed Motility
  - Visceral hypersensitivity/Brain-gut interactions
    - Chemoreceptor, mechanoreceptor, thermoreceptor malfunction
    - Altered cerebral processing of sensory data
  - Psychological abnormalities- somatoform disorder

Next Step

What should be done next?

- Endoscopy
- Ambulatory pH monitoring
- Combined Impedance-pH testing
- Esophageal manometry
- Acid suppression therapy.

Endoscopy

- Insensitive- EE only in 5-10% of cases[1].
- Highly specific
- Costly
- Invasive
- Not likely to change management
- Can help identify structural abnormalities associated w GERD, stricture, Schatzki's ring, hiatal hernia

- 1. Cherian et al, Dis Esophagus 1995; 8:129

Ambulatory pH monitoring

- Using endoscopy, a probe is attached to the distal esophagus to measure changes in pH for 48 hours.
- Can be done on or off PPIs.
- Diary allows correlation between symptoms and acid reflux.
- Sensitive and specific
- Can help rule out PPI resistance
- Costly
- Invasive- greater pt discomfort (occ chest pain)
- Can miss up to 25% of cases of reflux-not due to “acid”

Esophageal Manometry

- A thin probe is inserted intranasally and advanced into distal esophagus.
- Measurements are recorded as the pt is asked to swallow sips of water.
- Goal is to rule out motility disorders of the esophagus as cause for chest pain.
- Not very sensitive but specific
- Tensilon (Edrophonium) provocation can be used to increase sensitivity but it decreases the specificity by increasing the number of false positives.
- Poorly tolerated by most patients/invasive/costly.

Acid suppression therapy

- Also called the “PPI Test”
- Empiric trial of double dose PPI therapy for 1 to 8 weeks.
- Readily available
- Cheap
- Noninvasive
- Well tolerated with few if any side effects.
- Both diagnostic and therapeutic advantages

Management

- If the PPI test fails, then one should proceed with endoscopy/pH monitoring +/- impedance testing depending on availability.
- Should it be performed on PPI therapy or not? It depends…..
  - Is it GERD?
  - Is it PPI resistance? (up to 20%).[1]

1. Leite et al. Am J Gastroenterol 1996; 91:1572

Summary

- NCCP is a very common problem with high cost to the healthcare system and significant morbidity to the patient.
- The most common cause of NCCP is GERD.
- An empiric trial of high dose PPI therapy is the single most effective approach to dealing with NCCP.

Differential Diagnosis

- Cardiovascular
- CP related to Hyperadrenergic states
- Chest wall
- Pulmonary
- Mediastinal
- Psychiatric

- GI
  - Esophageal
    - Reflux
    - Rupture
    - Spasm
    - Esophagitis
  - Pancreatobiliary
    - Pancreatitis
    - Cholecystitis
    - Cholangitis
    - Biliary Colic
  - PUD

Non-Cardiac Chest Pain

- More than 50% of patients presenting to ED
  - Sustained concern 1yr after negative LHC
    - 51% unable to work, 47% limited activity, 44% still with perceived CAD
- Esophageal spasms?
  - 910 patients with negative LHC
    - 28% with abnormal motility (10% due to spasms)
- GERD most common cause
  - Abnormal acid exposure in 50% in recurrent noncardiac chest pain

Non-Cardiac Chest Pain

- Esophageal Hypersensitivity
  - Lower threshold for non-cardiac chest pain with intraesophageal balloon distension
    - 24 patients with CP and negative cardiac workup, EGD, Motility studies, 24h pH probe
    - Typical CP reproduced in 83% compared to none in controls
    - Related to altered cerebral processing rather than abnormal receptors

Approach to patient

- Exclude CAD
  - Angiography eliminates life-threatening disease as cause of CP
- Clues for esophageal etiology
  - Pain persistent for > 1 hr
  - Postprandial pain
  - Lack of pain radiation
  - Associated esophageal symptoms (heartburn, regurgitation, dysphagia)
  - Pain relieved by antacid ingestion
- Relief with NTG does not indicate cardiac origin
  - Out of 459 patients, 39% relieved (35% with, 41% w/o)

GERD

- Definition: Symptoms or complications resulting from the reflux of gastric contents into the esophagus or beyond, into the oral cavity (including larynx) or lung.
- Further classified as the presence of symptoms without erosions on endoscopic examination (non-erosive disease or NERD) or GERD symptoms with erosions present (ERD)

Guidelines for the Diagnosis and Management of GERD, Katz, et al; *Am J Gastroenterol* 2013;108:308-328

Symptoms and Epidemiology

- Prevalence of 10-20% of Western world
- Clinically troublesome heartburn is seen in about 6% of the population
- Regurgitation was reported in 16%
- Distinguishing cardiac from non-cardiac chest pain is required before considering GERD as a cause of chest pain.
- Although the symptom of dysphagia can be associated with uncomplicated GERD, its presence warrants investigation for a potential complication including an underlying motility disorder, stricture, ring, or malignancy

Symptoms and Epidemiology

- Extraesophageal symptoms: chronic cough, asthma, chronic laryngitis, other airway symptoms
- Atypical symptoms including dyspepsia (38%), epigastric pain, nausea, bloating, and belching may be indicative of GERD but overlap with other conditions.
- QOL: increase time off work, decrease physical functioning, nocturnal > daytime symptoms, sleep disturbances

Symptoms and Epidemiology

- Symptom frequency does not change with age
- Symptom intensity decreases after age 50
- Aging increases prevalence of erosive esophagitis (LA Grades C and D)
- Barrett's Esophagus increases in prevalence after age 50 (Caucasian males); M > F
- Men: more Erosive Esophagitis; Women: more NERD
- Esophageal Adenocarcinoma 8:1 male to female
- GERD associated with increased BMI, waist circumference, wt gain, ERD, and Barrett's Esophagus

Diagnosis

- Made by combination of:
  - Symptom presentation
  - Objective testing with endoscopy
  - Ambulatory reflux monitoring
- Heartburn and regurgitation correlates poorly with presence of Erosive Esophagitis
  - Sensitivity 30-76% ; Specificity 62-96%
- Empiric PPI trial
  - Sensitivity 78%; Specificity 54%

Diagnosis

- Non-cardiac chest pain
  - Generally associated with GERD
  - Generally responds to aggressive acid suppression
  - Cost-effective (when cardiac cause excluded)
    - Response greater than placebo in patients with objective evidence of GERD (ERD on EGD and/or abnormal pH monitoring)
- Dysphagia
  - Alarming symptom requiring endoscopy

Società Italiana di Medicina d'Emergenza-Urgenza

SIMEU

Il percorso assistenziale: l'algoritmo decisionale (Chest Pain Score e Heart Score)

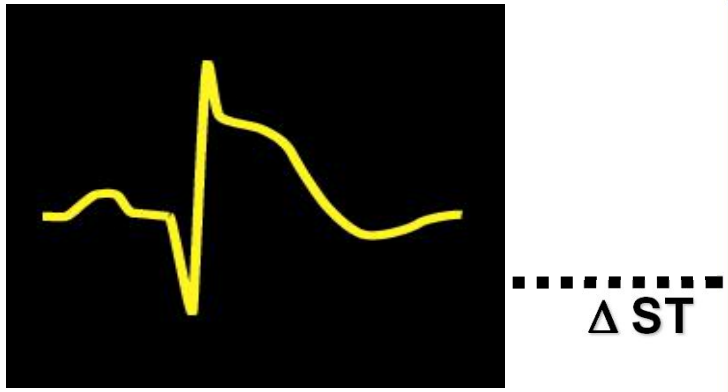
…the problem : in ED

ECG Normale/Non-Diagnostico

ECG: la chiave della stratificazione del rischio

Lab. Emodinamica o UCIC

Osservazione Breve in DEA



Δ ST

ECG: normale o non diagnostico

3

alto rischio
>70%

basso rischio
<5-20%

probabilità bassa o intermedia

Chest pain and other problem in ED

National Health Statistics Reports
Number 7 ■ August 6, 2008

National Hospital Ambulatory Medical Care Survey: 2006 Emergency Department Summary

by Stephen R. Pitts, M.D., M.P.H., F.A.C.E.P.; Richard W. Niska, M.D., M.P.H., F.A.C.E.P.; Jianmin Xu, M.S.; and Catharine W. Burt, Ed.D., Division of Health Care Statistics

Number and percent distribution of emergency department visits with corresponding standard errors, by the 20 leading principal reason for visit: United States, 2006

Principal reason for visit and RVC code[1]		Number of visits in thousands	Standard error in thousands	Percent distribution	Standard error of percent
All visits		119,191	5,276	100.0	...
Stomach and abdominal pain, cramps and spasms	S545	8,057	442	6.8	0.2
Chest pain and related symptoms	S050	6,392	401	5.4	0.2
Fever	S010	4,485	277	3.8	0.2
Headache, pain in head	S210	3,354	233	2.8	0.1
Back symptoms	S905	3,304	272	2.8	0.2
Shortness of breath	S415	3,007	200	2.5	0.1

Chest pain and other problem in ED

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CP and NSTEACS…the problem: in ED

- **CP or equivalent symptoms represents 4-9% of all ED visits**
- Gibler BW AHA 2001 8%
- Conti A AHJ 2002 9%
- Goodacre SW BMJ 2002 4%
- Christenson J MAJ 2004 7%

CP and NSTEACS…the problem: in ED

- CP or equivalent symptoms represents 4-9% of all ED visits

- **Only 30% of patients with CP have AMI or ACS (50% of admitted)**
  Lee NEJM 2000

CP and NSTEACS…the problem: in ED

- CP or equivalent symptoms represents 4-9% of all ED visits
- Only 30% of CP patients have AMI or ACS (50% of admitted)

- **Admission rate 40-60%**
- Gibler BW AHA 2001 60%
- Conti A AHJ 2002 40%
- Goodacre SW BMJ 2002 57%

CP and NSTEACS…the problem: in ED

- CP or equivalent symptoms represents 4-9% of all ED visits
- Only 30% of CP patients have AMI or ACS (50% of admitted)
- Admission rate 40-60%

- **Morbidity/Mortality for missed AMI is high 20% < 24h**

Lee, Am J Cardiol 1987

Storrow, Ann Em Med 2000 **(Missed AMI: 2-5%)**

Storrow, Ann Em Med 2000, Rusnak, Ann Em Med 1989:
(20-40% of reimboursement is due to malpractice of CAD,
no variations throughout years!)
In these patients mortality is double than other admitted

Effetto **Bullying:**

l’organizzazione e il management esercita pressione nei confronti dei dipendenti per raggiungere i targets adottando comportamenti al limite del lecito ed eticamente discutibili

CP and NSTEACS…the problem: in ED

QUALITY GRAND ROUNDS

Series Editors: Robert M. Wachter, MD; Kaveh G. Shojania, MD; Sanjay Saint, MD, MPH; Amy J. Markowitz, JD; and Mark Smith, MD, MBA

IMPROVING PATIENT CARE

Triage of Patients with Acute Chest Pain and Possible Cardiac Ischemia: The Elusive Search for Diagnostic Perfection

Lee Goldman, MD, and Ajay J. Kirtane, MD*

Few diagnostic decisions in medicine have been more heavily researched than the approach to the patient with acute chest pain. Despite the advances in both diagnosing and treating patients presenting with this symptom, cases of missed myocardial infarctions still cause substantial morbidity and mortality. This article examines a case in which a patient was sent home from the emergency department after presenting with chest pain and was subsequently found to have a myocardial infarction. In the context of the case, the article discusses clinical decision making about the diagnosis and triage of patients presenting with acute chest pain or with symptoms consistent with possible cardiac ischemia. A standardized approach to addressing the management of these patients is essential, given the adverse consequences of missing a life-threatening condition.

Ann Intern Med. 2003;139:987-995. www.annals.org

For author affiliations, see end of text.

For a list of questions and answers from the Quality Grand Rounds conference, see the Appendix, available at www.annals.org.

State-of-the-Art Evaluation of ED patients with potential ACS

Clinical Feature	Likelihood Ratio (95% CI)
Increased likelihood of AMI	
Described as pressure	1.3 (1.2–1.5)
Pain in chest or left arm	2.7*
Chest pain radiation	
To right arm or shoulder	4.7 (1.9–12)
To left arm	2.3 (1.7–3.1)
To both left and right arm	7.1 (3.6–14.2)
To both arms or shoulders	4.1 (2.5–6.5)
Chest pain most important symptom	2.0*
Chest pain associated with exertion	2.4 (1.5–3.8)
Worse than previous angina or similar to prior AMI	1.8 (1.6–2.0)
History of MI	1.5–3.0†
Nausea or vomiting	1.9 (1.7–2.3)
Diaphoresis	2.0 (1.9–2.2)
Third heart sound	3.2 (1.6–6.5)
Hypotension (systolic BP <80 mm Hg)	3.1 (1.8–5.2)
Pulmonary crackles	2.1 (1.4–3.1)
Decreased likelihood of AMI	
Pleuritic chest pain	0.2 (0.1–0.3)
Described as sharp	0.3 (0.2–0.5)
Positional chest pain	0.3 (0.2–0.5)
Reproduced by palpation	0.3 (0.2–0.4)
Inframammary location	0.8 (0.7–0.9)
Not associated with exertion	0.8 (0.6–0.9)

Panju AA, Hemmelgarm BR, Guyatt GH, Simel DL. Is this patient having a myocardial infarction. *JAMA*. 1998;280:1256–1263.
Swap CJ, Nagurney JT. Value and limitations of chest pain history in the evaluation of patients with suspected acute coronary syndromes. *JAMA*. 2005;294:2623–2629. doi: 10.1001/jama.294.20.2623.

JE Hollander Circulation 2016; 134: 547-564

Effectiveness of a multidisciplinary chest pain unit for the assessment of coronary syndromes and risk stratification in the Florence area

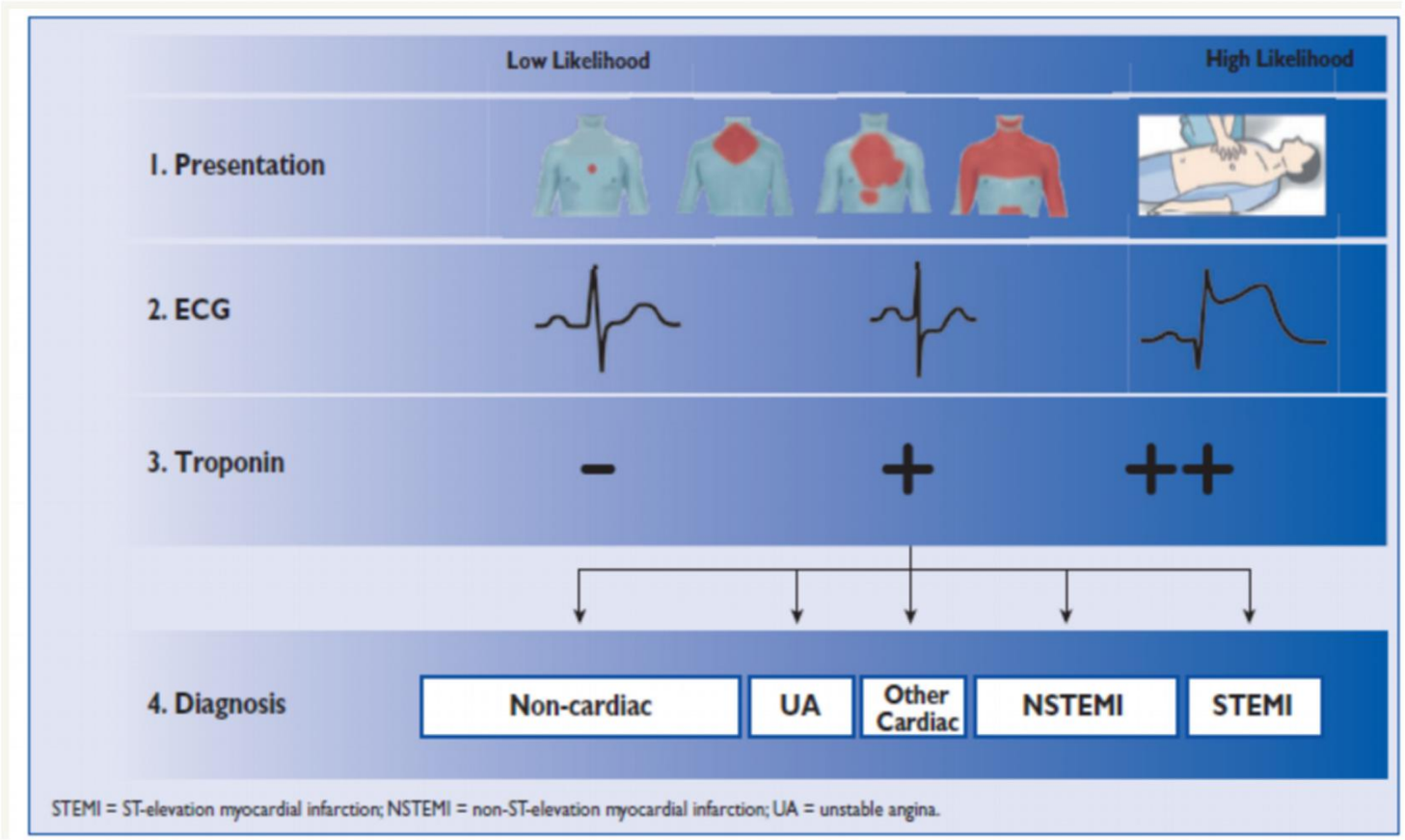
Alberto Conti, MD,[a] Barbara Paladini, MD,[a] Simone Toccafondi, MD,[a] Simone Magazzini, MD,[a] Iacopo Olivotto, MD,[a] Ferdinando Galassi, MD,[b] Cesco Pieroni, MD,[c] Gennaro Santoro, MD,[d] David Antoniucci, MD,[c] and Giancarlo Berni, MD[a] *Florence, Italy*

Table I. Clinical chest pain score

Location	
Substernal, precordial	+3
Left chest, neck, lower jaw, epigastrium	+1
Apex	−1
Radiation	
Either arm, shoulder, back, neck, lower jaw	+1
Character	
Crushing, pressing, heaviness	+3
Sticking, pleuritic, pinprick	−1
Associated symptoms	
Dyspnea, nausea, diaphoresis	+2
History of angina	+3

A score <4 is considered as "very low" probability of CAD; a score ≥4 as "low-intermediate and high" probability of CAD.

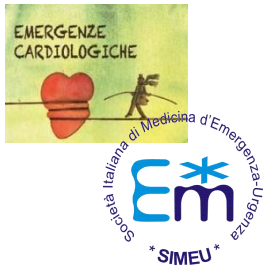
Dolore toracico alla presentazione…STEACS



Clinica: alta sensibilità, bassa specificità…necessità di ECG

2015 ESC Guidelines for the Management of NSTEACS Eur Heart J doi:10.1093/euroheartj/ehv320

2002, Eur Heart J Task force on the management of chest pain.
2000, NEJM Evaluation of the patient with chest pain.
2012, Eur Heart J ESC Guidelines for the management of AMI in patients presenting with ST-segment elevation.
2015, Eur Heart J ESC Guidelines for the management of ACS in patients presenting without persistent ST-segment elevation.

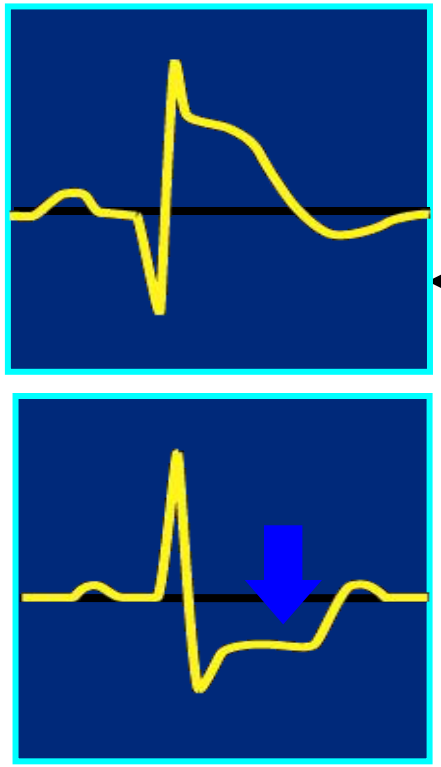


ECG: la prima guida

ECG: chiave della stratificazione del rischio

Lab. Emodinamica o UCIC

Osservazione Breve in DEA



Δ ST

ECG: normale o non diagnostico

alto rischio
>70%

basso rischio
<5-20%

probabilità bassa o intermedia

Circulation

American Heart Association®

State-of-the-Art Evaluation of ED patients with potential ACS

Incidence of ACS in patients with normal or nonspecific ECG is 5% to 28%.

New ECG abnormalities increases the UA risk of 14-43% and AMI risk of 25-73%

JE Hollander Circulation 2016; 134: 547-564

Selker HP, Zalenski RJ, Antman EM, Aufderheide TP, Bernard SA, Bonow RO, Gibler WB, Hagen MD, Johnson P, Lau J, McNutt RA, Ornato J, Schwartz JS, Scott JD, Tunick PA, Weaver WD. An evaluation of technologies for identifying acute cardiac ischemia in the emergency department: a report from a National Heart Attack Alert Program Working Group. *Ann Emerg Med*. 1997;29:13–87.

2016, NICE Guidelines in chest pain of recent onset

- Chest pain or arms, back, jaws,
- lasting longer 15 minutes,

associates with

- nausea, vomiting, sweating, brethlessness, or haemodynamic instability.

New onset CP or deterioration in stable angina.
Do not use peoples's response to nitrates.
Do not assess symptoms of an ACS differently in men and women, or in ethnic groups.

2016, NICE Guidelines. Chest pain of recent onset (in development:GID-CGWAVE0774) Expected publication date in September 2016

Indagini

Enzimi cardiaci:
Troponina I e T diventano rilevabili nel siero 3-6 ore dopo **IMA**, il picco è prevedibile a 12-24 ore, e possono rimanere elevate fino a 14 giorni.

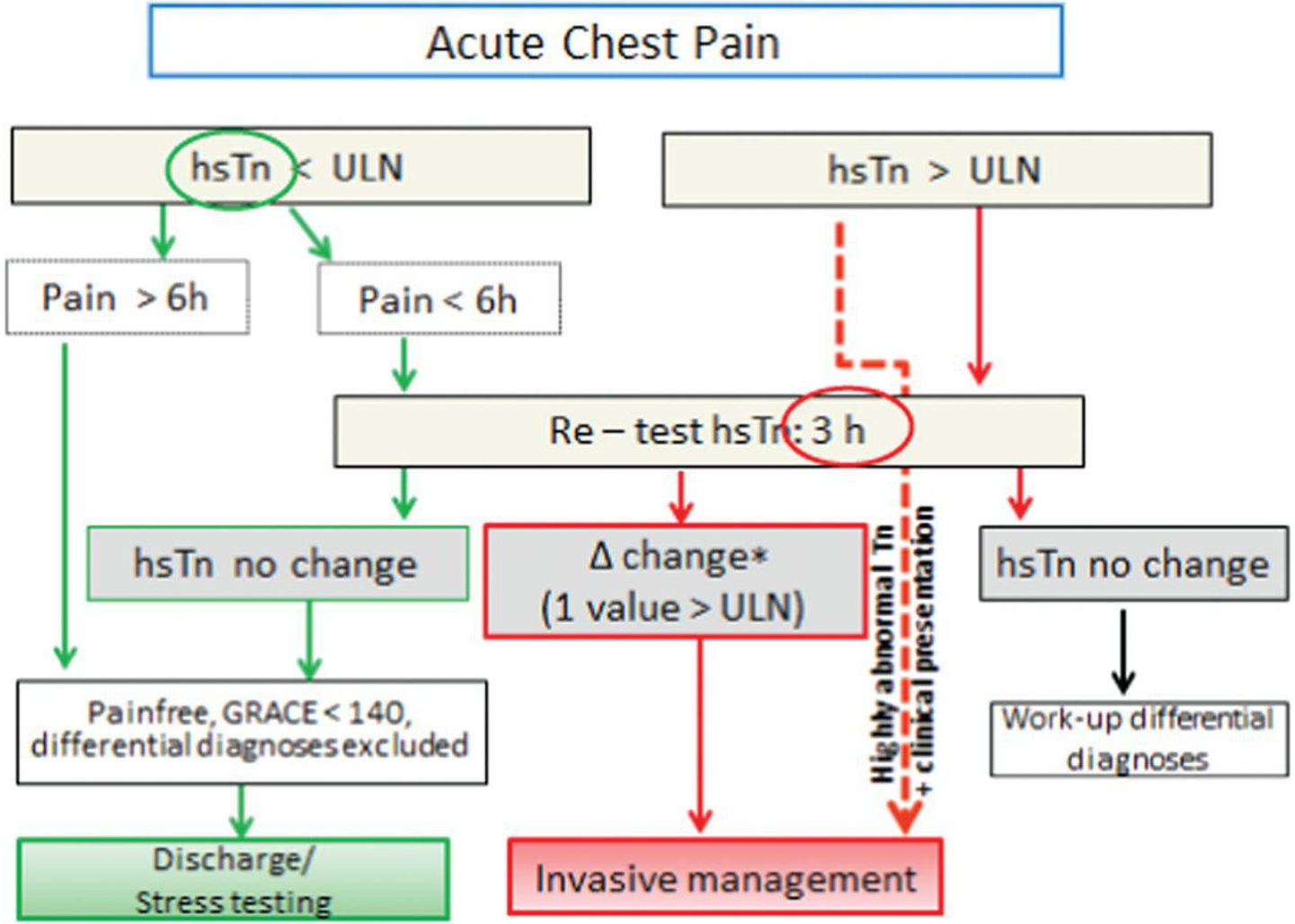
Le Troponine sono quindi solitamente testate a 6 e 9 ore dopo l'insorgenza del dolore. Il test può essere ripetuto nel caso di sospetto clinico suggestivo fino a 12-24 ore

P**ossibile un rapido rule-out se disponibile Troponina ad alta sensitività (con 2 soli prelievi a distanza di 3 ore: base-ingresso e 3 ore dopo).**

Peters. Acute coronary syndromes without ST segment elevation. BMJ. 2007 Jun 16;334(7606):1265-9.
Management of Acute Coronary Syndromes (ACS) in patients presenting without persistent ST-segment elevation, ESC (2011).
Chest pain of recent onset, NICE Clinical Guideline (March 2010).

Algorithm for the use of high-sensitivity cardiac troponin levels suggested

in the 2011 ESC NSTEMI guidelines



Mueller C. Eur Heart J 2014;35:552-556

CP in the ED: which tests?

Gold Standard: angiography

Invasive	Costly	High-dose rad.	Angiography (6)
Not invasive	Costly (High)	High-dose rad.	MSCT (5)
Not invasive	Costly (High)	Low-dose rad.	Stress-MPI (4)
Not invasive	Low-cost	no rad.	Stress-Echo (2,3)
Not invasive	Very low-cost	no rad.	ETT (1)

Costly? Invasive? Radiations?

((1)) Circulation. 2000 Sep 19;102(12):1463-7
((2)) Am J Med. 2001;111:18 –23.
((3)) Eur Heart J. 2006 Oct;27(20):2448-58.
((4)) NEJM vol 344,n°24 June 14, 2001
((5)) Circulation 2007;115(13):1762-8
((6)) J Am Coll Cardiol 2001;37:2042-9.

MSTC multi slice computer tomography
SPECT single photon emission computed tomography
ETT exercise tolerance test

Challenges Facing Cardiology, Nuclear Medicine and Emergency Medicine Today

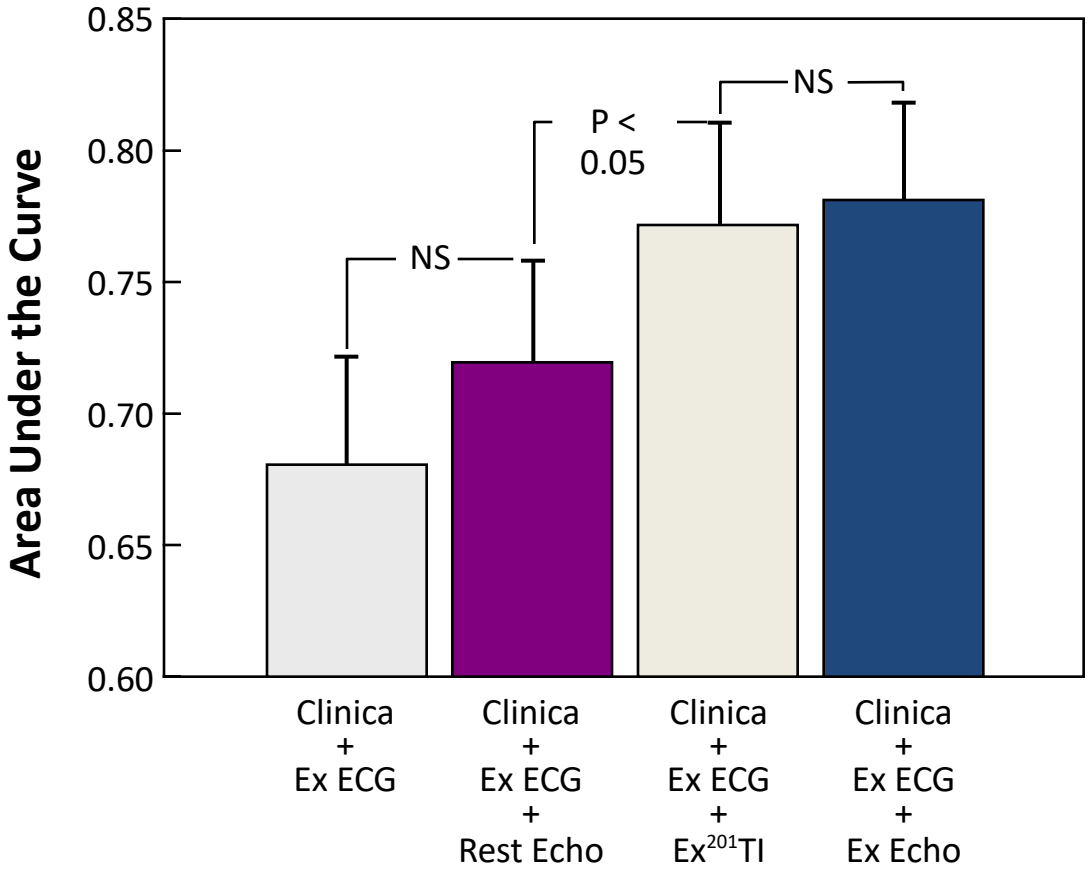
- Increasing imbalance between infinite demand and finite resources
- Fundamental changes in diagnostics

Today's Dilemma:

- Choosing rational vs. rationed care

“Diagnostic value of testing in CP patients”

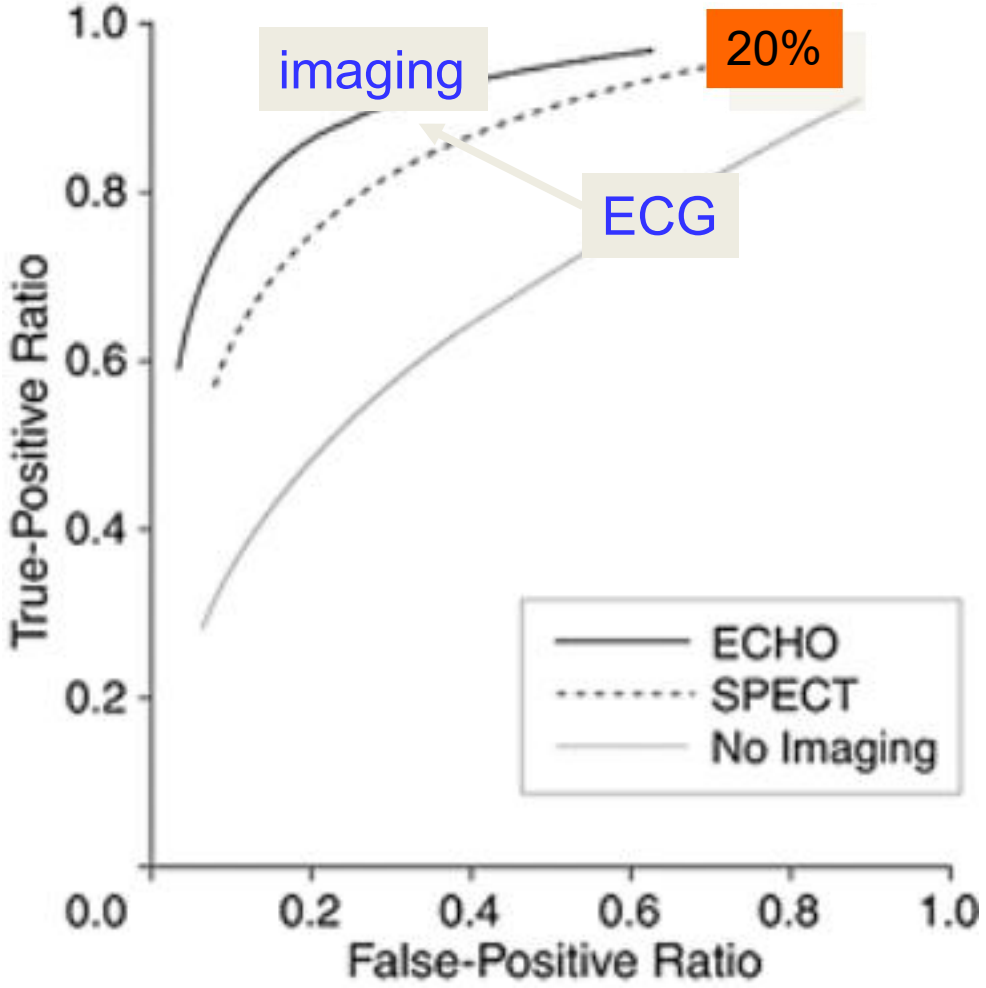
- Clin (clinical parameters)
- Ex-ECG (Stress)
- Echo (resting)
- Echo (Stress)
- SPECT (stress)



Choosing rational

Circulation 1998;98: 2679-86

Exercise-MPI Imaging and Exercise-Echocardiography ?



Choosing rationed care

JAMA. 1998;280:913-920.

Exercise-ECG, stress-MPI, stress-Echo, MSCT-CTA: MA in 431 studies

Test Accuracy (First Authors, Year [Ref. #])	No. Studied	Methods	Sensitivity, %	Specificity, %
ECG (Gaibazzi et al., 2011 [12])	11,691	MA of 68 studies	67	72
SPECT (Heijenbrok-kal et al., 2007 [5])				
Exercise	5,786	MA of 55 studies	88	69
Adenosine	2,132	MA of 11 studies	91	81
Dipyridamole	1,434	MA of 58 studies	90	75
Dobutamine	1,066	MA of 102 studies	84	75
Echo (Heijenbrok-kal et al., 2007 [5])				
Exercise	7,787	MA of 48 studies	83	84
Adenosine	1,194	MA of 14 studies	79	92
Dipyridamole	9,341	MA of 23 studies	72	95
Dobutamine	18,142	MA of 16 studies	81	84
CTA (Meijboom et al., 2007 [8])	33	Diagnosis confirmed with invasive CA	100	80

12-month cardiac event rates				
Test Strategy	**CTA (13)**	**ECG (12)**	**SPECT (11)**	**Echo (11)**
n	517	536	5,946	2,900
Initial negative diagnostic test, %	0.95	2.97	0.58	1.03
In patients who test positive on invasive CA (9)		4.8%		
In patients who test negative on invasive CA (10)		0.6%		

CA = coronary angiography; CTA = computed tomographic angiography; ECG = electrocardiography; Echo = echocardiography; MA = meta-analysis; SPECT = single photon-emitting computed tomography.

a Gaibazzi N, Contrast stress-echo or exercise-ECG in CP and normal ECG and 12-hour cTnI. Am J Cardiol 2011;107: 161–7.
b Heijenbrok-Kal MH, Stress echo, stress-SPECT and CT for the assessment of CAD: a meta-analysis. Am Heart J 2007;154: 415–23.
c Meijboom WB, 64-Slice CT coronary angiography in patients with non-ST elevation ACS. Heart 2007;93:1386 –92.

Priest VL, JACC Cardiovascular Imaging 2011; 4(5)

Exercise-ECG, stress-MPI, stress-Echo, MSCT (CTA)?

	Diagnosis of CAD	
	Sensitivity (%)	Specificity (%)
Exercise ECG [a, 91, 94, 95]	45–50	85–90
Exercise stress echocardiography[96]	80–85	80–88
Exercise stress SPECT[96–99]	73–92	63–87
Dobutamine stress echocardiography[96]	79–83	82–86
Dobutamine stress MRI[b,100]	79–88	81–91
Vasodilator stress echocardiography[96]	72–79	92–95
Vasodilator stress SPECT[96, 99]	90–91	75–84
Vasodilator stress MRI[b,98, 100–102]	67–94	61–85
Coronary CTA[c,103–105]	95–99	64–83
Vasodilator stress PET[97, 99, 106]	81–97	74–91

2013 ESC guidelines on the management of stable coronary artery disease.
Sechtem U *European Heart Journal* 2013;**34**(38):2949-3003.

Clinical pre-test probabilities in patients with stable chest pain.

	Typical angina		Atypical angina		Non-anginal pain	
Age	Men	Women	Men	Women	Men	Women
30-39	59	28	29	10	18	5
40-49	69	37	38	14	25	8
50-59	77	47	49	20	34	12
60-69	84	58	59	28	44	17
70-79	89	68	69	37	54	24
>80	93	76	78	47	65	32

[a] Probabilities of obstructive coronary disease shown reflect the estimates for patients aged 35, 45, 55, 65, 75, and 85 years.

Rischio intermedio se paziente compreso tra 15-85%

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Du Mulin 1750: Principi di Terapia della Sindrome

Finding the Holy Grail Is Not a Short-Term Project

Early instruments had poor clinical uptake because of unacceptably low sensitivity: these include the Goldman Risk score, acute cardiac ischemia time–insensitive predictive instrument (ACI-TIPI), the Thrombolysis in Myocardial Infarction (TIMI) risk score, and Global Registry of Acute Coronary Events (GRACE).

Graal = risk-score?

CL Atzema, MJ Schull. Circulation 2016

Finding the Holy Grail Is Not a Short-Term Project

More recently the North American

…la troponina

Graal = algorhythm?

Protocol to Assess Patients With C… …ins Using Contemporary Troponins (A… …d the HEART (History, Electrocardi… …factors, Troponin) Pathway, among othe… …porated conventional tro-ponins into their clinica… …ion instruments.

CL Atzema, MJ Schull. Circulation 2016

Editorial Circulation 2016

Finding the Holy Grail Is Not a Short-Term Project

the HEART Pathway, which showed 100% sensitivity using 2 sets of conventional troponins

CL Atzema, MJ Schull. Circulation 2016

External validation:

the HEART Pathway had a miss rate of 1.7% (95% confidence interval, 1.0–2.9)

Mahler SA. The HEART Pathway RCT. Circ Cardiovasc Qual Outcomes 2015.

Editorial Eur Heart J 2016

(e.g. the hs-cTn 0 h/3 h-algorithm)

Chest pain in the ER: a multicenter validation of the HEART Score (2010)
The HEART score for patients with CP in the ED: a multinational validation study (2013)

The HEART score for Chest Pain Patients in the ED		
History	Highly Suspicious Moderately Suspicious Slightly or Non-Suspicious	2 ponits 1 point 0 points
ECG	Significant ST-Depression Nonspecific repolarization Normal	2 ponits 1 point 0 points
Age	≥ 65 years > 45 - <65 years ≤ 45 years	2 ponits 1 point 0 points
Risk Factors	≥ 3 or istory of CAD 1 or 2 RF No RF	2 ponits 1 point 0 points
Troponin	≥ 3 x Normal Limit > 1 - < 3 x Normal Limit ≤ Normal Limit	2 ponits 1 point 0 points
Risk factors: DM, current or recent (< 1 month) smoker, HTN, HLP, family history of CAD, & obesity		
Score 0-3: 2.5% MACE over next 6 weeks —> Discharge Home Score 4-6: 20.3% MACE over next 6 weeks —> Admit for Clinical Observation Score 7-10: 72.7% MACE over next 6 weeks —> Early invasive Strategies		

Backus BE. *Clin Pathw Cardiol.* 2010;9:164–169. Six AJ. *Clin Pathw Cardiol.* 2013;12:121–126.

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0= Low MACE Discharge!

Backus BE. *Clin Pathw Cardiol.* 2010;9:164–169. Six AJ. *Clin Pathw Cardiol.* 2013;12:121–126.

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	Nonspecific repolarization	1 point
	Normal	0 points
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	> 45 - <65 years	1 point
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6=20% MACE
Observation!

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Troponin	> 3 x Normal Limit	2 ponits
	> 1 - < 3 x Normal Limit	1 point
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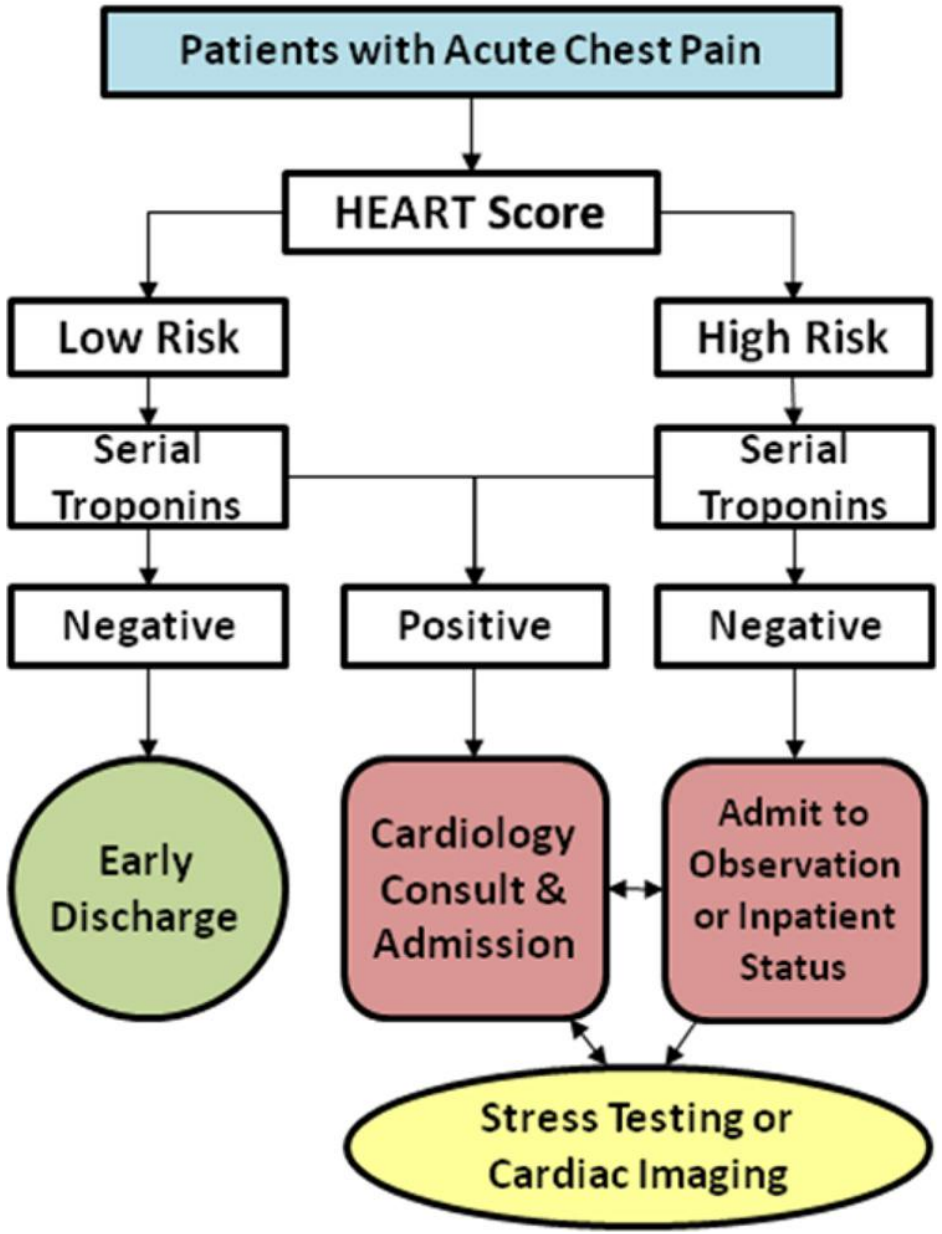
8=70% MACE
Admit!

Backus BE. *Clin Pathw Cardiol.* 2010;9:164–169. Six AJ. *Clin Pathw Cardiol.* 2013;12:121–126.

HEART Pathway



USL NordOvest Toscana protocollo Chest Pain screening
…se “rischio intermedio”

1
se dolore toracico tipico, ECG non diagnostico, cTnI normale non diagnostica,
paziente < 65 anni:
AngioTC-Coronarica

2
se dolore toracico tipico, ECG non diagnostico, cTnI normale non diagnostica,
paziente ≥ 65 anni:
SPECT Miocardica (Scintigrafia miocardica da stress)

Nel sesso femminile è consigliata comunque angio-TC-coronarica
Successiva eventuale ulteriore definizione diagnostica con SPECT Miocardica

In atto protocollo per appuntamento informatico con
radiodiagnostica e medicina nucleare:
il paziente del PS alla dimissione riceve data e ora dell’esame prospettato

53 pazienti positivi allo screenong con angioTCcoronarica o SPECT o entrambi
Che sono stati riconosciuti con cardiopatia ischemica critica e non critica

…via ringrazio per l’attenzione

Regione Toscana